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DEPARTMENT OF THE INTERIOR.

BUREAU OF GOVERNMENT LABORATORIES

BIOLOGICAL LABORATORY.

A PRELIMINARY REPORT

ON

TRYPANOSOMIASIS OF HORSES

IN THE PHILIPPINE ISLANDS.

By W. E. MUSGRAVE, M. D.,
Acting Director Biological Laboratory.

AND

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OFFICE OF THE SUPERINTENDE
OF GOVERNMENT LABO RATOBJ ES,
Uamla,P.l.t i *larch 27, 1903.*

SIR: I have the honor to trans-mit herewith a preliminary report J" Ir v|wiH*oiiiia*is **of** horses in the **Philippine Fslands bv W r** Mw grave, M. D., an **1** Xor,nan E**.Williamson.**

1 am, very respectfully,

PAUL C. FREER,
Su 'oratories.

Hon. JAS. j ^MITH,
Acting [ecretary of the Interior, Manila, P '.J.

BIo Logic u- **LABORATOI** Y,
Manila, P. /. ..,/,,,. ch 26, 1903.

SIR: In compliance w ..... o sub-
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the Ph **^PPine Islands."** **3T«io9omia«5 of he** rses in

Very respect

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fully,

MUSGRAVi M, D.,
Actitin , IHr ectc. *Piologic* * # , *oratory.*
PA, JL C. FRE :HJ ' r / < *<il Ub*
Superintendent of Government Laboratories.

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W. E.

I'HEUMIXUIV REPORT OS TR1T1NOSOMUS1S* Iff HntlSh iv m PHILIPPINE ISLAKD&

{By W. E. Musgrave, A. Williamson, A[illegible] ting Director of the Biological Laboratory, and Norman E. Bacteriologist, Bureau of Government Laboratories.]

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far as poeeible.

HISTOHY OP THE DISEASE IN THE PHILIPPINE ISLANDS.

* l>Ullli *** was afterward determined to be trypanosomiasis was "A preliminary note on a parasitic disease of horses," by Smith and ed Manila, October 17, 1901. <lml PHW>«»W first as Kinyoun,d.i > buUetin fnm, th, my

* "Surra," nagana, tsetse-fly disease, mal de caderas, mal de coit, pjudi, etc. > ,U,urin,.

In General Older No. ;ii)o. **Headquarters** Division of **the Philippines,** dated **December 11, 1901,** in addition to a **republication** of Smith and **Kinyoun's preliminary aote,** aTe SOUK[1] additional **notes by Smith,** in which **he stati a tin** disease **to be identical** with **the well-known "suita** of Iadia and Burnmh. **The mode of kfectio]** is unknown, IMIT **the parasite is** probably **introduced through the** bite of -ome suctorial **ine&t, such** as **the** lly or **moeqnii**o. Tu> **animals were generally killed** upon **the supposition** that **they** hud **giand<**

Sniitl i's recommendations are th .a **horses suffering** from ti> e disease **shoal** be isolated at a distance of at **least half** a mile from healthy animals, and that the blood of all **sui**pected or **glanders be** examined **before makis**g recommendation **for di**sposition. T!is **was a** serious mistake, and **particularly so at a fchne when the epi**demic was co**mparatively** limited. It would ha ve been far **better** to have cc'tumui'd **to** kill **these** an in-als for glanders. **or** *vh* at not, so long ns they were p iromptiy destroyed. The isolation of the *tick* ones at .i >ii.-ance o i' **half** a mil' from those vvhirh **wore healthy was** nut **;i pra**ctical proce**lure** and **could** not **but result in** •tabtishing new foci **of** infection.

In **a** letter o*I* **transmittal, published** in **Bulletin NTo. iv. Bureau** of **Lnixoal Lnduetry, Department of Agriculture, fcfarch 29, L9O2,** • '.'• Glee, assist**ant** veterinarian. Board **i of Health,** Manila, mentions **a** "ii' w" disease as appearing in **the Philippic**e Islands **during** 190 **I. II.** states that the parasites were first obser **I** in the hi,od of a horse taken by him to the **laboratory of th**e Board if I ha lth. The report accompanying **the** leti er of transmittal was first **pub**lished in the American Veterinary **teview, N< « 5Tork, -**[1] **:•**; 190**:. In Bulletin No. 42, Bureau of** \ nima **I Indus! - bnon a**ry. Sti). s quote Kinyonn **as folli**ow- "i rom wiiai I **can leam ft** e disease surra appears to be dist **•ibuted** all **over Luzon and** lius l„on **there** Tor many y>ars. No one seems to know wti. re it c i mc **from.** I do not think it **came** f iom China, as no cases have been report **I in** Hongk **rag, whwe a conaidCTable Bomber** of **artillery 1**orses **ir**kent."

lii **eonin*** nting **upon the above** i eports and correspondence, -:j|. mon and **Stiles** write tit;* t "according to information recei **ml** from I)r. Kinvoun. **the dift** ase is beyond question surra, and that **Ir. lonI** ing made the first observation on the **diaeaae in \!** anila." Discussing rli,« ni_gin of s jrra in the **Philippine blandc**, they **say:** "Hur **inforn** ation from **mila :> ooi yei suffieientl^ detailed** to

enable Of to judge with certainty *wh*ether rarra luis existed many years there or WII.-IIHT it was recently introduced IF it has been rece:iily introduced, it seema w n i^Mble, EHUD our present incomplete data, that, n was carried to China by the English troops from [ndia, and th;it <>ur troops carried it from China to the Pisilippines.

* * From present accessible data, it does not seem to be enliivlv established that the disease mentioned as existing *ia* previous years was of the same nature."

Turner[1], in American Medicine, March 29, 1^">-j, writes thai much *to* his surprise he found surra parasites in the blood of two carabao. One of these animals wii* Buffering at ii e time with an injured leg. luit nothing is stated about the course of the disease in either of the animals After remarks upon the epidemic of rinderpest in cattle and carabao in the Philippine Islands, he states: "It is very probable that the cattle epidemic is surra and not rip/erpest, and that the disease among horses and mules had its origin from infected carabao cattle."

Careful *urn*estigat<>n fails to give even the slightest evidence in support of Curry's eonelu-ion. In the first place, rinderpest and trypanosomiasis have practicaLly notliin*i in common. From a < linical standpoint, they have classical symptoms which are so radically different that \\ is not understood how they couhl be confused. That rinderpest and not surra is the epidemic which has destroyed so many thousands of cattle and carabao in these island* during the last three years has been amply demonstrated. This has been proved by the fact that preventive methods of inoculation have eradicated rinderpest from certain sections of the country and daily contact with infected animals at the Serum Laboratory has hi't no shadow of a doubt. The HonorabU[1] Civil Commission are now considering a proposed law making compulsory the inoculation against rinderpest of all cattle and carabao imported into this country.

Ir ifl a veil-known fact that trypanosomiasis is found in cattle, buffaloes, etc., and there could be nothing surprising in its occurrtne<- in carabao. S# far, however, as the Philippine epidemic is concerned *I.* it is exceedingly rare in these animals, for in the examination of the blood of a considerable number of cattle und carabao, sick and well, extending over a period of six months, the para-sites have not been found, and none of these animals have shown symptoms <if trypanosomiasis. It must be remembered that our work

was commenced in September of la^t year, toward the close of the tain] seasoM, and has been continued through the cool and dry weather. It is not unlikely that we may find Borne i trypanosomiasis tn bovinea when the next wet season begins, especially it' sean-h is made in animals- with exposed woun ds.

Jn American Medicine, Julj n>. L902, Currj write.-: "1 am imable to give accurate Sgurea as to the number of animals destroyed bi this disease, which in certain places has been a veritable plague. Among horses and mules of the Quartermaster's Department and the cavalry horses, considerably over 2,000 animals have died during the pasi six months, from July 1 to December 31, 1901, the largeel percentage from surra, In the Provinces of the Camarines an<l Alhay the-lose among native ponies has been v*ry severe. Some pueblos in these provinces are now practically withoui hoi ses or carabao. Thousands o< ponies have died in £hia section of the i dand alone."

The writmga relating to trypanoeomiaaifl in the Philippine Islands have been reviewed somewhat in detail because some of this work is confusing and uncertain, and teavea the question of priority in thr discovery of the disease here in an unsatisfactory state. There can he no question thai Dr. J. W. Jobling, Director of the Serum Laboratory, was the firs! to observe the pai asite in tin' blood of horses in the Philippine Islands. Smith and Kinvonn mention this fact in their preliminary report and Dr. Kinyoun further corroborates this in a letter to Salmon and Stiles, Veterinary Surgeon 8 lee to >dK the specimen of blood to the laboratory for examination, as stated in his report mentioned above, but he *dm** not nlention Dr. Jobling as having made t he exa nination.

In a persona' conversation, I>r. Jobling informs as thai on 0 cto- b ;r l.\ 1901, I>r. Slee brought him a specimen of blood from a horse to examine, and that he found numerous para sites w ith which he was not familiar. While looking up the literature, !•rs. Smith and Kinvoun i ame into the laboratory, looked into the focus ed miiT. scope and a sked him what he had. He told them that he had nor \ct determined: thai it was hi rse's blood containing p;: rasites unknown to him. Dr. Jobling did not then publish anything in ga rd to the parasite or the die case, snd lias ool as yet done so.

Two

t ch was pi wever, contains many he

days later, Smith and Kinvonn wrote their preliminary note, whi- ddished ag mentioned above This communieation, he insccuncies, in the descriptioa both of I

disease and of the pan td had it not been followed later „ mo»e complete and acraiate work ..f ,,ih. doubtful writera would have considered the article in *t Ah* of thequestion of priority in the *i* discovery of trypanosomia Philippine Island,, and even now no accurat don oi i! -ite found in this country has been given. Under description of the disease, Smith and Kinj thai impair- »* appetite tipation and fever of mi to ^rU symptoms; thai it may terminate fatally or by alov thai the mortality in American hora tlmt at postmortem H *m* art* pale but otherwise nnnal in appear- «K*. In th. ption of the parasite, th. thai *a* i, like worm, having mud , fericbocephahiB dispar It»-14 micTons in length; thai the Deck ly half its length^ tapering gradually to a point representing the mouth (;

Veterinary Di S - a ription of the diseasej while very brief and containing errors, is more accurate than tha: of Smith and Kinyoun. but his description of the parasite, as th. of Smith and Kinvonn, is certain): not diagnostic.

In discussing the histon of trypanosomiasis in thB oountrv, one <>f Hie tir.-t qi be decided is whether *fh<* disease was introduced during 1901,1 t- in ifhich it was discovered, or vhe& it bad existed In - e prior to thai time. The most careful and searching i»vestiga1 to« anv tangible • vidence that it existed hei .r.lnne. L90L During *i* e before May rJv "'I. the blood of *m* k and healthy *U*.rses was examined at the winy Pathological I aboratory by Strong ami Musgrave, a> a tnai routine, acd had ypanosoma been pre ^m •I *m* :tl! probability ha ve been seen. Investi,,iti<,,, , of some of the statements atwerting the existence of trypanosomiasis before 1901 makes it certain that •he diseases mentioned were not trypanosomiasis. Kinyoun's argument that the disease was not importe d from Chi: a, as suggested by Salmon and Stiles, because there is no su •era in China. is a good one, and i , fuilv ,H)r ne out by the facts obta *md* in the preseni investigatio M· [t [8 hardlv possible that a disease » readily tranamisi ouM pass through a country that was at *B time a theater of war, where tho usands of hones of many natk ns were present, w.thout !. aving an epiden lic in us wake. The .1 ias II0r disease has been reported as occurring in

China; animals coming here from Chinese ports show no **infection,** ami **we are assured by several competent authorities that the disease** inpiui"somiasis **is not known thi**re.

Since we are satisfied that tnpanoson iasis **lid** noi exist **IB the Philippine Islands prior to** Ma> **or June, L901,** and **also thai** it **did** not thru i **irist,** nor lm> Li since **existed** in China, **we should naturally expeci** to **find its admission** into **these** l.-lan-U through **animals coming** from some infected port.

Through the courtesy of **the Custom Bouse authorities and Veterinary Surgeon Richards of the** Insular **Board of Health, we have obtained the** date of arrival, point **of embarkation, consign*** s, total **Dumber and** kind **of** animaU t eceive**d into this** country **during the >ix months immediately preceding the first recognized** case of **trpanoaomiasis. The subsequent-history of eael** lot of these mimals **was** tn:ced as far as possible, to dete iiniii-' **any possible connection with the epidemic**

A lot of **circus** animals, of **the** usual **variety** arrived **here on** Man-li : from **Singapore, having been** a **month** in Hongkong, and **remained** in **I**his c ty **for** about a ix week-. **No epidemic** followed in **Hongkong,** and **they could not** tie **connected** with **the epidemic** here**. but realising** that they had been in infected ports, anil that **some** wild animals may harbor tin- **trypani**soma, proba»ly Tor year-. without serious **incoo**venience to themselves, the possil le connection **between this circus and** tin- **epidemic h.** s been e**arefully studied.** Wil le they were **in** Hongkong, **the weather** was too mid for **flies** be **about** in any **numbers,** so that no »on**fcion can** IK* traced betwee n animals from t at co**nntry** and the **subsequent infection** in **the Philippin***s.

During May. **1901, there were received** from Australian ports 26 head of horses, a number of which were ra< e horses, and some of **them were sen*** to Pa**say race track** in **Uanila.** One **of** the seven horses received on May 4 **was** ill at **the time of** landing and **subsequently died** of what is now gener illy known in th ese isl**ands** a- "•Mirra." **The next** animal known to be infected was a race horse stabled on Calle ITli TJli, which had **been on** Hi Pasay track, and which was taken ill during the latter part of May,. 1901. \ seco nd and third horse in these stab **lea** and **anotb**er sta oled at the race track developed the disease **and died**; one of these horses for some weeks before his death was stab led in Malatc district and was treated at the pony co rra] in **o] lila.** About **thia** time the

disease appeared among the cavalry horses at Pasay (just across the sinti from the race track), in (he pony corral, and in si ables in Malate near those in which the sick hoiae had been placed and ;ilso where some other race ho?ses were stabled. From tin points th< infection spread rapidly, and through shipment of animate *v* as sunn transferred io large areas of the counts y.

The annual report of Colonel C. F. Humphrey. Chief Quartermaster, Division of the Philippines, for the fiscal year ending Jane 30, 1902, states thai 3,693 animal* died or wei e killed because of *di>* - ease during the year, and that glanders and "surra" were respo *m*sible for Dost of tlie h&voe. *in* answer to a h-iier asking for information. Colonel Humphrey writes thai L,3O5 horses and 672 *mv* les died or were killed on account of "surra," glanders, and other diacases during the calender year 1901, aini 8,318 horses and i,192 mules during L902, OT a tot al loss of 5,787 animals during the two *ttrs,* T]e exact muni, er of cases of trrpanoflomiask in this lot is "" given • bui ii is certainly very large. No accurat figures are obtainable giving the losses among the horses of the Civil Governed and of private p<rsons, but enough is known I o show that tin • were very iv *hern* y. A conservative estimate of the money viilne of]osses in horses alone, to say. nothing of I he ind iiect on es resultIng from their death, won Id not be less thai $2,000,000.

MODES OF TRANSMISSION AND INFECTION.

So far as direct evidence goes, trypanos • tiniasis is a Mound disease. I he infectious agent must co me in e ntact with a wounded sip-fait, her skin or *mvu* ous membran •• and when thea require-in. tils are Fulfilled, no matter how. in susceptible ami nals, the disease is the resu.!i. .\ study of ii"* modes of infe tion, th en, consists in a study of the practical metho ds by which infection? material is brought into contact with wounded surfaces.

Ititimj flies h ve bee n, for flge-S considered a means of tranpintssipn'of the disease by natives in i Africa and in i certain districts of Ind i.a, and these assertions have received the suppo rl of nearly all scientific writers on the subject for more than ftft} years.

A! • solute proof of this manner of transmission has been furntehi d from Africa, India. South America, and other couni ries, and th-se observations have also been c onfirmed in the present investigation of tho Philippi ne epidem ^'-

The period during which Hie- are capable of transmitting the disease after feeding on infected blood appear? to be lew than forty-eight hour*. After this time trypanosoma hare rarely bees found in their body juices* made from them and injected intjt susceptible animals have not produced the disease ; and direct biting experiments with them have been negative. This seems to demonstnite conclusively i^o things: 'That the action of the fly is mechanical, and that the fly dors not act as an intermediate host for the tryp&noaoma. This point lias an important bearing upon methods of prevention in the spread of the disease, ts will be shown when thai part of tin- subject is discussed.

The conclusion that biting flies act simply as agents in the mechanical transmission of the disease forces us to regard all hit ing insects a* dangerous. Even the common house fly, which does not bite, must he placed under ban, for in case of abrasion or other wounds on infected animals, ami where healthy animals, also with abrasions, are in close proximity, the house fly ran earn the infection on its legs from one wound to the other, just as it is known to carry the germs of typhoid fever, dysentery, cholera, and other diseases from dejections and other infected sultsunces to our food and drink.

A varying percentage of rats are known to harbor a trypanosoma somewhat resembling the one found in the horse, and it has been conclusively shown in the present investigation that a certain number of rats in Manila harbor the same trypanosoma which causes the disease in other animals. The parasites have hem determined both morphologically and in their pathogenic action to be identical with the parasite causing trypanosomiasis in horses.

Lingard claimed that some of the rat trypanosoma of India were pathogenic for the horse, but we are tempted to think that some of his rats were infected with *Trypanosoma evansi*, though he does not say so, just as are some of those in Manila. This explanation would clear up some of the confusing results arrived at by due author in regard to nit trypanosomiasis. and if true, would also add significance to the discovery that these animals in Manila occasionally harbor *Trypanosoma evansi*. It would also make very probable the thesis-tion that the disease Lingard thought transmitted by rat excreta in *iimti)* fed to horses was in reality transmitted by insects from rats infected with *Trypanotoma evansi*.

Rabinowiteeh and Kempncr pm, ed that flea: W(•n• capa h] - »f *n«n the nit trvpanosomi. Prom rat. to rat. and with this knowledge in view, *we* musi a1» consider i! as capable o: transmit- !? "f "Sllr a" parasite ** °**J fr<111, « ,t. but also from In TM e d r i its to horses, especially to thoae with woundi of any kind tor practical pui *until i»r.~* *what msecU art capable of* I ;^/)r/ *the di* ease, all insects, *including flies, fleas, lice, mosquitoes, etc., should be considered as agents in the spread of thi disease and should be taken cognizance of in recommendations and procedures for its oniroi.*

The great majority of write agree thai infection car no1 take place through the Bound mucoaa of the alimentary tract and that ^ «^ infection foUowing &e admmistrai ion by nstutho* occasic the virulent blood and ead'of thc organs of animals recently d dis- "• f«-t that I . lt:ll „ ease are probably due to t these animal: amaged ' " ^ - " - n , mouth or up ,,,,,, branes of the rt of t tary ^ wVen would, ^ r i i t T L T . L r ' r : car of co tion, j ould r_1_^rt.of the body by bringing an injured aorfi is material, -• occur in into contact with ection r vice versa.

In nearly all feeding experiment^ 1, . the n large doses of fective agent have been given, ^ i" « .r appn in this sense they have n ched natural Lnfeotion, which, * P TM from the nature of things and whether administered through the mucous membrane or t the skin, W(Ull d be in small dos Langard attempted infec tion through thedigwt ive ,-anul In the •ation of ven- small doses of infected blood given fre- quently in I, rge dilutions of water. One of ius ^ rses that had i such treatment, ami in addition • one dose of 13 c. c. of infected I. leveioped *thi* disease on the one iinnflri d and thirtieth d riment I, ay after beginning the exp e fed a second horse 200 mmmm is of fresh Vlr »1(ent blood at one do • with an im-, ation "tv-tis be that these 1 period of seve e days. He does not st horses were ted from) nsects during the periods of the experiments, wh i(h protec 1 8n inftv tol country, and it is mo tiuu re were made i probl lWe , considering the inc tIj «*"' periods of one bandred and thirl y and seventy-five days, that h lisaoifitak were infected in some other way. o far as we have been able to discover, there is not in literature any absolute ptoirf of in fection t trough the sound mucosa bv feeding.

In this preliminary report, but one of our many feeding <>xperimente n HI be *given.*

Sionby No. 12i—healthy adult male monkey—waa isolated, fcemperatuie taken and blood examined daily for a week. The temperahire remained normal and the blood negative for trypanoaoma. Alter twelve hours' fasting, he was fed weekly for six weeks on cooked rice (the usual diet) *i*oaked with freah, warm virulent blood, rich in tryjtiinosoma from different animal*, al different feedings. On two occasion* he was given to drink infected blood in weafc potassium citrate solution, in which the fcryanoaoma Uve longer than in any other known solntioi outside of the body.

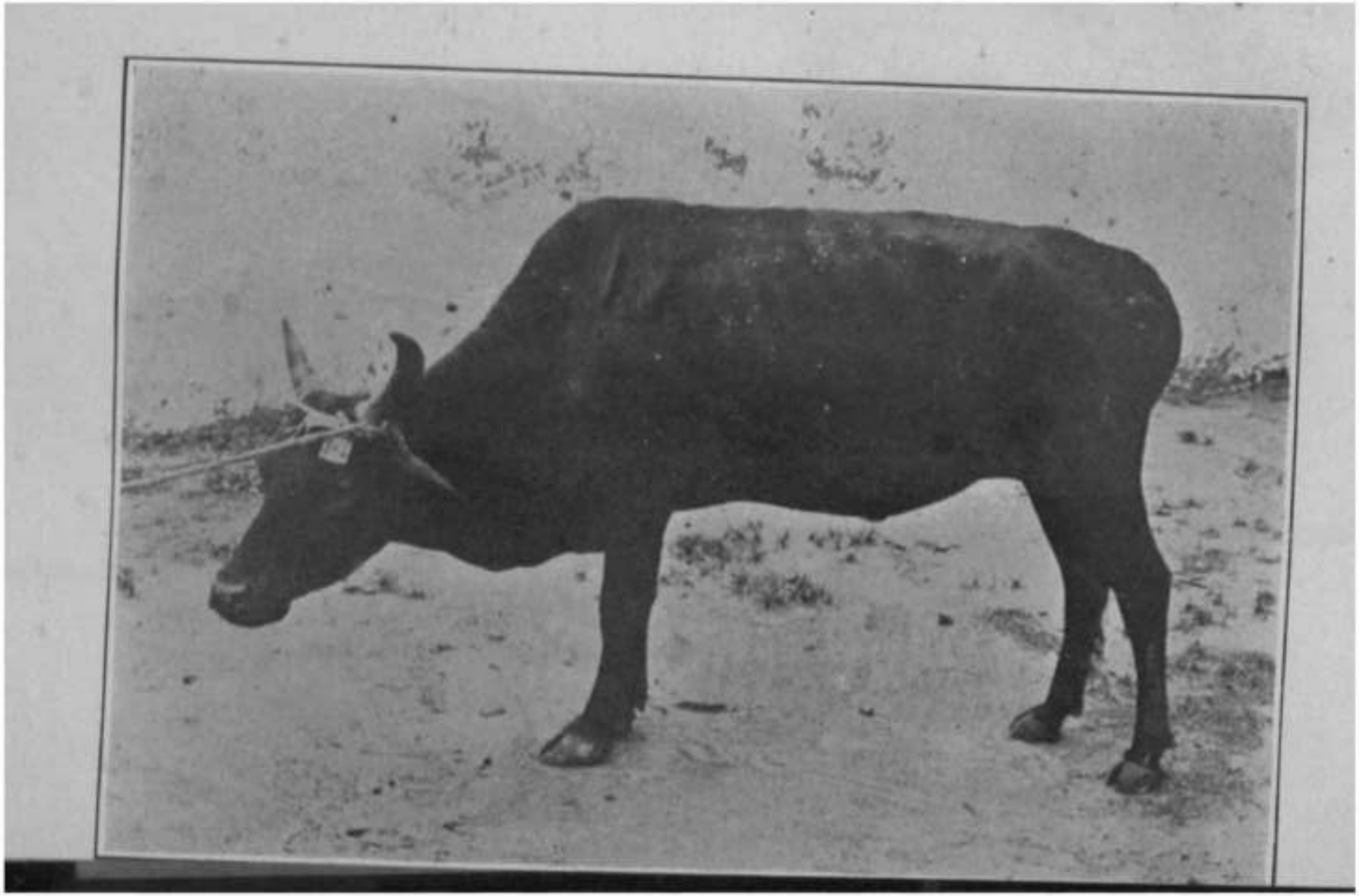
At the eml of six weeksj, the animal was apparently in good health, temperature had remained normal, and the blood free from parasites. hi nrdn- absolutely to exclude the existence of infection, s drop of hia blood waa infected BabeutaneOBaly into another monkey, which remained well and was afterwaa • proved susceptable. During the feeding, the infected rice would often be stored in his chops ami remain there for 1 hours.

After proving the animal not infected at the end of six weeki, a small scratch was made in the imcosa of the mouth and he was again fed as before. The disease developed on the fourth day. as evidenced by rise in temperature and the presence if trypanosomai in the blood. He ran the regular courst of the disaae and died on tin* • ighteenth day after inoculatit on.

Other possible means of mechanical transmission that suggest themselves are: The removal of a bridle firom a diseased horse, esp R-eially one witi >re month, and placing it oD a healthy animal: the changing of harness from an inf.ected nimal with Bere shoulders or back to JI healthy animal or the passinj of a curry •nil or brofih over an injured t?ui face in a sick animal and then over a healthy one with an injnry of some kind.

The maiver of perpetuation of an epidemic of trypanosomias a in any country is a TV important point in considering the prevention and eradication of the disease.

By tli' very nature of parasites and of parasitic diseases in ronerul, we know that unless the disease is matiintous, the parasite must have a natural host, or there must be a stage in its life cycle in which it can exist for an indefinite period outside the living body; otherwise the infection will disappear.



[illegible]any of [illegible] y are[illegible] [illegible]ely destitute of [illegible]estic anima[illegible] some [illegible] [illegible]e never had one within their border. [illegible] [illegible]e flies in these districts are capable of infecting domestic animals. As it has been quite conclusively shown that the fly is not capable of carrying the infectio[illegible] at most but a short time, it [illegible]essarily means that there is a source of infection from which the flies are [illegible] applied [illegible] the [illegible] ence would be that the [illegible] [illegible]ection is t[illegible] wild animals in which the country abounds. It has already been shown t[illegible] some of these animals are susceptible to [illegible] disease and that others harbor the parasites with little or no inconvenience. It is very probable that, were inoculation methods instead of microscopic blood examinations used for diagnostic purposes, [illegible] much larger percentage of these w[illegible] [illegible]d infected [illegible]an has generally been suppose[illegible]

[illegible] [illegible] sections of [illegible]outh America [illegible] like those in Africa, [illegible] the indication [illegible] are that [illegible] [illegible] in the same manner.

[illegible]n India some observers claim that the cow acts as a host f[illegible]r the parasites over the long dry period in which the [illegible] not [illegible]nough cases in horses to continue the infect[illegible] [illegible]ies are that [illegible] of wild animals wh[illegible]ch exist [illegible] [illegible]ast certain districts of [illegible] It is clai[illegible]ed that in ce[illegible] [illegible]n sections of t[illegible]e country there are tw[illegible] [illegible] [illegible]ive in the b[illegible] [illegible]ble to rinderpest and foot and mouth disease, but are not known to ha[illegible]e "surra," [illegible] [illegible] [illegible]ed areas. At certain seasons the flies are [illegible] [illegible]rous that these animals seek [illegible] for protection from them. It would be interesting to test [illegible] blood [illegible]nals by inocu[illegible] [illegible]o see whether or not they [illegible] [illegible]ee from trypanosomiasis. In India [illegible]nels also may play an [illegible]portant part in carrying the infecti[illegible] fro[illegible] [illegible]

[illegible]

From the foregoing, and if the disease continues to spre[illegible] [illegible]t is [illegible] wild animals of this country must be considered in [illegible] epidemic. If [illegible] [illegible] are not [illegible] be, and [illegible]e problem will thus be [illegible]duced.

The part thar rata play in perpetuating an epidemic has not yet been 1'itlty determined, but the feet that at \his tirae, in the middle of the dry -eason, a considerable number of these animals are found to be Infected, and with the knowledge before *n*± that the infection m»y be trasBmitted from one *ni* to another by fleas, which are numerous on rats at a] seasons of the year, makes it probable that these animals play • rerj important part in perpetuating the *'infection* in the Philippine [elands and in other countri s.

II-wever, i far as the city of Manila is concerned, it do.s not appear necessary to leave the II<T->- family in discover how the infection is perpetuated. Now. even during the dry season, one tan, almost daily, see a horse. sick with surra, driven along the street>. and biting Hies, although not In any means as nnmeroni as during the tfei Beaaon, are still plentiful enough bo continue tin in feet ion.

The <'\istence e •!' an extra-corporeal stage of the trypanosoma, living on i^nis-.- and in water in marshy places, in this staje taken into the stomach of susceptible animals eating and drinking In these localities, and from this organ or other part of the anil nal eco lomy j^ssing into the Mood in tin- forme we recognize, is without sufficient evidence to warrant consi leration in this paper.

B<fore leaving this sul 'jeet. however, for a fuller discussion in a subsequent.paper, it is proper to state that the tryjwnosoma quickly die under all tried environments outside the body of some living creitnre, ainl n» evidence <\t their existence in water, on grass, 01 other similar plan- ean be advanced. Both water and grass have beei inoculated with \nvicv aumbers of tryps nosom,i and have failed to convey the disease, after days, week.s or month.-, when fed to -us- ceptible aninulls, and also when in.jected under the skin.

Ifalaria i- limilar to try] anosomiasis in thai both are parasitic disease- and both arc prevalent in low lying, marshy lands and dur- ing wet weather. Malaria was for ages attributed to the air, the water, etc., of these marshes, and it took \«ars to make the public understand that all these r<mdir ions are harmless in prodw ing it, provided I he patient is protected from the hit. of mosquitoes, so prevalent in i hese regic us.

Ta kc tin' epidemic of trypa nosomiasis in hfanila, At tin' time of its outbreak and for soine time afterwards, it was confined to tL e city. The grass and water give ii th<' !n*' ses was the sam(' which had been *fvd* for rears, and no d isease resu hod.

exposure to infected unminie

introduction. The maioritrTf .1 I

ponies was the only horse of

dry feed only.

troops on

toe-disease. Similar eonditiona are found in

"e jnrtaa .langerou, to horses provided with dry food anT™ wrter while through thejn as th,v are

»1 »shown by a *ma* rerafluitann

I taken to a n..« place becomes a focus for the spread of tho <**, provided l,iti,,g Hies 110 matter

,yordry. AU animals in mar«hy ptae, do not

• • although th,, drink the same

If poaaible to dotroy ifected animal ii, pin, [.land. ,,,,| to pr be remaining ones from hifect^ <<» it hours, then, would never be an,

intreduo fron, an jnf

•lit.v. The -unecoBditior-ezweng before it. introduction te rvi.rod.enl and animals could go on eating gr«a. and drinkine *m* I, .nding "floods, inundation % Biting fl, ial for th™, t,, feed upon

"f coarae, ,11 i ^ni.^als can not be datroved at once but • -" bo don- ,-raduall, and the same result accoL

Aould b, our mrthod of warfare aga.nst the diseaae, *it*

time to iK^in, **before the** rains **again batch** out **millions** of biting flies **rapidly** to **increase the number of cases. During the present dry weather, while comparative!; ten**dency exists, a systematic **examination** of all animals and **the destruction of those found infected** would **prevent a grea4 increase of** tin disease, which, **without some Bucfa** effort. i> **sure** to **reappear** with t]e season **of** 1'ies.

Jr is not |inssil)!r. front ;i **practical standpoint,** to **destroy** all **flies, and were** it possihle. it is much easier ami simpler **to** render **the** flies **harmless by** destroying **the sources** *>f infection. The disease, horse is **less than worthless,** for he i? sure to **die** and to preserve him i> itotli a **wast**e of food **and** a **mena**ce to other **animals.**

There is another point in this **connection which already** adds **materially** to the seriousness of **the** situation, **and Hue** is **the fact,** already mentioned in this report, that a **certain number** - *f* **the** "Manila nits" are **infected** with the **trypanosoma** of the horse **epidemic^** .lust **what** part **these** little pests ;IJV u''inj^ to play toward **perpetuating** the epidemic- **and** in the spread »*f the **disease** in horsrs U **difficult** to foresee **The question** is stilt under study and will **be** more fully considered in the **completed report** The dc-truction **of** nils in Manila •n account <>*f* hnhonie plague will **probably** ac**complisfa** the additional **recall of lessening the sources of infection** for surra.

SYMPTOMS AND DIAGNOSIS.

Daring the incubation period, i. e.. the time **between** the date ., infection and the rise of temperature with **the appearance** of the parasites in the **blood,** there **an**e no sy**mptoms** of moment

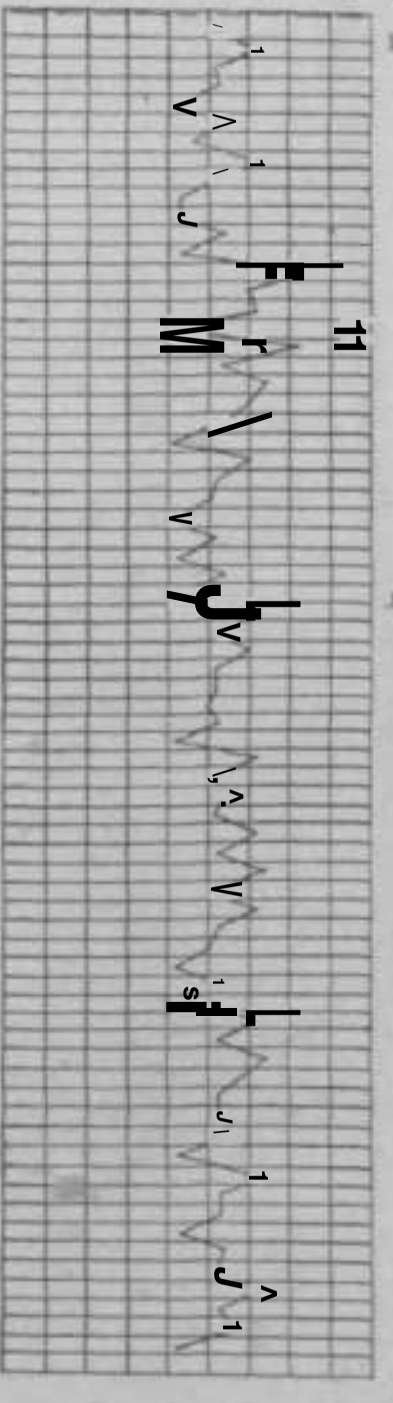
In experimental animals, jifter four to six days of ineuhation. **and** in **naturally contracted** cases, after an unknown **period,** which is. **however,** in all probability tin same ;ts with experimental ones, the temperature rises and trypanosonia appear in the Mood. Further than slight symptoms, as thirst and gome dejection, then are usually no other marked **symptoms** of illness for several days.

The course of the fever is neither **regular** not constmt; it may riso rapidly **to 40'** ('. or **more** and **become** remittent or even intermittent from the start. More often it **remains abon**e 39° <. **from** one to throe days, **aad** then **becomes** remittent, or less **frequently,** intermittent; toward the end of the disease, t**nperatui**res become more' consta**at, being n**mitten**t** and ranging from 38.5° to 40.5° C.,

always higher in the afternoons. In observations on a large number of animals we have seen no cases in which the temperature suggested true relapsing fever.

Pony No. 110, December 17, 1902.

[Age, 7; sex, male; inoculation, admitted with trypanosomiasis; history, gray pony in good condition; early in the disease when received.]

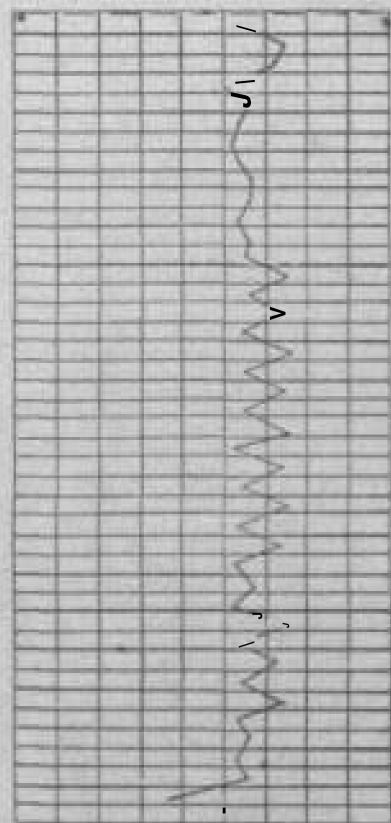


Mule [illegible] [illegible] bruary 4, 1903.

[[illegible]x, male; inoculation, [illegible] te [illegible] trypano[illegible]miasis; history, large, dark-colored [illegible] mule, well advance[illegible] in [illegible] [illegible]ase; ha[illegible] been fed entirely on dry food.]

Action. — 34 35 36 37 38 39 40 41 42 — Date. — Results.

No treatment.



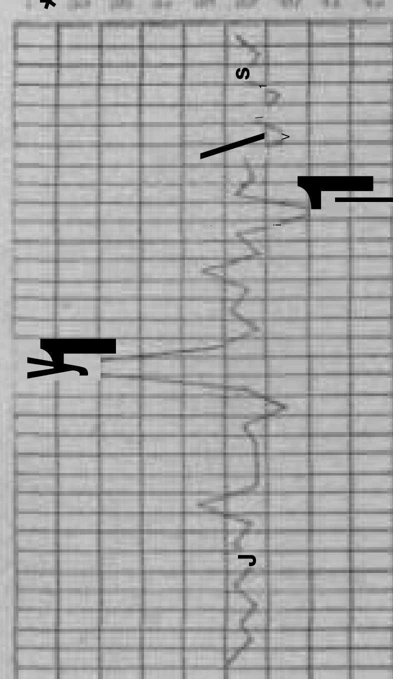
Feb. 11 Positive trypanosoma.
12 Positive trypanosoma.
13
18 Positive trypanosoma.
19
22
Positive trypanosoma.
Mar. [illegible]
2
3 Dead.

M[illegible], 151, January 12, 1903.

[Age, 9; sex, male; inocula[illegible] [illegible]ed [illegible]ted with trypanosomiasis; history, large, mo[illegible] [illegible]lored American mule, well a[illegible]nced in the disease; has been [illegible]d entirely on dry [illegible]]

Action. — [illegible] 35 36 37 38 39 40 41 42 — Date. — Results.

Treated for five days with quinine.



Jan. [illegible] Positive trypanosoma.
[illegible] Positive trypanosoma.
[illegible] Positive trypanosoma.
15 Positive trypanosoma.
16 Positive trypanosoma.
17
18
19
Positive trypanosoma.
Positive trypanosoma.
26
27
28 Dead.

MULE No 178, WELL ADMfcCEO IN THE DISEASE. SHOWING EDEMA Or H.ND *LEGS* AND BE LLV

MULE No ITS, WELL ADVANCED IN THE DISEASE SHOWING EDEMA OF GENITALS BELLY AND L

Oi the first symptoms noticeable is the increas-,ng paUor of tIu, ". . . . .embranes, which may usually be noticed within a wee aftrr tll(, 0I set, and whi ih I'r, ogresses ipidly. The membrani rhite and later Q a yellowish ting P iajc tll(, mi lcosa lf liu* (V(I :il111 ! lose a frequently noticed and maj appear ai any stage if the disease. I tarrhal dischargee i\om fche nose and eyes of a straw-colored seroua fluid, su b, i ll(>Itti: ind tenacious, is a frequent symptom, but the quantity or tl he character of the discharge would not lead one to think of glanders. The suhmaxillary and sublingual glands •ire often swollen; rarely, however, to any very considerable extent. The hair remains Dormal in the earl) stages, but later becomes rough and dry-looking and in some cases partly falls out. l w erythema mentioned IJ\ so many wr iters is not a constant or even frequent Bymptom in t his epidemlie The bowels and appei ite are usually normal, and no •ignificant changes are obse tv ed a the urine. W^hen the disease is well estab.lished. the a-limal stands with I head down, listless ind dei ected, and when forced to mo ve, does s 0 j n u very sluggish manner.

k The *m* ucous membranes are pale, with a small watti y discharge fi' nd nose and often small petechiae, e qwciaUy of tl e conjunctivae. Edema, u Bully beginni ng in the she itli or legs, are notice •1 and in proi tracted cases, before death become the most noticeable feature- of ? the disease. The edema from the ge ;_ I • a lon g cntually forming a *I* rge b \u d, *vh* tails spread ich, if the animal lh es long enough, may extend forward to the chest, the front legi Edema of is less common and pronounced, but does long til not occur in animals living for a me, as is the case with mill es and some horses. In animals living but a short time, edema • be entirt-lv absent may

Paresis, especially of the hind]•arts, is a very common symptom in the later stages, and while never reaching true paralysis, coordination may become so poor that the animal falls to the ground. This condition may last for a few days until d eath ends the st ,,,,, gle. In some cases, more rapid in tin ir course, the paresis may be scarcely perceptible.

During the period of incubation, there are no known means of diagnosis. During the early stages of the disease; microscopic examination of the blood is the nnly method of arriving at a correct

diagnosis. Later on, I week to ten days after tIK* initial ria of temperature and depending Bomewhat upon the rapidity of the comae, a positive diagno?i> ran readily IK: made by a simple in:-pection. The fever, anemia, beginning edema, pnresis, emaciation ami general appearance of the animal make a characteristic picture. Finally, when tin - marked, ;> diagnosis is easily made nt some distance from the animal.

In this country, with the <li-ease constantly present, and where early diagnosis is of so much importance in the interest of healthy animals, a hone's blood should be examined microscopically as soon as a rise of temperature ifl noticed. The parasites are usually found in fairly large numbers when the animal has temperature; when Q rlic disease is uvtl established, they are almost constantly present in sufficient quantity to render easy a microscopic diagnosis. The course varies considerably, being from two to >i\ or eighi weeks in horses and somewhat Longer in mules. Complications are not very frequent in this country- Broncho-pneumonia is occasionalh observed, and venous thrombosis sometimea occurs. [Jnderoar observalion them have been two horses in which glanders and trypanosomiasis were associfced.

Contrary to *the* Btatementz of wme writera apon th<- Bubject, in this country, the disease is invariable fatal in the horse.

PREVENTIVE MEASURES.

1. Prevention of reinfection of the country by proper quarantine laws.

2. BSradication of fch< nt infection by enforcing • -th'eient Banitary regulations.

It is believe• 1 that the methoda to 1" described are practicable and, if idopted, will prove gufficteni to control the epidemic and eventually to eradicate it from the country, but to gire Uu best results suHi work should be begun at onee, during the dry season, while tb. cases are c'mparntivt'h rare and before the wet season comes with 'ts greLI increase in the number of biting flies and I he consequent spread of infection.

Had vigorous n«-:hods been adopted when the disense first appeared in this country in 1901, there would not fave been an epidemie. and even-MUS. >,re proper procedure follower] persitentlv. ili« disease shc"ild Iu eradicated from tlie Islands. If,

however, no more efficient course is adopted than the *uw* in use now. tin- discus,, will go on spreading until the who ;n try is involved and the epidemic becomes perpetuated, as it has been in Africa, South America, India, and other countri

The subject is an all-important 01 ,nIrv> ;JM(i *n* perative that fa slaters. Withoul authority, municipal sanii a (as I, so well df! -) mustalwaye \\ ith tike authority given by proper ordinances, a d panosonii; old I trolled fro filially ci -d from any eountrv in which it I Ahold.

In [uarantine teg against the introdu. of trypanosomitais into a non-ii country, a safe hut hardly justiSable procedure would be to forbid the em animals fro in an infected port, as was so promptly done by I against the Philippin ds when thi T' hirt'- Wheflier our hom in enfonses the same laws against all others infected with trypanosomiasis an '11 animals which h. *n* in infected countries bi shipped to America from non-infected poi srithoui iooowl uarantine laws, be i)»' SIJ. tiler*- still rema for stating that there mue forces other than quarantine laws which pn the introduetio iato the i Wild aninu circu» an r purposes are certainly admitted in considi from inf« of these animals barix without ii introduction r seems very probable. Not alone qu irantine laws, *bat* other rying H bly]da the die

However, trypanosomiasis has gained admission to the PhiHppi ar «16 rned, then «ssary to prevent i virgin country. It would ha- Philippine [slands with tbeiaMuci k•nt (li

trous results by the enforcement of proper quarantine regulations without actually prohibiting the importation of animals. Thai this was not done is owing to the fact that the disease was not recognized until after its introduction mid to our inexperience in denims with tropical conditions, but it would appear in place to sound a not* warning to other count:ies, especially thpee within tlie geographically infected zone, and which are as yet without the disease. It is a question of economic importance Becoxtd to none in a lai ge area of 'It.- world, and di serves the ek est attentiat and prompt action of the sanitary guardians of the public welfare.

The oajority *of* t). recommendationa of writers from this and other countries deal more particularly with the destruction of Hies as a means of controlling the *a* fection, which, if a practical procedure; would probably give good results, but, except «rhap6 in certain stables and in small localities, this would be absolutely impracticable as a general method.

Tl.e accumulated evidence of scientific literatim- and the deductions of our own experiments are so strongly against the theory that food and water are to be con-idered in the transmission of the disease that no farther consideration will be given it in this preliminary report.

In dealing with such a widely spread epidemic, the firs: fcial is satisfactory ordinances; secondly, efficient sanitary officials; and lastly, coöp"'ration between sanitary officials and others charged with the execution of the *]sn*s.

It should be the duty of each Government official to report every siek horse he obsi rves to the Board of Health, and sanitary in-pectors, in making their rounds, should be required to take cog]nizance of the physical condition of horses in tli eir respective districts, reporting to the Board of Health any that appear ill.

As soon as the report of a sick animal is received, the Board of Health Bhoul send a competeat man to i:spect it. and if it has "surra" it should immedtat ly be killed and if possible at once transferred to a crematory in a fly-proof wagon; if this it not practicable, ii e body should be protected from it sects for twenty-four boars, either by a •oating a of earth or by a mosquito bar. or in any other efficient mat ner. After the expiration of twenty-four hours it may be disposed of as desired.

If. after a careful examination of a >irk an inal, the diagnosis of trrpai osomiasis is doubtful, the animal e ther should be protected

flies, or, if this can m.i be done, should 1... isolated as far froi other animali ranined. I

' •»**»* to proi liniiil from flies tlia,

This MIHV be wscon s: Xhe hoi , bo placed in screened alls or comp material; all may be made BO -lark that few flies will enter; Unagreeable antiseptic wash may be used for the short time required; or the horae may be smudged; and finally, where s"We, iiU i ;„_v be reinforced by the destruction n> of the flies in the immediate vicinity.

If a ease of trypanof ccura in or near stables where the are other horses, they should all I* um,(" and, where possible, a blood examination should be made. h this JS noi possible, ill* all should be taken and i hose sl,,>wi the di- i- having a *t* mu <,louIi| ,,, "1 treated ;i> above deec'riluK, Those showing no evidence of i *m* should l»> remored *i,* ofeerstal tied out ai a considerable distance from the inf. ality. Their fcemperatu taken daily in th- afternoon -. and if an y show fever, these should be treated as sus- piciotu animals and tin- others juin moved or i protected from fliea RatB around inf< ected stables should be poisoned. Two ,]ivi after the removal of the last case from any stable healthy animals ma returned, with no other precautions than those air in ntion(1.

It is to be remembered that in tlcaling wiMi th- disease in a sin- gl< tty, such as i: the city of Manila , it will be fc,uiuj *m* possible permanentlj to eradicate it by prat-tieal m<ans so long.-,s the infec- tion is prevalent in the su i rounding country, but *in* thi.- city, vith its writ organized sanitarj corp• and with proper precaul ions, it should be confined to >porad'c cases, even during tiu- .ret season. I'll disease should be classed and taken cognizance of, just as the 1!lt, fections diseases, plague, smallpox, etc., are, by the Boari of Health,

The following - Sll&t'' stions to owners of small pri- vate stables or of individual horses ar. recon unend d as an add ition to what has already been said:

w hen using the anima ^ *» *« daytnne, as modi as poati ble avoid aifowinga ho] .| in a group of other *h* orses. To illustrate: Only a few days ago, we observed standing - in front of a Govern-

uit-m building Borne thirty *ax forty* horsey and one of them, bitched to rablie carroma ta, had a well-advanced case of trypanosomiasis. Should such a thing happen during the season of biting flies, the danger of infection to all would be very great,

Stables should be kept Bcrupuloualj clean and wHI ventilated and excreta and waste should be promptly removed.

All sores of whatever character on horses should be kept covered with e suitable ointment to beep off the flies.

Especially valuable horses may be protected with screen M«J -tails.

There is no condufive evidence, so far as trvpanosomi&is is concerned, of anj danger from allowing hoises to drink die *-ity u.ater or to eit food supplied in the Manila mark't.

rpon the appearance of illness in B !i>>r-i. a competoni observer ahould be asked I examine the animal.

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1903.—No. 4.

DEPARTMENT OF THE INTERIOR.

BUREAU OF GOVERNMENT LABORATORIES.

SERUM LABORATORY.

Preliminary Report on the Study of Rinderpest of Cattle and Camhaos in the Philippine ISUMids.

BY JAMES *W.* JOB1 1NG, M. D.,
Director *at* ihe Serum L*horatory.

MANILA:
BUREAU OF PUBLIC PRINTING.
1903.

LETTER OF TRANSMITTAL.

DKPABTKENT OF THE IXTKKIOK.
lit BEAD OF GrOYI F L.ABOkATOB
OFFICE OF THE SITF.KIXTKN K LABORS
\faniia, !'. /.. r

t: I have the honor i« forward herewiti^ a papef entitled • \ p n. liminaiy Report on the Study of Rinderpest of I 1n d Oa B i n Philipimie l>]an«k" by Jamefl *W.* JobIU«, M. |>.. hi,,.,, t(u, inn Labon

I am, very • nllw

PACLC. 1
boratoi

Hon. D *Wow*
Secretary of the Interior, Manila, /'./.

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A PRELIMINARY REPORT ON THE RINDERPEST OF CATTLE AND CARABAOS IN THE PHILIPPINE ISLANDS.

BY JAMES W. JOBLING, M. D., Director of the Bureau of Government Laboratories.

This preliminary report is especially intended as a circular of information to the cattle owners and breeders of the Philippine Islands, giving the symptoms, means of prevention, and treatment of rinderpest. In consequence, scientific discussion and technicalities have been avoided wherever possible. The Civil Government intends to immunize all the cattle and carabao now on these Islands, as well as those to be imported. To accomplish the best results, it is necessary for cattle owners and breeders to become thoroughly acquainted with the disease in order to successfully cooperate in the work.

In the following, articles written by numerous authors have been condensed and extracts made.

Definition.—According to Gamgee, "Rinderpest is a specific, malignant, and highly contagious disease, known to us only as the result of direct or indirect communication from sick to healthy animals. It never originates spontaneously, but is perpetuated by constant reproduction, after the manner of other contagious diseases. It is essentially a bovine disease, although it is claimed it may be communicated to swine, sheep, deer, antelopes, gazelles, and sebums, seldom attacking animals more than once." My own definition would be that it is a specific infectious disease, characterized by congestion and inflammation of the mucous membranes, more particularly of the digestive tract.

It is marked by a period of incubation of from three to ten days, by a chill, which precedes all other symptoms; redness of all the visible mucous membranes, soreness, early and in a marked manner in the vagina of cows; sometimes delirium and muscular twitching; discharges from eyes and nose; normal secretions checked or suppressed; abdominal pain with diarrhea, although in certain instances there is constipation. In some epidemics a scaly eruption on the back and characteristic one on the inside of the thigh. The fetor of the breath and discharges is [illegible] majority of animals seized with rinderpest die, and, after death, decomposition rapidly takes place.

The following brief historical review is taken from an extract of Fleming's work on Animal Plagues, as given by Edington in the annual report to the Colonial Secretary, Cape Town, for the year 1897.

The date of the firs! aeeouni <\t a disease among cattle which probably B rinderpest i^j given ;i- A. I>. 69. Columella, who lived at that tiin<-. -In< 1 who. according to atvountf*. had considerable influence on the pi- ress- of veterinary medicine, has written of numy of the <iseases of the lower animals. In the ninth cbapfc- Birth book, in describing the sympioj r. he sa:

"Ti i> preseni when the tears are running down the face; when the head is earned low and keavily, and the eyes are closed; when the Miliva Sows from the month; when the respiration is shorter than in health and seem nabarraased, or sometin ompanied by groaning."

He further insif ted on the most sensible procedure of separating Hx- <uk from tin- iu-altliv <wvk.

Since that time epidemics of greater or \< nt have from time to tim ked the cattle on large areaB of the jp^d

Rinderpesi h;i> caused the death • ra) million cattle in Europe alone. In A. I*. 360, eastern Europe was visited by an epidemic of an mgh- virulent character, which caused an enonnonfi loss, the cattle apparently dying almost Q asthi tmesick; in A. D. .VJI Ii.aly, Francr, and Belgium developed a scourge which *I* ft scarcely su :ilident cattle to breed i from; in the year 'Ji'i England suffered from an epidemic whk-h caused untold Buffering; and during tin[1] year [S1(]l France was again -verelj aflflicted.

From this period up to the beginning of the eighteenth century, when our km .e of epizoair diseases tx comes more exact, numerous epi- demics of i nruL nt disease appeared among cattle ii all |>;iri> of Eun e, causin g hnnu-nsv loas an great sufferi)g.

In 1708 Kmiold ; serts thai rinderpest had commenced its destruction in Russia, from which country it spread to all | parts of Europe. Of alt the descriptio] s of this e pidemk relating to the nature and spread of the cattie plague, probably t: e best are th< se of Lancisi and Ra inaxninni, I wo physicians who gave special attention to tin disease. Their description nf J e sympto ins corresponds with those encountered in the Philippine Islands, with this exce Ion : I bav< never seu. either at tl< is Laboratory, whi re the minuiU ha e contracted the disease by me ans of natural infec- tion i and by inoculation, or in the provi: ces, where the disease is con- tracted by natural ii> fection alone, cases covered with pustules and s mil tumor?-. Front the Frequency of I he pustules in the cases observed by I^ant-i^i and Ramazzinni. they concluded thai the disease was similar to nnd identical with smallpox in man.

In Holhind. dun ng the year 1713, 200,000 animals are supposed to have sin cumbed to the disease, and between 1.11 and 1* 14 over 1,500,000 died in western Europe : in interval betwe tin 1840 and 1843 Eg rpi lost over 665,000 •; in V 65, 500,000 were destroyed in England ; and from 1884 to 1894 Russia lost over 1,815,000.

The disease is now present in India, China, [illegible] part of [illegible]

In the Philippine Islands rinderpest apparently first appeared in 1882, [illegible] instructing the people [illegible] this period until the [illegible] Islands of the Archipelago, causing a loss o[illegible] rabao, estimated by some to be as high as 90 per cent.

METHODS OF TRANSMISSION.

The cause of rinderpest is not known, but from its being so very infectious and from the fact that it is [illegible] by [illegible] blood, it is probably produced by some microorganism the nature of which we have been unable to determine. The infection is carried but a very limited distance in the atmosphere, or by running water. The usual method of transmission is by means of infected ground, but it can also be conveyed by any of the excretions, such as the discharges from the nose and mouth, the stools, and, according to some authors, by the bile; by buckets and other objects which have been in contact with the sick animal; by means of the indiscriminate disposal of the offal, or by allowing the excreta to pass by way of an open drain into or through a pasture containing herds of cattle; by means of [illegible] attendants handling sick animals and carelessly carrying the infection upon their shoes to a place where healthy cattle are kept; by dogs or wild hogs, which, if allowed access to the carcass of an animal dead with rinderpest, may tear it to pieces and scatter the bones and fragments of flesh to new areas of ground, which thus become infected. It can also be conveyed by means of the hides removed from animals dying of rinderpest. One source of great loss to cattle shippers in transporting cattle on ships which, without proper disinfection, have previously been transporting diseased animals.[1]

[1] This latter danger has been shown [illegible] in this [illegible] Laboratory [illegible] preparation of [illegible] from China. With [illegible] cows for [illegible] every shipment of calves or cows we have received has [illegible] shown some of the first symptoms of the disease (high temperature) on admission, or has developed the same within twenty-four hours.

One instance of this occurred very recently. Fifty [illegible] calves were five days in transit from Hongkong to this port, and within seventy-two hours after admittance to this Laboratory for immunization, two [illegible] died within twenty-four hours af[illegible] [illegible] all showed a temperature of 41° C. or over [illegible] with the exception of four.

As the incubation period of rinderpest is from [illegible] days, it [illegible] that the infection must have taken place either at [illegible] the ship or in Hongkong just previous to shipping, as after arriving at the Laboratory the majority died before they had passed the regular [illegible] if the infection had taken place here the animals would hardly [illegible] [illegible] (?) symptoms before eight or ten days.

In experimental woik it has been proven that 0.1 c & of blood taken from a sick animal and injected under the skin of a healthy one is sufficient to reproduce the disease.

Edingtos states that if a small amount of the discharge from the nose of a sick animal be rubbed on the muzzle of a healthy one the latter will contract the disease almost as quickly as if it had been inoculated with virulent blood. but ii' thi? discharge be kept twenty-four hours before applying to the healthy animal, the disease is greatly modified in type. He further mentioned that in localities in which red-water or Texas fever was present, and where he was afraid to inoculate with virulent blood for fear of conveying the Texas fever parasite, he diluted the blood with a large quantity of water and drenched the animal with it. In these cases they contracted the disease about as quickly as when inoculated. In a series of experiments, made in order to find out the maximum length of time rinderpest would live in the dried state, be added sufficient blood to dry sawdust to give it a bright-red color and allowed tha mixture to stand at room temperature for six days. He found that 2 grams of this mixture would produce the virulent disease.

Hutcheon states that complete desiccation destroys the infection, and that putrefaction apparently has the same effect.

From the above it will be very readily seen what a. great mistake it is to allow an animal sick with rinderpest to remain at large, with the subsequent danger of infecting all the remaining stock in the vicinity. If a few precautions were taken the danger would be reduced to ;i minimum.

GENERAL PATHOLOGICAL ANATOMY.

The body is emaciated. There is often an excoriation of the skin below the inner canthus of the eye, produced by the irritating discharge during life. The tail and buttocks are often soiled by the fecal discharges.

So far I have been unable to determine any specific cutaneous lesions, especially none of those reported by the oldur writers.

In one case (carabao), in which the animal was sick about twenty days, a pustular eruption appeared about the fifteenth day. This eruption was discrete, but the pustule^ were very close together and scattered over the entire surface of the body, apparently showing no predilection for Iny one part

The natives in the provinces claim thai many of the convalescent animals show a scaly appearance of the skin, but we have never noticed this condition in a sufficient number od cases to be able to say that it generally accompanies the disease^

The skin covering the upper lip is often thickened and excoriated by the discharge from the nose.

The eonjunctive are nearly always congested, mote p^H-dally in carabao08, in whjeh animals they are generally a bright-red color. 1 have seen a number off eowe sick with rinderpest, where the conjunctive showed

practically no changes. These cases generally occurred in animals which had been inoculatnl with the disease.

The nrawua membrane of the nose generally, and over the septum in particular, is deeply congested. It often appears of a purple color. In a few cases I have noticed superficial ulcerations on the anterior portion of the septum, but I am inclined to think that they were due to some other cause.

Most writers upon rinderpest lay stress upon the frequency with which ulcers are to be found in the mouth. This is contrary to our experience at this Laboratory, for while the great majority show a marked congestion of the mucous membrane, with a covering of thick, slimy mucus, comparatively few show ulcerations.

Ulcers sometimes appear on the dorsum of the tongue, accompanied with marked congestion.

The fauces and pharnyx are the seat of a catarrhal inflammation and covered with thickened mucus.

Mington states that in many of his cases the tonsils showed pin-head abscesses in the cortical layer.

The mucous membrane of the oesophagus and trachea, as well as in other parts of the body, may be deeply congested, but in the majority of cases appears normal.

The lungs generally appear perfectly healthy. In some cases there is a congestion, but I believe this to be principally hypostatic, due to weakened heart action. A number of cases showed an emphysematous[1] condition.

The pericardium contains about the usual amount of fluid and appears normal. The parietal lining sometimes shows a few subserous hemorrhages.

It is not uncommon to find petechiffi (minute dark-red points) scattered over the surface of the heart.

The muscular tissue is generally paler than normal, and shows a condition of marked cloudy swelling. In the cavities of the heart the blood seldom coagulates firmly, either forming a soft coagulum or having a sirupy consistence. The endocardium or lining membrane often shows minute hemorrhages.

The general lymphatic system seems to be affected in this disease, as in the majority of cases almost all of the lymphatic glands of the body appear enlarged, and in some cases present an edematous appearance. This condition is best seen in the abdominal cavity, where the lymph glands in the mesentery supporting the small intestine are almost invariably greatly enlarged, and in some cases hemorrhagic.

The rumen (first stomach), reticulum (second stomach), omasum (third stomach) and abomasum (fourth stomach) are generally normal in appearance, although the contents of the last are always very dry and the mucous membrane sometimes slightly congested.

[1] Dilated air cells in the lungs.

The abomasum (fourth stomach) is uauallj the organ in which the most marked pathological changes ire found. The contents arc generally fluiil, and coi sists of a large amoani **(mucus and often of con&iderably blood mixed with tlu- food. The i dor is ver\ fouL

The chants m the BXLCCUS numlirane van from a sligbJ i ongestion, gene rally localised ;a the pyloric or lower end. i» an extreme "ue with tileorations, involving the mucous membrane *at* th<- entire organ.

\. rv ofti n minute bemorchag es ab ml fee of a ;»iu head will be fomid over the deeply conj ested areas. Xi tmeroua email uloen axe often present, more often at the pyloric or bwer mil. They art! geoerally ihallow, with the bottoms covered by a greyish-yellow exudate. I ha ve seen cases iu which the ulcer extended completelj around the pylo ric orifice.

The upper portion of the small intestine U invariably congested, aim ost 10 as jfreat an extent as is the fourth sinniafh, and it often shows the minute hemorrhagefi BO frequently observed in tlie latter. I have *m* ver see*n* move tluin two or tin.e casa in which thriv peace alceratioiM in Qua location; these are apparently confined to the fourth stomach and cnx-nm.

In the severest f • nin of thi disease, the feces show casts Eroai L2 to 35 ce Dtametera in length and poetmortem examination demone trates a diphthoritic condition of the upper portion of the small intestine with pseudomembraneous formation.

In many cases be moeoua membranee of the remainder of the in-esti.e is so slig-htly aiTec-i ed as to ap iju-ar norinal. while in"ol hers there is the *m* st extreme congestio m, with the formation of casts, r eyers patches are often en!.. but, in my *v*\\ erience, never ulce ited. 1 have i never seen nleers in rhis]>ortion of the ii testine. V mart ed congestion is very often seen iround the ileo-cecal valve, with smalt Bubmucous extravas ations of •od.

The eeeum i- gener illy merely t!e seat of a i ongestion, hut in other cases it is vio iently inflamed, showing uloerations, bemorrhagt s, etc.

The colon is fi equentiv cong ested, but the changes ai e not so far advan ced as those seen in the upper part of the small intestine and in the fourth stomach.

Tli e peritonen in often -hows signs of an acute localized inflanimati on, involving that pori ion covering the smr ill intestine, which ti often coated \\ ith a fibrous exudate.

The peritoneal cavity usually contain i larger amount of iluid than in a healthy animal.

The liver ie g is found and E hows evidence of marked cloudy sw elling. It i> ft ngested, often presenting a mottled appearance, equently bile-stained.

The gall bladder is distended v e, which is us seen in color, but I have seen all shades, from ht yello mcous

> ith lS! w to black, glTin* n

membrane usually appears healthy, but sometimes is markedly [illegible]gested, covered with a tenacious [illegible] and showing [illegible] hemorrhages described [illegible] as oc[illegible] [illegible] fourth stomach and elsewhere.

The kidneys [illegible]

[illegible]rgan does not appear to be greatly congested and is [illegible] [illegible]al in size. [illegible] vagina is always greatly congested [illegible]

Th[illegible] [illegible] portions of the [illegible] [illegible] a hemorrhagic appearance. [illegible] some cases pre-[illegible]

SYMPTOMS.

[illegible] observation of [illegible] [illegible]est resulting [illegible] natural inf[illegible] [illegible]een almost ent[illegible] [illegible] disease o[illegible] [illegible] contracted [illegible] [illegible] developed by individ[illegible] [illegible] on a s[illegible] area of grou[illegible] previously infec[illegible] [illegible] of animals dying of [illegible] [illegible]. The [illegible] [illegible] [illegible] to [illegible] [illegible] placed in su[illegible] position as [illegible] more or [illegible] [illegible]cted excreta.

The inoculation period in [illegible] those animals con[illegible] the disease fr[illegible] [illegible] exposure va[illegible] from s[illegible] [illegible] I seen it less than six days. The earliest rise of temperature observed is about fifty-one hours after inoculation with [illegible] (Edington[illegible]).

In animals inoculated with virulent blood the incubation period is from sixty to ninety-six hours. [illegible] [illegible]y of onset and sometimes the intensity of the subsequent disea[illegible] [illegible]g. first, upon the virulence of the disease in the animal from which the blood was obtained; second, upon the length of time the latter has been kept and third, upon the quantity used for the inocu[illegible]. The average time before the first rise of temperature is about seventy-two hours. In c[illegible] the animal is inoculated with a large dose (10 c. c. to 25 c. c.) [illegible] rise of temperature is often noticed on the evening of the sa[me] day, but th[illegible] [tem]perature generally falls to normal o[illegible] [illegible] [illegible] until the period of incubation has passed.

Generally on the evening of the fourth day after inoculation a rise in temperature to 40 to 40.6 C. will be noted.[1] It does not remain high in all cases, but sometimes drops to normal on the following morning.

[illegible] the Philippine Islands, a healthy cow's evening temperature will average 39° C.

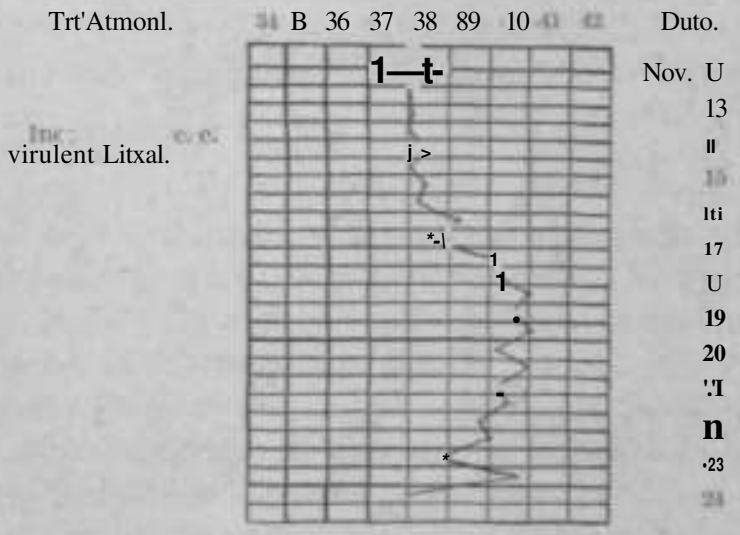
remaining so for **I**wenty- tYmr **hoon and then** again rising to over 40° C, remaining high, with slight **morning remit**-until just before death, when it rapidly drops to subnormal.

The **temperature** curve in nn **inoculated animal** is well shown in (hart No. 1.

CIUKT *SO.* 1.

Ose No. 45, November 12, 1902.

[Weight, 400 pounds; **age,** 2 year*: sex. **tanate:** color, light brown. **Inoculation, cinder]**
• *ry.* Inoculate Xovembt-r 14, **IWt,** *rlih **B** r. <v **ranteot blood Cna**



Mil twtniv-huir **hoa**rs after **the first** rise **of temperature it will** be notic-.'tl that the muzzle is somewhat dry, a:ul tin[1] animal *a*ppears less inclined to take food. About the **uxne time flw** mucous **membrane** of **the** inner p• irtionofti e eye becomes inje **ted** sun soon presen **Is a vivid pink** color **with** a slight **watery** discharge running down the face from thi* point. In num*- **Instances** ihi^ i^ **the** initial **visible symptom** of thi,* disease. The **mucus** discharge from the nose is **mnch augmented.** The bowels are somewhat **constipated,** altliough the feces are often eo.ated witli slimy **mncua** ***Tin*** hair is rou:h.

The animal **BHOWB** great thirst: **and** if in the open. I aves the herd; and, if water is near. will stay by it: the ears hang fo nrard: **the** head droops, while flies gather about it **tad** no great effort is made to dislodg' them. There m **iay be twitching of the superficial** muscles of the back, shoulders or hind quarters; ni mination is irregular or ceases, grinding of the teeth becom **es** almt» st con **rtant When khe animal is** lying down the head is commonly turned toward the flank. **With the exception of** those **cases** noted above, **the** temperature at tli is time is ve **ry high,** in **many** cases being ov.r 41° C.

About *to*rty-eight liours after tl rise of tempt-ratur.e the liardene<1 fece? **tther** to a foul-si nulling, discolored watery dis* thar^e containing mucu9 flakes and ltlood, or to a dirty, thick, slimy fluid containing streaks of i)lood nn<l in some cases n **tuens casts.** The other symptom9 now all become aggravated. The discharges from the

eyes, nose, and mouth are [illegible] in amount, [illegible] from the nose is changed in character, [illegible] thick and [illegible]. The skin of the upper lip over which [illegible] becomes thickened, dry, and excoriated. The breath has a very [illegible] odor. Prostration is very [illegible] weakness; there is extreme thirst. [illegible] from [illegible] liquid feces are passed almost continually with great strain, [illegible] moaning; the [illegible] involuntarily, the [illegible] groaning [illegible], finally [illegible]. It rapidly becomes weaker, the respirations are more rapid and labored, finally, just before death, the temperature drops to subnormal.

The symptoms described above are not constant, either in the order given, character, or severity.

The duration of the disease from the first rise of temperature until death is usually from two to ten days, the average being about six.

If the disease is of a milder type, the stools after a few days lose mucus and blood streaks, and gradually assume their normal consistency, all the other symptoms abating at the same time.

I have noticed that a larger percentage of carabaos than of cattle show the highly injected conjunctivæ, and that following the "simultaneous method" of inoculation, when a diarrhoea does appear, it generally does so at an earlier stage with carabaos than with cattle.

The great majority of the animals which are affected die. Some authorities state that the mortality is from 60 to 80 per cent, but here in the Philippines I believe [illegible] be much higher, especially in the rainy season. This is also noticed by the natives, who maintain that while in the wet season most of the animals die, in the dry season many recover.

In this respect it is interesting to note that in regions where wild hogs are numerous the natives state that they find dead hogs, as the ep[illegible] rises in extent and [illegible]ence. They explain this by the theory that the wild hog contracts the disease by eating the carcases of animals dead with rinderpest. In the Pasteur Institute it has been found that hogs are susceptible to the disease, and in view of this the above does not seem improbable.

In this Laboratory we have had no opportunity to experiment with wild hogs, but procured two farm-bred animals, one of which was inoculated with 5 c. c. of virulent blood. The animal appeared well on the [illegible] after, had very little [illegible], and was lying down most of the time, with no other symptoms. The temperature on the evening of inoculation was 39.5° C.

On the third day after the inoculation the [illegible] distinct signs of illness, the back was arched; head hanging [illegible]; extreme thirst; conjunctivæ slightly congested, with a discharge from the inner angle of the eye; the hog lying down most of the time. The respiration was rapid. The morning temperature was 40.2° C. and the evening 40.4° C.

On the fourth day **there wac** a **profuse yellowish,** watery diarrhea, **the** animal **appearing** to have **involuntary dischargee part of the time.**

There was no mucus or blood in the f.ces at **anytime. With the exception** of the **diarrhea,** the animal **showed the symptoms** it did **on** the **pn vioua** day. although it was now weaker.

On the fifth day the diarrhea had disappeared; the animal was still ury weak, hut the temperature had dropped to **normal. The bog W! now** !>!<(! to death, **the** blood **being** drawn int<* **potassium citrate solution** and used to **inoculate** hog Xn. 2 air l cow No. *VR.*

The postmortem showed no **marked** lesions, with the **exception** of a slight, hypeni'inia of **almost** the entire **alimentary** canal.

ll<.g No. 2 recetved '.» c. e. of the blood, hut **oevei developed any** symptoms of the disea:-e.

Cow Xo. 46 received T c. C of the blood **and,** after the usual **incubation period, showed the typical** form **of** rinderpest, **although** the **symptoms** were **much milder** than is generally seen after **inoculation with** such a large **quantity** of virulent blood. **Unfortunately** no other **oonimnnu** cattle wore on hand to test. tlie blood drawn from this cow, so **that forth** er exp**lerunente** were **prevented.** This animal was **bled bo** death. The **pod mortem lesions** were **those** usually **seen in rinderpest,** although **not** so far advanced.

This hog had **the** shortest **incubation period of** any animal I I ave seen, and I I would have believed it to IK? suffering from some other disease had cow No. 46 not developed typ**icaJ** rinder pest after the re**gulai** incubation period.

From **this one. series** of ex**periments** it would **appear** that **while the** hog may **contrs**et the disease and **die, and its** excre**hi** may **fora fl aouro** of **infection** for cattle and **carahaO) yH** it **U difficult** for the sick hog to reintVct **others** of its kind. **However, n*> definii**e conclusions **could** be **based** ui>on **the evidence** at my **disposal,** and **the** work **will** be continued when **opportunity** "tTe>s.

Some exp•< rnmnts are now b<ing conducte I in the prov inces to determine the susceptibility **of the** wild hogs, an-l to see if they are abl< to comuiiicntc the **disease** to others.

PREVLXTIVK M K\SU**RES.**

When an animal **shows** any **symptome of the** d isease as given on pages i **11.** .tc., it -hould **he immediately** isolated. **By isolation J mean that** it sho•nld **be entirely separated** from the remainder of i he herd and pla>ed , on a small inclosed area, so situated that after it dies or re-overs i In- ground and everything which **hat** come in contact with it can be thor- , ougbly **disinfected. It could 1**e kep**t on the** spot where found, tempora**rily I fenced** ii; and vrith a bamboo and **nipi**a cover ing to protect it from I he ra**y**s of the sun. The excreta should not *U-* allowed to enter a drain **i**nd so infect su rroum ling territory. **but** should be retained **on thi** spot and tii oroughly disinfected ei the? with crii de carbolic acid in a strength of

ahmn. '•'> \>< cent, **or t>\ the addition** a of good chlor •:<• .if **lime,** or buried. Tli' attendant, if a **native and** nut **weari]** g shoes, should **thoroughly** i ini"> et his fe **I as well as lands with a a** er cent solution **of carboli id, before craning in contact with other animals.**

If he wears shoes .he should have two pairs, one to wear while working **with the sick animal, the other** (which should be left on the outside of the im-losure) to be put on **when** leaving.

Aft• r **the animal dies** or **re**overs**. the shelter should be burned** on the infected area, anil **the entire** surface of ground within **the** inclosure, as well as that **on which the** animal has been **browsing** or lying, **diainfet**ted **with** earbntu' arid or chloride of lime. It would be still better, after sprinkling **with carbolic acid or chl<**oride of lime, to cover the ground with dry grass and then **Bet** fin- t> ii.

Tin- rriij;uiiiiUT **of the herd** must **be transferred** to **ni**w pa-tures and **there k**ept sep**«rate** from one another, and **the temperatures of** all **ta**ken dailv. Any animal showing a temperature above **normal,** or any of the symptoms described on page 12, **jhould be immediately** uolated in **the manner ah**ove described, **andtiw**e herd once more mo\ed.

BY **following tb**ese pre.tiutions I believe an **epidemic** of rinderpest can be suppre--*'(! in its beginning, and only **those animals which are** in **the incubation** stage it **the time U**e disease is first re**sognized** will further dev**elop the** disease.

Tin- **bodies** of **the** :niinmW **which have died** of the disease should be **either burned** or buried, Ii is better to• **burn then**: but if this can not be **don**e, care should be taken to bury them so deeply that hogs and other animals **caJB** i ot exhume th*vem* and scatter the bones and fragments of flesh **arodsd the** surrounding **country,** in which event new points **of** infection would **probably IK- formed.**

\ **rery eareral Bearch should** be made for th- source **of** tliv prim,ary infection, -o that after suppres-ing the **din**ease in the herd it may **noi** be reintrodui-d.

As the hides removed fro•m uiiimul- dying of runli**rpest** convey the disease, they **mould ?*' thoroughly disinfected** with **a** 1 per c*at* solution of carbolic **acid,** allowing **then** to remain D tlii;- **aolation** for **several** hour>. M**i>l then** hanging them in the 1 sun until **thoroughly dry,** turning **them •** over several **il times** HO that the rays of the sun will strike all par; s. If they are to be sent from the infected **I locality,** it would !»e better to **redisinfi**ect them before shipment. I have given directions for the disinfection of the hides bec**ause** their retention may ot* insisted upon. My own opinion, however, is that it **it would be bett**er to destroy thrm **with** the carcass.

nanrsiXA TIOX.

There are • **number** of different methods of imniuiu.ing cattle and cirabaos against rindcrpest, several of which will be described, with their advantages and disadvantages.

IXOCULATIO5 »Y \ IUXTOKK OF (il.VCERIN \SU lai.K TAKKN FBO3I AN \MMAI, BUCK WITH RIXDKBPBST (KDWGTON'fl MiL....

Edington recommends the use of bile taken from an animal which has been sick six days, preferably from one which has contracted the dise.se by natural infection, becanc he found greater immunity conferred thereby than by that taken from animals inoculated with virulent blood.

The bile, according to his directions, should be green, having a white froth on the surface and possess no putrefactive odor. To obtain it, open the abdominal cavity of the dead animal, tie the neck of the gall bladder with two strong ligntures of twine and cut between them. The bile can then be secured by one of several methods, viz: Immerse the bladder in a bucket of 2 per cent carbolic acid, then wash in cool water which has recently been boiled, and open the Madder with a knife which has also been boiled, allowing the bile to ik>\\ into a vessel recently sterilized by thoroughly washing with *boilitig* water; or, after 'the bladder has been disinfected, the bile can then be obtained by means of a trocar and cannla, hollow needle, or even a sharpened small piece of bamboo which has been sterilized. If found to be satisfactory, half its volume of glycerin is added to the bile, and the mixture is then kept in a cool place for eight days; after which it is ready for use. The inoculator should not take the bile from the dead cow, as he is liable to carry the infection to the animals lie is inoculating.

Of the bile thus prepared, 15 to 30 c. c. is injected under the skin of the dew-lap. The syringe which is used for this purpose should be allowed to remain in a 3 per cent solution of carbolic acid for about thirty minutes, and before using should be washed out with water which has been freshly boiled. It would also be well to wash the skin where the inoculation is to be made with the same carbolic-acid solution. After ten daiys the animal should be reinoculatect with 0.2 c. c. of virulent blood.

The advantages of this method are: First, there are practically no deaths following the inoculation; second, after preparing the bile it can be kept ready for use for about one yeai: third, pregnant animals seldom abort.

The disadvanta^es are: First, the immunity thus produced lasts a very .-hort time, generally from two weeks to three months; second, very little immunity is conferred until after ten days; third, in some animals no immunity *is* produced at all; fourth, the small quantity of bile secured from each animal makes it necessary to allow a number of an i ma Is to contract the disease in order to obtain a sufficient amount for the immunization of the remainder of the herd; fifth, it requires \\\>> *iaocuh*tions; sixth, it is necessary to bleed a sick cow to get virulent blood I'or the second inoculation.

SERUM METHOD.

Koch demonstrated that the serum of the blood taken from an animal which had suffered from rinderpest ;\pd recovered possessed immunizing powers.

The serum which is used for this and the following methods is pn> pared by inoculating cattle with gradually increasing doses of blood taken from an animal sick with the disease, until they can bear very large quantities.

1 hl» anini;l1 lirM receives &e "amraltaneniis m .1 *m* * • ribed on page IS fc^T^K..... of - > < ^ » rnr, the proper period, it is gireu lOO c < the temperature again drops to normal and nfterwunl., ,„ ...,„0 e. c. not show a goo! reaction within t- *'"', it ie given 10 dose, and after the >f virulent blood, then .,•,] UHV& latOT /nr *t+ tnpexature becomes normal) .c, and finaUy 1 i j S " "•'•'" theani 8 bled for eerum

In bleeding our serun, animaU, they are Btrapped apon .!,, apemtinir

!**•« rt solution of carbolic acid, flowed by alcohoT1 "^t, ument s are also sterilized in a 3 per cent carbolic-acid

After sterilisation is com] rh(,l;ir L;' troear _u ,_Jumfl'!* f » withdrawn, to ai « of robber tubing to I ,ula, for if tl t done the animal in its struggle* may npad tl, I into which *the* blood is be in drawn or cause the prerionaty sterile vessel to b (i Th e ? *f* to flow into tall gla^s cylinders holding l" Dg taken at one operation. It is th. ll0Urs, at & *h* time &e riot will e quite firmly and will be surrounded by 1 IT ^rum; this is drawn off by means of sterile pipettes or by i syph on.

ration the dots shoul.l be alibi twenty-four hours, as at the end ,f that obtained.

_ Ff ! * ***** «» an »"«1^ after receiving 1 000 c e t nhat blood, are a» to remain until the temperaW L r nimI - Tl„ with an n ' " "r » they are inoculat^ \ t ^ W> I a^a bled in r a s b e f o r e . ' ' " o f

M y assistant, Mr. Chas 3. Sly, ha* bad - ling of all serums, while Dr. J. G. Manila, has done nea of the bleeding, well as the gene Hvall 37, them for beir nhiable work in awtintr in the an, pr,vHlentin.l, Their work L no, been confined to this Laboratory. an-1 ,-ara' ao. nlate<l a Pwi nmnv ca ttle

»**M*SZZl r -tinn ,11< lian(, 7T "' <Te<iil ^ *• uof

In using the scrum. *)< in **100 c c should be injected** under the .-kin. using **the precautions given** above.

Theadvantaj es of **this method are: First, thai** it **produces no reaction; cond, in** dairy cattle **there** is **no suppression of** milk: **third, the** immunity **conferred i^ slmofil immedii** te; f**mrth,** it' **the disease is j** ust devsloping, it **will often modify 111* attack, making** it **much milder** in **type; fifth,** then' **are oo deaths as a result** of **the raocuL** ons; sixth, pregnant animals «k* n<>t atmrt : **Beventh, the Berum** run be **prepared** in any **quantity** and it will **keep during seven or eighi months,**

Tli*.' **disadvantages are:** Kir-i. **the** s!]<>n **period** <>r immunity, it **aversing** from two to four **mon1** hs; secon **d,** tin- >kill **required in preparing the serum; third. 1 believe sometim<** s very little **immunity** is **conferred,** as **1** have seen cases **in which a small quantity of virulent blood, given** from **ten** to **fifteen days after the inoculation** of **ram, would develop** a **virulent** iype of the **d** isease.

A- stated above, ;i **great many** calves **received** from **Hongkong for** vaccine work **have shown some** "' **the** first **symptoms** of **the** i isease either upon **the** day of ad miss inn **or** within twenty- four hours **thereafter.** For this reason **we have** been giving ill **animals which** haw **shown** a **temperatore above** normal, oo **c c of serum upon the** day **of admission, the remainder receiving** the **"simultaneous method" described below.**

In these cases where Berum aloxu is given, and where I I is desired **to** con for permanent immunity, **the calf is reinoculated with** virulent **blood** alone after ten davs. To obtain a reati>*n* in t.hese cases we have found it **necessary to give ;t dose of** lo t<> 25 c. c. **of** virulent blood **when** \'. is given within **ten to** thirty day? after **the primary Inoculation,** and **even** under these **circumstaxti** ces some calves will show no **reaction.**

SERUM sw ULTAN i:oi;s MKTIIOD.

This method, with the modincal ion noted on **paj** e 20, is **the** one **in UN**[1] at **this** La bora to ry, as well as at the **principal** points **tiiroughout** the **world** where rinder; est is prevalent. It **was** first **oaed by** Kollo and Turner in their work in **South** Africa. It ritj' ires more skill than **the bile** method, a? it is nece **ssary to** first **prepare serum and** then to obtain virulent hlood from **another** animal sick **with the d** isease.

When we first begin inoculating in this **Laboratory** «e used fresh virulent blood, hr t soon found that Kdii gton's method of **pzeservin** it, in a solution of pota-sium citrate to prevent co **igolatum,** was preferable If the blood is kept in a enol place it I an, according to our experience, be used for at least -even days with **good resultc Sane** authors maintain that it can be preserved for a longer **period** The hlood is drawn into a 500 c. c. sterile flask, which eonta-ns 25 c. c. of a 5 per cent solution of potassium citrate, so as to give 1.25 .Trams of potassium **citrate** tn each flask.

In using this method, the amount of serum necessary (which varies from 15 to 50 c. c., according to the susceptibility of the animal, as determined by experiment with others in the herd) is injected under the skin on one side of the animal, and 1 c. c. of the virulent blood on the opposite side and at the same time. If this amount of virulent blood were given without simultaneous inoculation of serum, it would invariabl produce the disease in latter is give n. the same time, it not on mmunity, but so aids the rulent blood; a

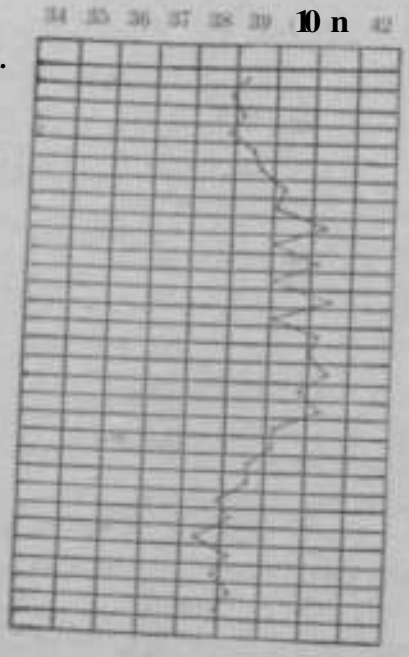
^sequence a ria mpemtare ooly. j« noted

reaction after inoculation by the "si rt No. 2.

•Ser No. 72, Dec mbrrdl, 1902.

"si ^ 4 years; sex, male; colur, red; inoculation, rinderpest; history, ed Decembe 1902, with 1 c. c. virulent blood from cow No. 67, and serum

TrvutmfiK. i Iralent uiood,20e. e\ nerum.



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The advantages * this method are: Firet, the senun «, i dink^equu,, ?" epared and kept on han ities; second, it confers im te par- tial ; which becomes much greater after the resulting reaction, and e incubation period at the time o ion the subsequent disease may be modified; th ctions are more even, under better control, an onger any bile method; fourth, only one inoculation is required; fifth, it uals showing a reaction ity cor e ective and lasts for years, while a temp ity probably lasting for several months is conferred upon th ones having no reaction.

aifimmiii LfenwiUven- ,r t.,00 ,, « * inunu,,

The disadvantages are: First, the inability to perfectly control the reactions by the regulation of the relation between the dose of virulent

lilnod and of serum: second, in order tKi obtain reactions in all animate, some ca- - requix* ond inoculation with virulent blood; third, to do i the work properly it is necessary to take temperatures from the fourth day ; fourth, the mortality, which is from 'Z to 10 pel Gent, is higher than *t* by any of the other methods described.

i At this Laboratory we use the simultaneous method as modified by » Rogers. The modification consists in taking the temperatures <>n and after the fourth day of all the animals inoculated, and those showu ig no . reaction from the first i aoeulation are reinoculated after ten days with [0 c <. of virulent blood.

The advantages of this method are: First, a reaction is obtained more often than by any other method; second, it is shown in a much larger percentage of cases; third, those animals having BO reaction after the seco•lid inoculation wilt have a longer immunity i onferred apon them than by the serum or any of the bile met hods, although it is probably not iif long duration.

The disadvantages are: First, that second inoculatioi - are required in aome ea>'>: second, beginning on the fo>urth day, it is necessary to keep temperature records of the animals, thus m cessita ting » larger for*e of ino culators; third, the difficulties encountered iu the provi nces where the nat ives are• in such marked opposition to the inoculations as to r>nder rt almost impossible in the outlying district;-.

This meth Mid is to be preferred when practicable, as iimnunr y exte ading over i long period is conferred upon the majority of the animals, while a temporary one is given to all. Rogers states that a fter a good reaction the immunity continues for years.

Tlie work done at this Laboratory lias been of too recent a dat<e to determine the duration of the immunity in this country, but it will undoubtedly accord with Roger's experiei ice.

DEFIBRI N u 11> iu.tu>it METHOD.

This method originally recommended by K« •_ ers n :n be used [„v cattle owners then selves.

It is first necessary to Bud an animal which lias just recovered from the rinderpest; it is then blod. with all the precaui ions g ren on page *l*>.* the hi od bei ug alien red flow into a wi le-mo ithed vessel which has pi e- vi ously I'' en ste rilised. Then with on ordinary egg-b eater o r wire bm sh which has l>.en boi led for at le fifteen minutes, the blood should be whipped for fifteen or Iwenty mimii.es, or inti 1 th<re is complete sepa ra- tio>n of the fibrin, which forms a stri agy mns> clinging to thi e egg-beater. The blood can then be used, as it will no! coagulate; it i- t.. he inj.ected under the skin in >i ses of from 50 to 250 c. c. It must be used fresh, as it will a on sp oil. It epnfert an immunitr lasting *from* one to four month s.

I be that where the blood
treatment or immr
blood into a sterile flask or
tion. This would do aw
o
contamination, which is
defibrination.
second,
animals which have recovered
is no fever.
The disadvantages are: First, only a temporary immunity is obtained;
second, the blood can not be ke t be fresh when used.
This method is one which s
inces where it is impossible to ob fit in distant pr
the "simultaneous method." A for culation
will be seen that with the
disease in its incubation period, no more w
one to four months, the epidemic thus dying in it
ing
icy.

TREATMENT.

Most of the writers whom we have been to review and who have had experience with rinderpest, join in savin that no treatment is of
en once an animal has contracted the disease, although
some state that large doses of serum given subcutaneously exert a favorable actio upon the course of the disease.
Serum has
Laboratory, b
unable to detect any differ
number of cases showed a t
going it is evident that prevention is
In case an epidemic
e calves, we have been
h a
pre-
Th e of infec
when suitab ions to
after ontrol.
infection
Where poss mals in the infected district s
nized by the "simultaneous method." When expert help can not be obtained for this purpose the "defibrinated-blood method" or "Edington's glycerin and bile" method may be used by the cattle owners themselves.
Of these two latter methods I believe the "defibrinated-blood method" be the best, as immediate immunity is produced, whereas
is first neces to all. the mixture to stand eight days
before inc nals, a tv s not c red until ten
days after inoculation, so tha e first case appears it is eighteen
days before the animals becom e.

\> no treatment)m> an\ **effect** ujmri **the course <>! rinderpest)** and :ts it ha* been proven that, an animal which **hai** been **inoculated and** has **shown** a good reaction **leldom contracts the disense,** \\ \> **evideni** tlint \\ i- noi only **necesaaiy** to inoculate all thf aniniais now in the **Philippine [elands** but iiko those to be imported. **By this means** it will **be possible** to **completely** remove rinderpest from the UlamK but if such precautions **are** not taken, it **will** continue, indefinitely, **spreading from** one **point to another, killing** off **a** large **percentage of the yonng** an him **Is. and** so **working i continual hardship** on **the people.**

O

I9O3.—No. 5.

DEPARTMENT Of THE INTERIOR.

BUREAU „K GOVER ntsr LABORATORIES.

BIOLOGICAL LABORATORY.

TRYPANOSOMA USB TKVI'.WHSlilinsiS. WITH SI1T|\| REFERENCE TO SURA L\ TIIF imiPPINE ISU\|)s.

Bv

W. E. MUSGRAVE, M. D.T
Acting DIr^ior Bk>lo$e)c*l Ubont

AV[)

MOSES T. CLEGG,
Assistant Bacteriologist Btok^fcut Laboratory.

M AMI A:
BCR] AU OF PUBLIC PRINTING.
1903.

LETTER OF TRANSMITTAL.

BUBE&U OF GoVEBJWEfT LABORATORIES,
OfUCs op THE SUPERINTENDENT

Sir: I ...ve th, honor to tamsmif h e r j ^ ^ t S * ^ ...

uxbomtorv and Moses T /•! ... l»!'.'I<»L'']r:t]

UboSS ,,,im h ' ' ^ Bi

Superinte... ...oratories.

Secretary of the Interior.

LETTER OF SUBMITTAL.

BUREAU OF GOVERXMBNT LABORATOBHS,
BIOLOGICAL LABOBATOBY,
Manila, I\ /.. JuU 4, 1903.

SIB: In compliance with your request of July 1, L902, 1 have the honor to submit herewith a report <n "Trypanosoma and Trypai oso- niiaste, i\ith special reference to Surra in the Philippine Mancte."

Vi rv respect-fully,

W. I!. M SGRAVE\1. !»., *Acling I>irector Biological Laboratory.*

Dr. PAUL C. F KKKK,
Superintendent of Government Labor ories.*

4

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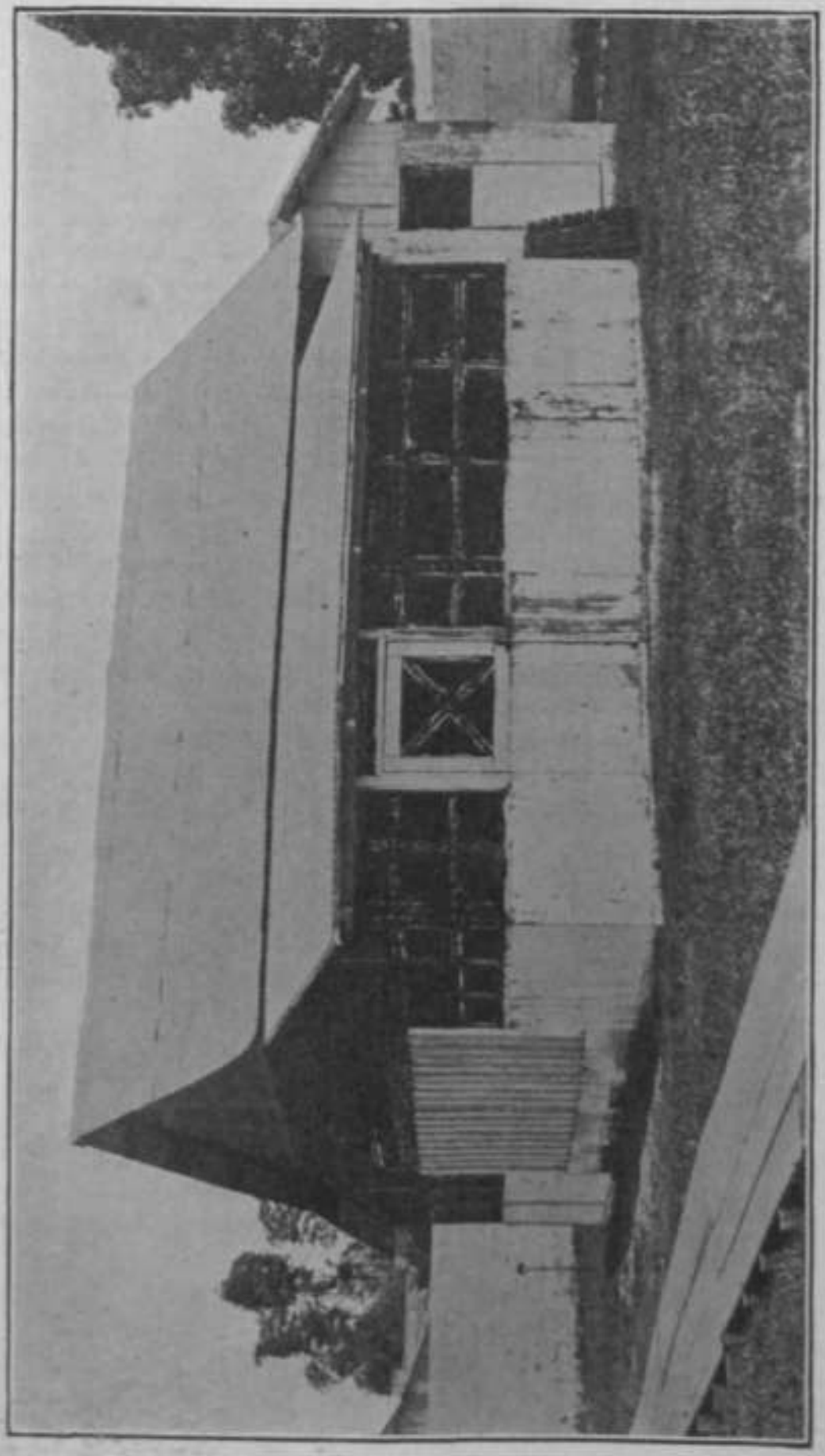


FIG. 1.—Insect-proof stable constructed for our experimental work.

INTRODUCTION.

utering upon a discussion of the text of *tint* remarks regarding liti« at *om* «] appear rtvWie

Figure liUurti cially conatructed insect-proof stable in which all experimei ing extraordinary precaution were perform. Io obtain saustVtory results such a structure is an abeol,

^Me > screenoc | on aI1 sideSj the sta]lg are sepa ^ ·
11 "tlU1^ w"1 each is provic ^ with a door of the same kind. On ea.
ere is an additional hall entirely sen ened and with a single outside door. Ai one end an insect-proof operating room was built and provided
Wlt" » P otecte f entrance to the different stalls.

Becau -e of these precauti., ns, experiments i,ave been conducted bi with an absolut. certainty of results; and owing to a lack of facility :i>lar to ours, many of the ooi clusio as contained in reports relating especially to the transmission of tfci disease do not appear to hav. been based upon accu ate obscnati ons.

Discussior ifi of the transmission of ti e dise m by feeding, based upon observations made without p rotecting animals f rom u^ ects do not, (f course, le;ld t0 A &1 al settlement lf the ' questi »; and so with* many other conclusions in the voluminoue literatu ire relating to this subj.

'• reviewi og literature we I ;ed in • each instance to give credit to the person to win mi due. but in this we nm sometimes have failed works of Ve •^e*, Lingard. Kanthuck. Durham, and Blandford. Laveran iU< d Mesnil, Rabinowitoh and Kumpner, Wasielewski and Senn, Schat Schilling; Bruce, and many others, li ave been freely u^ed.

^' desire to exp rese our <h obligations to Miss Mary Polk, librarian of the Bureau of Government laboratories, 1 I. for her bibliog raphy and prep iring • he index, and to Mr> c< j^ Arnell, stenographer and translator, und M r. Charles Martin, photo igrapher of the retu nf Government Labord ories, for Taj uable assistance.

Finally, th iis report has bwn mad. le possib le by the proi ptne M in & \\ow_ ing requisitions for the « N M r s and I he constant advice of Dr. Paul C. Freer, Superintendent of Government Uborato: ies.

BIOLOGICAL LA ORATOl Y, *Manila, P. I., July 4, 1903.*

TRYPAXOSOMA AXD TEYPANOSOMIASIS.

I. DEFINITION.

The <isease is a specific infection of many of tin- **Lowe*** tmiimils. **and** occasion•.Ily of niiiii. **caused** l»v TrvpanoHiinrt. It occurs in epidemic form over **laig**e area **a of tropica] countries, and** « usually mi**ore severe during** **the** rain; seasoL It i> el*aracter am* **by a period** of incubation, follow**ed,** in **most** animals, by a **remittent,** intermittout, or, less frequently, **relaps-** **ing** fev**e!•; by** the pr<sence **of Trypaoosoma** in **the etrcnlating bio**od, **which** in some animals are numerous in proportion to the **temperature; by progressive anemia** and **emaciation; by a eatarrhal condition of** the **mucous** niembranccri of the eyes and **no&e;** by roughn<-- **of the** hair. **which** in many in-tances, fal Is <>ut; and by **subcutaneous edema,** n**ore** c• imnonly of the pi<• extremit ies, ge**oitals,** and **belly.** In **the** later stages pare**QS** of **the** |Kinterior extremities is \<rv **QommoiL The** mortality among most animals of economic **importance** is 100 **per cent.**

There are **found** in **most animals ;u post-mortem, in** addition to **the** rvi'lence of sev**ere anemia,** certai**a changes in the** sj>leen, the most c«**a-** sta the other lesion: rish, gel- ations ad

Qt being enlargement and a peculiar mottling. Taken with principal J, **snch as lymphatic** hyperplasia; **peculiar, yellom** **nibeataneou8** and suberous **infiltrations;** an enlarged **liver ai** the **accumulatioi]** <f **fluid in** tin **i.** cavities, it **makes an anatomic** picture which is rarely **excelled** in **chronic diseases peculiar to** mail.

II. NOMENCLATURE AND CLASSIFICATION.

A list **of the** van uate **Trypanoc**omiasis in **differ-** **en! parts** <f the world has been compiled **from litentuz**e as follows:

*Ml)*ce.	IVmiu.
An Jin tap.	Dnu in.
Anftnir **[wnidsiise.**	l **,>• relapci^g** f.-vi-r.
Berbail.	**Equine ram,**
Bes**i b*lkr*nkheit.**	Equine syphilis.
Beschalseu(»**iic.**	Exantheme eoi **talc**
Blaschenausschlag.	Ki-lt >urr«.
Bovine sur**ra.**	Flagellose **de tijiliiiu.**
Buffalo sur*i A.*	Gal**fall.**
Camel sur**Iit.**	**Uiliiu.**
Canine surra.	Glossinose.
Dog surra.	HUT se pox.

!!•rse surm.
Jurkkrankl eit.
Khftnhi g.

l.u niniiclii-.
Leuma equtortun.
Mill tlf- r;iilcr.'s.
Ualadie *A* trypanosome.
\falad1e in-mjrm' iln coit
Malmiic iff ID ts<?t s6.
Maladie da St^mctlang.
Jktaladie <ln coit,
Ualadie da prttzit.
M i! lilii- \.''in'ni'i)]]f iln <•]..
Mitni.
gana.
Xik algaya.
N'gz ntt.
Nygana.
Oae.
I'lTllir: ons anelli)l OJ horses.
)'•-;•• dc <'ailcira».
Pferdestaupe.
Pint ta.
Pinuta-ka-darid.
Phora.
l'in ta.
Pint ra.
PhitgK] a.

Ph." ra.
Pi \) nerrit infectieuse du cheval.
Poooa.
Purnniu.
Rat >-iirra.
Relapsing fever of equines.
Sar.
Sara.
Schleuchende fieber.
Sokre,
Sukal.
StUTA.

Surrakntnlcheit.
Tap.
Tap-dik.
Tape-lik.
Tarai.
Tebersa.
Tibarsa.
liyjiuii sonrose.
Tsetse-fly disease.
TsMs^kra nkheit.
Tiniil)V-a.
runil<v-bnbu.
Wibai-ki-bokhar.
Zaharbad.
Zhcrbmi.
Zucbtlfthme.

I-' .ort the .,,,,,,-T, ypanosomiasis," ««n>gg«ted by Salmon and Stiles, is used, being in a general sense comparable to the terms "ih ria-sis" id cinariasis." Following this classification furthe r.acco rding to the animal infected, we _TM1,1 have Trypanosomias -ofmanTn™n somiasis of horses, Trypanosomiasis of cattle, etc. Such a non, ture" wou ly satisfactorily, whethe afecting paras demical or not, a also regardless of the manner and place of infection. For ex-ample, the te 1M y- •*•»• . t c a r e i" T,,, Tr ypanosomiasis of horses w «W apply equally well' to nagana I contracted by tl, ,, flv ;,', ^h .Uri,:a and to surr bite of an infected tsét ancient Trypanoso-miatie in Manila.

the parasites causing the diseases kno ra »"*-r a» old names .,,,!' h» -.or.™. hoTO, be different, there could ! I,, no y(•rv £ cessary, for interfering with the better part of the esta iblishliL clature. *Surra* wo men-

ypanosomiasis of horses and of other animals due Tan intl^ with *Tr. brucei*, etc.

On the other hand, if these parasites are sho •vn to I , fK same, or, probably more correctly, until they are shown to be different, there

does not appear am valid reason why any of the names except that of Steel gun a, accepted by Evans, the original discoverer of the pathogenicity of the parasite in animals, should be retained.

Without entering in detail upon a discussion, which will be taken up later in the report, regarding the identity or nonidentity of *Tr. evansii*, *Tr. brucei*, *Tr. rovgct^i* (equiperdum), and *Tr. elmassiani* (equinum), and hence the identity or nonidentity of surra, nagana, dourine and mal de caderas, there is considerable difference of Opinion, and also considerable inconsistency in some of the writings, especially with reference to some of the diseases discovered and named since Evans's original report.

Numerous writers on Trypanosomiasis base their diagnoses on the presence of *Tr. brucei*, and, after carefully describing the parasite, state that they do not know whether or not it is identical with *Tr. evansii*. How can such writers, not having previously studied either of the parasites, state that it was not *Tr. evansii* rather than *Tr. brucei* they were working with? If they are positive that the parasite is *Tr. brucei*, then they affirm it to be different from *Tr. evansii*. It is obvious that.

*

if these parasites are identical, *Tr. bru*... of *Tr. evansi*... not entitled to a place in the nomenclature of Trypanosoma, ... was known and described years before Bruce performed his work. Bruce himself, in his original report, considered his parasite probably identical with *Tr. evansii*.

Some eminent authorities criticize Koch and many other writers for stating that *Tr. evansii* and *Tr. brucei* are identical, without offering ... the proof ... their statements. ... criticism seems ... unjust. The proof ... is ... demanded that they are different p... until this proof is furnished, writers, in our opinion, are perfectly entitled to consider the Trypanosomiasis of horses and a number of other animals as being due to an infection with *Tr. evansii*.

The practical importance of deciding this question is forcibly brought home to workers in the Philippines ... epidemic, a fact which has already been emphasized by other writers. We have ... to deal with an extensive epidemic of Trypanosomiasis in several species of domestic animals, particularly in horses, and the parasite causing the disease seems to be the same in all. This parasite answers the description given of *Tr. evansii*, *Tr. brucei*, and others, and it is not necessary either to introduce a new name or to classify from description. We have decided, after a careful review of all available literature pertaining to the subject, that we are dealing with *Tr. evansii* described by ... the causative agent ... Bruce as the cause of nagana and named *Tr. brucei* by Plimmer and Bradford and Schneider, and also described ... other names by various authors. To be consistent with this statement, "surra" would be the only allowable popular name for the disease caused by this parasite, the numerous other names becoming mere synonyms.

In those f»rius of the disease due t« other species of Trypnnosoina >ther names wonit] of course be allowable; but, with the possible exception of dmiriiH', we have nowhere else met BO much confusion and such a multiplication of name*? as* is found in the group of which *Tr. evanii* is the (iii-e.

III. HISTORIC.

Cali>lrini, according i" \Voges, in 1842 wrote letters detcrihing a disease in South America, which has subsequently been determined to be Trypanoaomiasis (mal dc cadents), and since tliat time has been die<ussed under viirioiiK miims and by several authors.

Sivori ami Leckr are satisfied that this disease existed in South America before 1850, while Laivrda states that mal de caderas was imported inland about IS 50 from Mara jo, an island at the mouth of the Amazon River, and from there spread rapidly over Brazil, thence to Paraguay, probably about I860, qnickb covering almost this entire country and killing thousands of bora*.

Douriae has been known in various places since the latter part of the eighteenth century, but curiously enough was one of the last varietus to have its •tiology elucidated. In 1858 Living*tone wrote of the ts&tsfly in Africa, at th*t time old and well known to the natives.

Surra *wt* tught prominently l>efot the scieritifio world in a report published by G. Evans in 1880. 11 accurately described the disease, which had been known for generations to the natives of Indii, and provi d the causative role of Trypanos«aa in this infection. Sim the publication of Evans's report a grea I deal has bees written regardiing Trypano*miasis, as a glance tt the bibliography will show.

The disease annmtlly destroye millions of dolUrs^ worth of anin.als in India. Africa, and South Americi* Son e of the more recently infected countries are the Islind of Maurr ius, Java, and the Philippines, The [aland of Mauritius was free from irypanosoi niasis up to 'he South African war. but during that conflict many animals from mf ected countries were sent into A Erica and some of them found their way into this island. *A* severe epidemic developed, destroying » maiiv of t'he animals that the planting and gathering "f croj s became an inij**-ihil.ity.

In 1900 surra bt oke out among the cattle, carat'ao. and horses of Jav a, since which time it has there been endemic. As -<>on as the disease was di-covere,| in .lava vigorous plans to prevent its spread were instituted arid with mark>d success, if the small lo»sea of that country are compar^l wr h the frig litful havoc among horses and cattle which have He.n reported from other infecte^ regi.ons.

In 1886 Bignami and Celli mentione la par;asite resembling *Tr.* farii whirl) tliey found in the blood of a patient suffering from malarial I ever. Nepveu, in 1898, reported the presence of Trypanosomi i in the blood of

seven patit-nt*. six of whom were differing from malaria and i be s•-T11li was healthy. He described ami illustrated the parasite. Duriiij 1902, Dotton, Ford, and Manson reported Trypi nosomui in human Iiings, and in 1903 Mj nson mil others reported a Dumber of ct*es.

The fir^t published report which we have of Trrpanoflomiasia in the Philippines eras by Smith and Kinyoun in 1901. The bisfe ry of the epidemic in this country baa been reported by \Cusgra\e and Williamson in a preliminary published *n>* Bulletin No. 3, Bureau i of Government Labintones. This report was read befare the Maniln Uedical 9ociety and brought out considerable diaeuasion. Tho only point ai issue was our atatement that the disease was introduced bere in L901. \\'e have inv-stigated as far as possible the arguments brought forth thai surra was here prior to that time, but have found Both ing to justify any cban| in our original statement. Tin* subject i not of |rv it important one way or the other, exce]tt fox its historic interest There is one thing absolutely certain, that the di*ase was intxodttted at that time, and. vfaether this was its origi ual appeanuut[1] or not, the frightful epidomit- which 1as raged here is positively connecte I with ihi^ in fection. Our statements regarding the manner of its spread were absolutely com incing at tlif time «f the publication of the preliminai y report, and additional work along these lines \u* siiu. confirmed the conclusions tin re given.

During the past month *v*e have had proof of the reimportation of the disease, this time in a cow received from Java.

Since its introduction the infection li.as been spreading throughout the Archipelago, and at the present time areas in which it is prevalent are reported from almost the entire group of islands.

IV. ETIOLOGY.

GEOGRAPHIC DISTRIBUTION.

The geographic range of the various forms of Trypanosomiasis is shown in the following table:

Continent.	Country.	Province, territory, division, district, etc.	Form.	Reported by—
Asia	India	Bengal	Surra	Lingard.
		Berars	do	Do.
		Bombay Presidency	do	Do.
		Burma	do	Lingard, Steel.
		Cashat	do	Do.
		Kohat	do	Lingard, Gunn.
		Konkan	do	Do.
		Kumaon Provinces	do	Do.
		Naga Hills	do	Do.
		Manipur	do	Do.
		Northwest Provinces	do	Do.
		Punjab	do	Lingard, Evatts.
		Rajputana	do	Do.
	Annam	Cochin China (Tonkin).	Surra	Blanchard, Mollereau.
		Indo-China (Nha Trang).	do	Carrgeau.
	Korea		do	W. G. C[illegible]

Continent.	Country.	Prorioee. tafifj division . district, etc.	Form, i	!tt|H.r[«l by—
Asia	I[1], T>i»		Sun*.	Haig.
	Syri*-..		IJtilit	Nocard and Leclainche.
	Java	Bantan	Surra	Panzotta.
		Cheribon	do	Do.
		Deli	do	Vrijburg.
		Rembang	do	Penning.
		Semarang	do	Do.
		Soemedang	do	Hubeiifl, *lie* I »»•*.
		Tegal	do	Panz.:Ul
	Philippines		do	Smitii and Kinyoun. See, (*»r-y. Balmon and stiles. Strong, Musgrave 1:1.1 Williamson.
Africa	Algeria		Dourine	Chauvra-. Nerche Signol, Vlordot, Lacs nermin.
	Abyssynia		Surra	Bnice. II til !<'ii.
	English Ea-t Africa		Nagana	Story.
	Egypt		Surra	Lingmrl.
	<if niuti* fjo>t Africa		Nagana	Koch.
	Kongo		do	Si *Um*
	Madagascar		Surra	Lingard.
	Mnurit:' :-		Nagana	Edington.
	Murooco		Dourine	Bruce, Nocard and Leclainche.
	Nubia		Nagana	Hallen.
	Somaliland		do	Brumpt.
	Soudan		do	Schilling, Dunny, and Pierre.
	Togo		surra	Koch, Schilling.
			Nagana	E. Martin.
	Tripoli		Dourine	Nocard and Leclainche.
	Transvaal		Nagana	Theitar.
	Zambesi		do	Livingstone.
	Zululand		do	Bruce.
	Malarial zone (see		do	Do.
Europe	0H|	[iiia	Dooi	
			do	Weber and Nocard, Legrain.
	Germ»n>	Celle	do	Haverman, Hansmann, and Pi:annenschmidt. Voges.
			do	Hertwig.
	Hungary		do	Noc iiTtl and LooUinc
	Spain		do	Weber and Socrrt.
		IV ences (Navarrv)	do	Nocunj and I.
	Turk' |	rt(>	-	Do.
South America	Argentine	i 'KiMinari'a	Mai d*	Sivori and I.
			caderas.	
		Chai''>	do	Do.
		Corrientes	do	Do.
		Formosa	do	Do.
				Vag es.
		Mlalones	do	- ri and Leeler, Vov es.
		Santa Fe	do	Do.
	Bolivia ..	M •• '••• I *TomO*	do	Do.
	Btmalt .		do	Reboni em.
				Sivori and L-eler. es.
	Chll.		do	
	Han Island		do	Lacerda.
	Paraguay		do	Thompson.
				Sivori and L-eler.
	t'nuruai,		do	Do.
North America			Surra	
	United States			Noc<>Mnn<1 Ltf Jainche, Reports of the Bureau of Animal Industry.
Australia			Surra	Lingard.

Fig. 9 gives a schematic representation of the infected areas, drawn from Scheube's UUIJI. Ig. 3, illustrating tiw -> n& of the world in which malaria prevails. Fig. 3 is reproduced to show tin* relation in geographic distribution of Trypanoeomiasis and malaria.

The table and maps given above illustrate the wide geographic distribution of Trypanosomiasis and its special prevalence in the tropical and subtropical zones. New points of infection are being reported from time to time, Neither the table nor the map are con); iud both may contain some inaccuracies owing to tine conflicting reports and the tad that some of the references £.ri\<-u are not available.

CLIMATIC CONDITIONS.

All the different form? of this disease are infect inns incident to the periods of wet weather. This statement is made in nil discussions of the subject, which we have been able to review. The reasons given for the fact are varied, but rln- true explanation, namely, that biting flies are much mure numerous during this season than during any other, is confirmed by nearly all recent writers. Hot only this, but tin* rainy season offers another and equally important condition, which will be fully discussed under modes of transmission—i. •.. the dark, cloudy days with great relative humidity make it possible for the fly mechanically to carry the infection f<»r a much longer time. We have shown conclusively thai bright sunlight quickly destroys the Trypanosoma; and even if the proper i'ie- were more numerous during dry weather, this factor alono would greatly limit their ability to carry infection.

To sum uj>, the tr;nsmission of the disease is greatest exactly under the climatic conditions most favorable to insect lite and to the insect's ability to carry the living infection. *Such conditions orettr in law-lying, marshy lands (hiring the dark, cloudy days of the rainy Mason.*

Trypanosomiasiji pa-vails to a limited extent under other circumstances, but \\v have reason to fear epidemics only when these above described are realized.

We know of no other predisposing cause- for surra. All species of animal within certain geographic area may contract- the disease by experimental methods. As will be shown, natural infection is a mechanical process, so tbat no reason exists against tin- supposition that all animals are susceptible to the usual methods of transmission.

A mim!».r of writers have stated that a greater percentage of foreign horses coming into an infected zone than of native animals contract the disease. Of SO horses observed by Lingard, 16 per rent died during the first year, and 70 per cent during the first seven years while under observation. \ustraliun bones were found by him to be more susceptible than the native horsos of India-

In our experience in Manila. Australian, Chinese, and American horses do not appear more susceptible than native ponies. Tn several instances

we hav

these conditions one appeared

in either case greatest percentage affected

ican horses ar s of animals; - Amer-

dedu large stables, a superficial

percentage higher

native ponies. occurred in stables containing

Lingard considers both sexes to 1«. ,,,|ii:,i[susce,'ltii|

no opportunity either to disprove this stater

all the horses sex ce

communication of the disease in other ani

»P1 ad do so in horses. "•"•' a"d (l"'r"» w raum h,

Steel stated that white and grey mules are more susceptible

than darker-colored animals; and, among others, Laveran and

elieve this to be the case with horses as well attribute

non to the supposed fac. that flies bite ligl.. ored animals

ark ones. This fact is questioned ors,

ie that on t ner animals the flies may be more

We have been unable to verify this state-

not been infected in greater pro-

th others, nor do they more readily attract biting flies. As

fact, our statistics of the Philippine epidemic show them

to be less acked. No importance can therefore be attrib-

uted to color as a factor in the spread of the disease.

In ge

horses c

animals in M greate

rats has shown us that the conta ore

ofte rence is probably not due to

the greater susceptibility of the former, but is accounted for by the

fact that, like dogs, they are prone to fight, and hence requently

have wounds, particularly about th favor the

entrance of the parasites.

TRYPANOSOMA.

HISTORIC NOTE.

In this dis sion the species of Trypanosoma have been followed in

part at the e publications.

Valentin (1841) discovered hematozoon, a

sites, the former in trout (Salmo fario) and

of frogs. Both were probably Trypanosoma, Doflein considering

description sufficient for the recognition

observed 843 Gruby

rogs, naming it *sanguinis*; and

despite the previous work of others, he has ge credited with

noraljy be.

it s discovery, hip work being inbeeqpentlj confirmed by a number of i in f>ti gators, .

Lankester (1871) discovered a aausage-s!ia|M,l parasite in the Mood of fro-,, naming it undulina. Oaule (1H80) *m* one further 001 lions on those bodies, which he considered protoplasmic portioi the blood corpuscles separated for a short period oi independent I and more prevalent in very dry, warm weather. [*ocoeytee < en to be converted into flagellate and then back to leucocytes. Blntscnli and Lankester, commenting on Gaule»a work, ad ndently, that the conversion of ameboid bodies into fia| a and the reeonY. of flagellates into bodies resembling white corpuscles did n the latter to be leacoeytes. Gwuw (1888) observed in frogs a ps which was named paran les-

Blanchard (1890) confirmed Grni rk and gave the following synonyms: *Panmecmm toricetom* I *Airotatormm* M • *hulariu radinta* Wedi, I84fi *imtrium cosiatum* I it, *,lulina ray* Lankest* r. 1871; Fanw . and *Hcmatomoitis* Mitraphammv. 1883.

Danilewaky bed at least six varieties ol in the blood offrogs. He noted the change in the blood at rest from I flagellate to the ameboid stage, as had already been mention- rthers. At forma were seen to segment into 64 B] whkfe gradually -umed nomad forms and divided by longitudinal division. Trana- - was occasionally seen. Flogge (1« that th£«e parasites very closely resembled *Tr. lewieO.* MnltiplksJ o- Btsted in longitudinal and tr. - division and spore formation, the lar Betimes being pi I ll>' an wneboid length as 80 micron? and mentioned that the pane with umlula: embranea and fiagella. E£e said that they wi nd i n f, tUh. birds, o; dudoaaa, and ral structure they resembled Trypenoaoma. Their snk action « not known.

Kaminski (1901) sgtin *nil* tention to Uu ibdrty in rease D the occurrence o! *mgvim** Gruby with t! animals. They were found ai all seasons of the year, and were more common in males than in femaks. No disease in frogs was produced,] ami there was no evidence of th uimals, , ,.-, when the] were I *r f<>r ll|onI hs. *i* rod in tin* in* which , ra ,mn, ,-. bat which in all probability t tri. homor ias.

Lewis (187 I ,ma |880) des rilwH] Tr ypanosoma found in tl e rats of 1ndia. In a owxm.l paper poblttbed in 1884 he considered tl »«e Trypanosoma identica] with *Tr. equinii.* 'Opie. Flujige. and i ome other

writers g[illegible] credit for discovering Tr[illegible] [illegible] [illegible] have [illegible] case in his article [illegible] does not indicate that the hematozoon of m[illegible] M. J. [illegible] h he reviews the work of Lew[illegible] others on t[illegible] [illegible]anosoma.

B[illegible] (1880) found flagellates in the intestinal canal of a noma-tod[illegible] *[illegible]lus gracilis* [illegible] Inc[illegible]uding fla[illegible] [illegible] domestic flies, so[illegible] observed [illegible] [illegible]late col[illegible] [illegible] re[illegible] [illegible] a Trypanosoma co[illegible] [illegible]is obser[illegible] [illegible] sters imported f[illegible] He states [illegible] [illegible] Lewis's description of it. [illegible] P[illegible] [illegible] India, have playe[illegible] [illegible] [illegible]oma to present in all. [illegible] [illegible]en they succumbed, although [illegible]

G. Evans (1880) discovered [illegible] sufferi[illegible] [illegible] [illegible]orses [illegible] He proved the causative agency of these parasi[illegible] [illegible] con[illegible] [illegible] disease. Steele (1885) [illegible] the parasite *Spirochæta evansi*. Crookshank (1886) made a report on [illegible] [illegible] [illegible] [illegible]ng Evans's [illegible] [illegible] Mitraphanow's T[illegible] [illegible] identical [illegible] [illegible] the intestines of the [illegible] and was prob-[illegible]

Certes (1882) found in the digestive tube of an oyster a parasite [illegible] [illegible]d *Tr. balbianii*. The general description follows that of Trypanosoma, but slight differences of internal structure were no[illegible] Undulating [illegible]ane and flagella were present, but nucleus, nucleolus, and vacuole were not observed. In a later paper he demonstrated a nucleus. He considered this Trypanosoma closely related to Mitraphanow's "hematomonas" (Trypanosoma) of fish. Laveran and Mesnil (1901) found these parasites rarely in Portugese oysters and frequently in common oysters. They say that the bodies were not flagellates and that the presence of an undulating membrane was questionable. They do not consider Certes's organism a Try[illegible] [illegible]

Mitraphanow (1883) described Trypanosoma in mudfish (*Cob[illegible] fossilis*). His parasite was 1 to 1½ microns broad and 30 to 40 microns long. He gave a very careful description of these organisms, which occurred in nearly all the fish examined, and were more numerous in hot [illegible] [illegible] He gave [illegible] the name "hematomonas" [illegible] des[illegible]ibed two species.

[illegible]ebius (1883) found Trypanosoma in oysters (*Tapes decussata*, [illegible] [illegible] in cold weather, [illegible] [illegible] and

Tap pdlmtra).* These pararitea were studied by Luatrac | 1 >•>.;», who considered them Tryjianosomn.

Bi_nami and Celli (1885) found, in the blood of a patient with malarial lever, paiasftes ra •sembling the Trypanosoma of frogs, birds, and Bah. Kepten (1898) -1. - I Trypanosoma b cases occur ing in men, six of whom wen sulTering from malarial fever. Barron is quoted by Laveran as hi flagellates in the Mood of an anemic woman. During LW8, Dntton, Ford, Sambon, Mai id •hers ht scribed the occurrence of Trypanoeoma in human beinj Datton fin «u»t of the8e P***"**8! fomitl in lh<1 Illon,1 of Dr. Ford's patient

Danilewsky (M •»•"" ll Tiypanofloma in tin- bk naming it y vm Like Blntachli's parasite it had a long BageUom and an undulating meml.mne. Division was longitudinal. transverse, o.•• by segmentation from the ameboid stage. No syu. W(:re produc..! in the heat Danilewaky thought this wae probably due to the high temperature of tl:e birds or the tolerance acquired by generations of infection.

Lau-ran and ttesnil (\'-ul\ > foand Trypanosoma in three kinds of fish—broehet, Bole, and red* That found in the *bn* ;,|rit •/. ind was nai . them *Irii,* afl Bemak, who & wed the. panu • *The* Tr panosoma fr• in, the sole was aUo of I ran mi il state thai Trypanoeoma had not previously been observed in salt-water Sao, hut in this th< probably mistaken, for Fhigge (1896) rejported finding thorn in I Mediterranean - »am which they found in the redeye had a fiagellum at each end; they placed it in a separate ge at which they called *Trypa*opk*ma,* giving th- parasite the name *Trypanoplosnuil>arr*

Etonget (1896) described Trypanosoma found in the bla ho suffering from dourine (besth bfi), and for two and one-half *I* this organism in susceptible animals. V lev sky and g enn (1899) confirmed Roogefa work, and determined the pathogenic action of this Trypanosoma for the horse, passing it tl; other animal! and Iwck to the horse, repi i was*": I ivrat *v* U tll(l ***** *Tr_ ro* I >arA!l ; and Hesnil (1901) proposed !t *Tr*- W ^ 1 ,, 1 , w!lk,h is of dourin July, i *t\\e* nn 9 'iion and v tiles.

Elmassian, according to Voge», in 1901 iii>t cliiTen-ntiat - ith America: vhik ribed tin- pan ,ion im.

Voges (1902)

. ferracc not available.

Theiler, in an article published [illegible] the discovery [illegible] Bruce (1902) [illegible] credited with [illegible] proposed the [illegible] Trypanosoma of [illegible] So [illegible] theilerii. [illegible] the [illegible] year Theiler [illegible] different species [illegible] trypanosoma [illegible] ings specimens of it to Laveran who [illegible] distinct species [illegible] cente[illegible] near the proposed th[illegible]

In 1901 [illegible] described a parasite which had been observed by [illegible] swimming in the blood of a sick horse in Manila, and this parasite was afterwards determined to be a Trypanosoma. Later in the same year Smith made some additional notes on the organism, and considered it *Tr. evansi*.

Curry (1902) described the parasite and classed it as a Trypanosoma, but was unable to [illegible] *Tr. evansii* or *Tr. brucei*. His description was the first accurate [illegible] the parasite found here.

[illegible]

is [illegible] or even [illegible] are readily observed with No. 4 ocular [illegible] Zeiss. If they are [illegible], considerable time [illegible] be necessary to find one, but once seen the diagnosis is determined. [illegible] facilitated by staining the specimen [illegible] any [illegible] approved methods. For a careful study stained specimens [illegible]ssar[illegible].

Fairly good results are obtained by any of the methods used for staining malarial parasites. Romanowsky's met[illegible] an[illegible] of its mo[illegible] tions, partic[illegible] [illegible] have also published direction[illegible] Laveran & Mesnil.

A most satisfactory stain for Trypa[illegible] [illegible] prepared by Dr. [illegible] G. Woolley, pathologist [illegible] tory, [illegible] the first time [illegible] permissio[illegible] [illegible] hed here for [illegible].

Fix smears in [illegible] alcohol for ten minutes.

A. [illegible]	[illegible]	[illegible]
Dis[illegible]	[illegible]	[illegible]
B. Polychrome methylene blue (Unna)	grams	[illegible]
C. Methylene blue (Med) (Grubler)	[illegible]	[illegible]
Distilled water	gram	[illegible]
[illegible]ion B	[illegible]	[illegible]
Of solution C	parts	2
	part	[illegible]

Mix [illegible] ch 4.5 c. c. of D.

Stain by immersion for twenty or thirty [illegible]

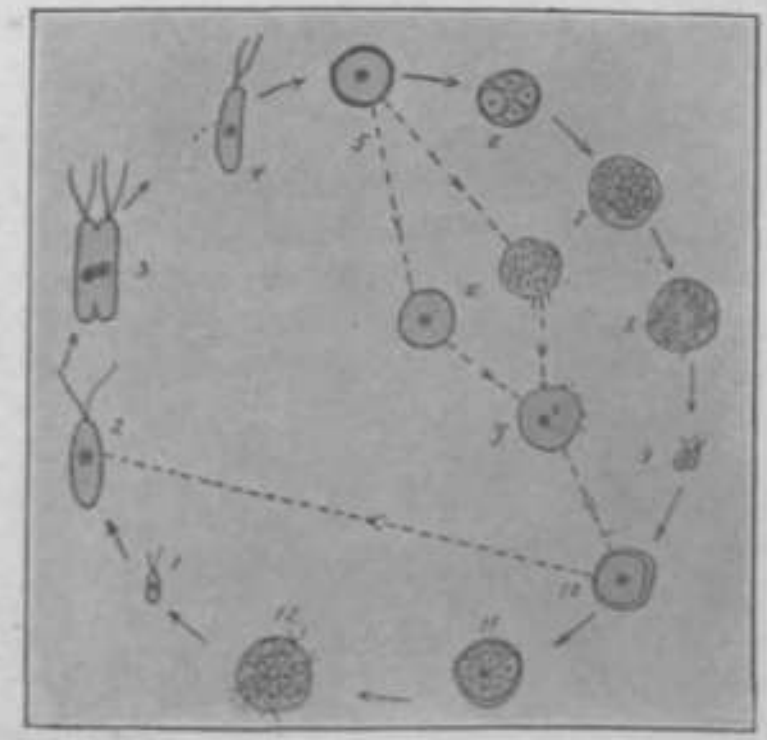
Wash for two to five seconds with [illegible] ater.

[illegible] ely.

longer [illegible] by [illegible]

Salmon and Stiles write of flagellates as follows:

In general, but eapeciaOy in reference to th<* lower fonna, it may be -;iiJ that tdo protoplasm is quite **liuiauguutmn.** ;< initi ly ilnitl **endopiasm** may lx- **rei**ognized surrounded liy it **peripheral** ectoplasm, tin- l.tit< i in turn iiiuv IK- **bounded <•** y a more dense **layer, Oka** a **flellrafrfi** cell **nenlaaae.** Those **three** <liviHions are, however, not always very **distinct,** Imt **grade all....< bapareeplihiy titto** one unother. \/w **pharynx (• a** very **auperiieiaJ Utfuadibultim;** a **pennaaent aana** appears to be **afcaeat, bal the aMreta appear to** bi expelled from :i **law reaiatant** point aI the posterii>r ixtitiniiy. without, however, fi Uiiviti- **any** trace of th^ir pussape. Th<- **Bagellmn represent* aa orgaa <f locomotion, aad there may he one or** men- **pteaeat Ifce pulaatibag recnale i- neat tte surface, btri does BO<** appear in **pqaaeaa dthex i diatiaH BMiubiane or** n **permanent pore. The aneleaa** is n unded and ap:pears to be provided with a **Badear DKinoTase arid aueleoliia,** If «I'lulition- **beepJBe anfiiTormble, aa when the mediuni beoomca too nrmdrtiewi by** evaporation or too **toxle by extreme paferdaetion, tae Injellate nay (ttoeard** it-*, flngflhini. l>eeonie round, and form a **BarrottBding eyat membrane; upon return of favorable conditions, it may eaoape from the eyal** ami. **(brmfaif i new BageUnm,** reco• hm.11,1 lift^; or it may **divide daring eacystmeni** i • **division** of the free **lorn** in nmltiplyitif: **(a usually** lun^itudin;i]. in **BOOM eaaca, the** orgnnisui tiny-ts before **dividing, then by longitudinal** (iivision two organisnia **are** formed; the latter **may then eaoape,** form their **flagella, and** ticcoine **ad**ive; or e;ich (laiijrhter orpaniMn mav **reineyai and divide** further: or **UM mother** flagellate, when encysted, may **divide into a** large number of so-culled "spores," each of which. ii|>on escaping, forms it flngellum. There may also be a com-



[•int'Tum of v«nnti-.ti* **in** \U<

FIG. 4.—Life cycle of flagellates: 1, A young flagellate; 2, Adult flagellate; 3, Longitudinal division of adult free form; 4, Daughter flagellate; 5, Encystation; 6-8, Division into isogametes; 9, Division into macrogametes and microgametes, characteristic for some forms; 10, Conjugation of the isogametes; 11, Conjugation of the micro and macro gametes; 10, Resting stage—zygote; 11-12, Division into young. (After Doflein, 1901, p. 50, fig. 29.)

plete **conjugation oi the two** imliviilnals. **lolloved \>\ encgrstmeat utd** division into numerous young.

The ilhutration (fig. 4) *taken* **from Dofiein u intended to >h.n\ (be** vjiriatiujis in the **life cyde of t!**

But **little** is? known with **reference to that of Trypanoeoma,** ami **the** majority of \vrit< •= so express themselves. **Son** ever, i **number hare** obse rved in **the** blood, **bodies of** various kind?, **which they haw** consi **Icred** it- **having to do** with **the phatea in the cycle of development Vogi -** and othe **ra consider the entire lif<** cycle of the parasite to be acte**!** out in **the blood, and** present very good argument**-** in **favor of their** i conclusions. Sclnit is **the only author, among those** *whom we* **bav« been able bo rei** iew, who **believes** in an ii termediate host **for the parasito** s.

11- says:

Analogous**l >** to **what** i-. known *ttt* **be true** in **malaria,** it upponrs that tin- surra parasite also goe**I throuj**h a cycle of s Mini <*W-*\opment in the bo>.*y at* tin[1] tly, and in that **of *the* In**rse, cow, a **ltd dcmkeg an** asexual one. The ase\iul den lopniont niiiy t»v <f **two** kim!-. **one** l>y **the** fyritmlion of spores a **ad** the otli.r by (livi-icii.

In **the blood of (tones or *earn* and** in **tt nr ezpcrimesta]** animals we have not observe**•i during** tlic **whole** <H»i rse of the investig ation a sexual **union of the parasites, whidi i> eontrarj** t'i **the obscivaUoni > f Pean&g and Plinuner** nn<i lira it ford, **who** iiiuki- **meatfoa of forms of** i **onjugat km.**

In tlii- **regard we** fwl jpstititnl in supposing that an hypol hesis si **oilar to** that whi ch Hanson |>nipos«l for malaria **bold*** tru> also in the case of su rra— that is, i **blood**-sucking insect (the stomoxys) serves as a **host** in tin s disease also, .tml that **the** surra par:asite is prop :<gated in the body uf t his insect outside of ih*- *hone* and **cow.**

Fig. 3**• taken from** tlii* **author Uhu** trates his obs **nratioi** ns.

We **are indined *U*** accept Voges's **iea (Jt' the** **lif*4'** cycle. Trypano **nna haw not been** found **living ontaidc the animal for any considerable length** of tinir; th.> **ren**oval of the **animal** ho^t **from** a **locality alw**ays result**- in the** disappearance of the disease, **and attempts permanently** to *ad* oct **inedia of any** kind **have usually** proved **ui** successiul. **We** Ua- per- for med a number of experiments w ith **biti**ng flies caught on sic **kaninu**ls, and **have fail**ed to convey t**ft*r** disease twintv-fmu hours, either by **allow**ing these flies to bite susceptib **blc** animal'-, or **by** in jecting or feeding emulsions „f th.se insects. This of course argues strongly against any but an improbebly short cycle in these insects.

Recently Novy has **• juried** thr **colti**vation of 7V. *lewisi* for over a year, without any loss in their virulence**. in 11** ni^i is composed of agar and rabbit's blood. Only very b rk-f mention of thi- report has been received, and we are unable to deter **nine w]**at is meant by "no loss of virulence" in *Tr. lewisii.* The work i- interesting, a nd tli< results wo iilil seem to furnish further evidence t itflt **an interim** diate host plays no **-nrt in the lif«** cycle of Tryp **mi**osoma.

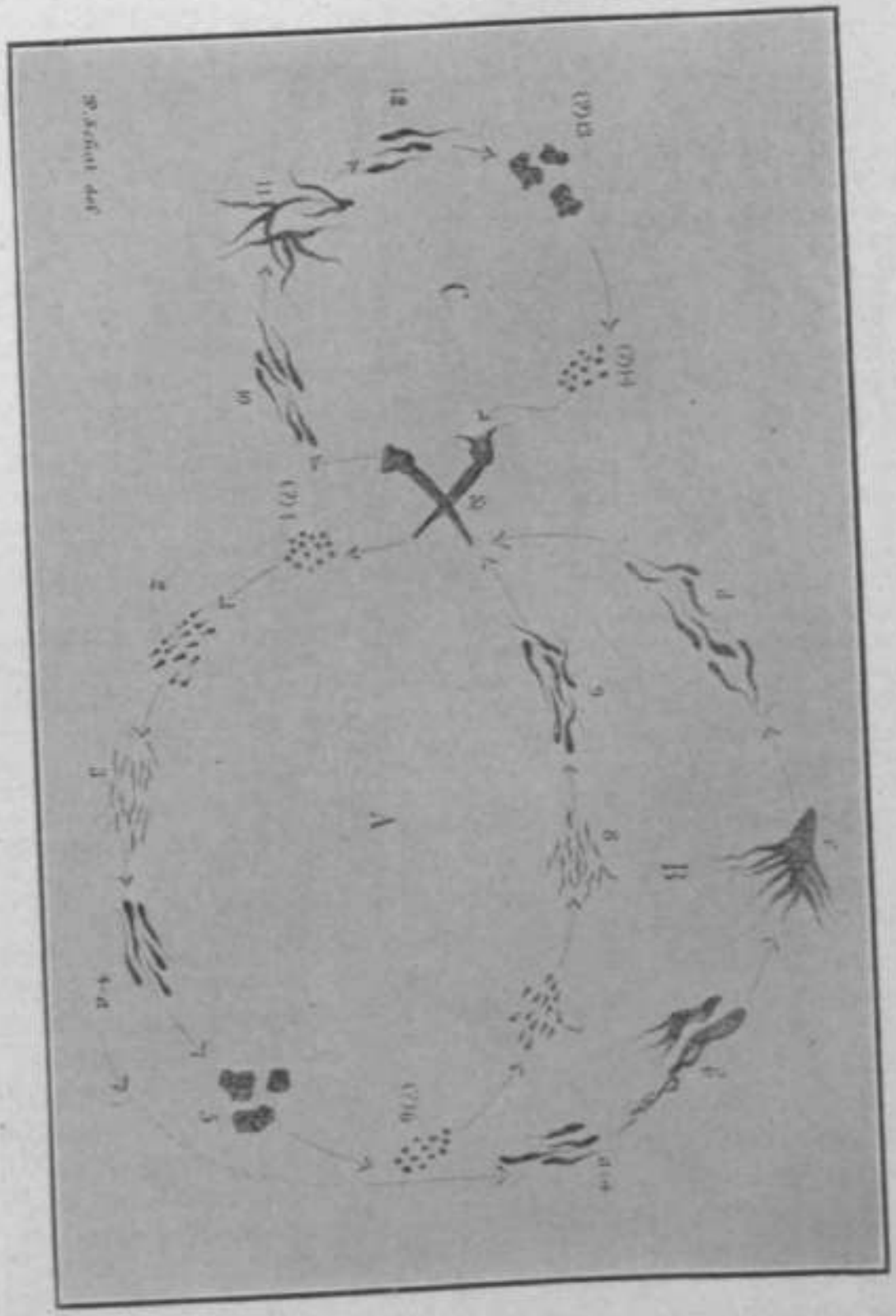


FIG. 5.—Illustrating life cycle of Trypanosoma (copied from Schat. 1901, Pl. II). Circle A gives a schematic representation of the cycle of a sexual development of the surra parasite through the formation of spores in horses, cattle, and donkeys. Circle B, the changes in the sexual development of the surra parasite through partition, in horses, cattle, and donkeys. Circle C, the cycle of sexual development of the surra parasite in the body of the stomoxys fly. Circle A (7). 1, spores introduced into the body of a horse, cow, or donkey through the bite of a fly; 2, The minute conical bodies which result; 3, The young surra parasites which spring from these minute bodies; 4, The matured surra parasite; 5, The amœboid form which results; (7) 6, The formation of spores; 7, The minute conical bodies; 8, The young surra parasite; 9, The matured surra parasite. Circle B. a, b, c, d, e, f, represent forms of partition; Circle C 10, surra parasite in the stomach of the stomoxys; 11, Process of conjugation in the stomach of the stomoxys; 12, The surra parasite produced; 13, 14, Not yet observed, but are probably the subsequent stages of development of the surra parasite in the body of the fly.

•"'lil 1|f *U q ecies are in gen eral similar i organisms. IV family diagn< sis, as given by Salmon and Still s, is as follows:

n_ -gellate parasi ktforaw with one dhiel flagellum directed auu-riorlv in » me fora s a s emrfarj Sagdhxm directed , osteriorly; body usua' lly with ^ ^ gles, and wound more o i |,.ss i,i the form of a »piml; one tagl« „f (i, body provided with an undulating membrane. One rodeos and on., mrtrowme present

T!lh, mnr! phology varie species ,£ TrypanoaoiM - ff^tly in the sum. and also to a greate r extent in diflerent <j, - n |ge Qeral th(. .^ sites may be said to measure from 1 to 5 mi(rons in thickness a ad frr(111 15 to 4 microns in lengOi, inolndji Hum. *They* nil show rery active eel-like movement* and some motility, 1- some species the latter is very sli e parasites ondukting with extreme rapidity, b ut cov- erw ...rt a distance as to be easily followed ande* *th* microscope; wMIe in other , espi ially V. *lewi* m, the movements are often so rapid in fresh :ly drawn blood thai it is impossible to Iceep th e parasite in ,!„„ field. Some wrritera have need this variation in nwiility w a diagnostic poin i In differentiating the organisms, and in general some importi nce may be attached to it. hut I here are so many exception-, due to condi- tions w hi(<l1 it: e not understood, that its value in differentia] diagni osis may p;irtly IK- die regarded. Yiir; ations are occasionalIv found in one species, often, indeed, in a -ingle preparation, which a: e nearly as great as those observed between different species.

Tiic Qagellnm at tlit >r end of the parnsite, in all forms which we have studied, varies greatly in length. It is always activolv motile, point.-d. and c oniinuoufi, with the thi ckened marg Q of tlie imdulai ing membrane ending at or near the centrosome or micro nucleus. It |may be 'iliroly homogeneous. or it ma> contain from one to seeveral distinct granules extending w 11 out from the body of tli e parasite.

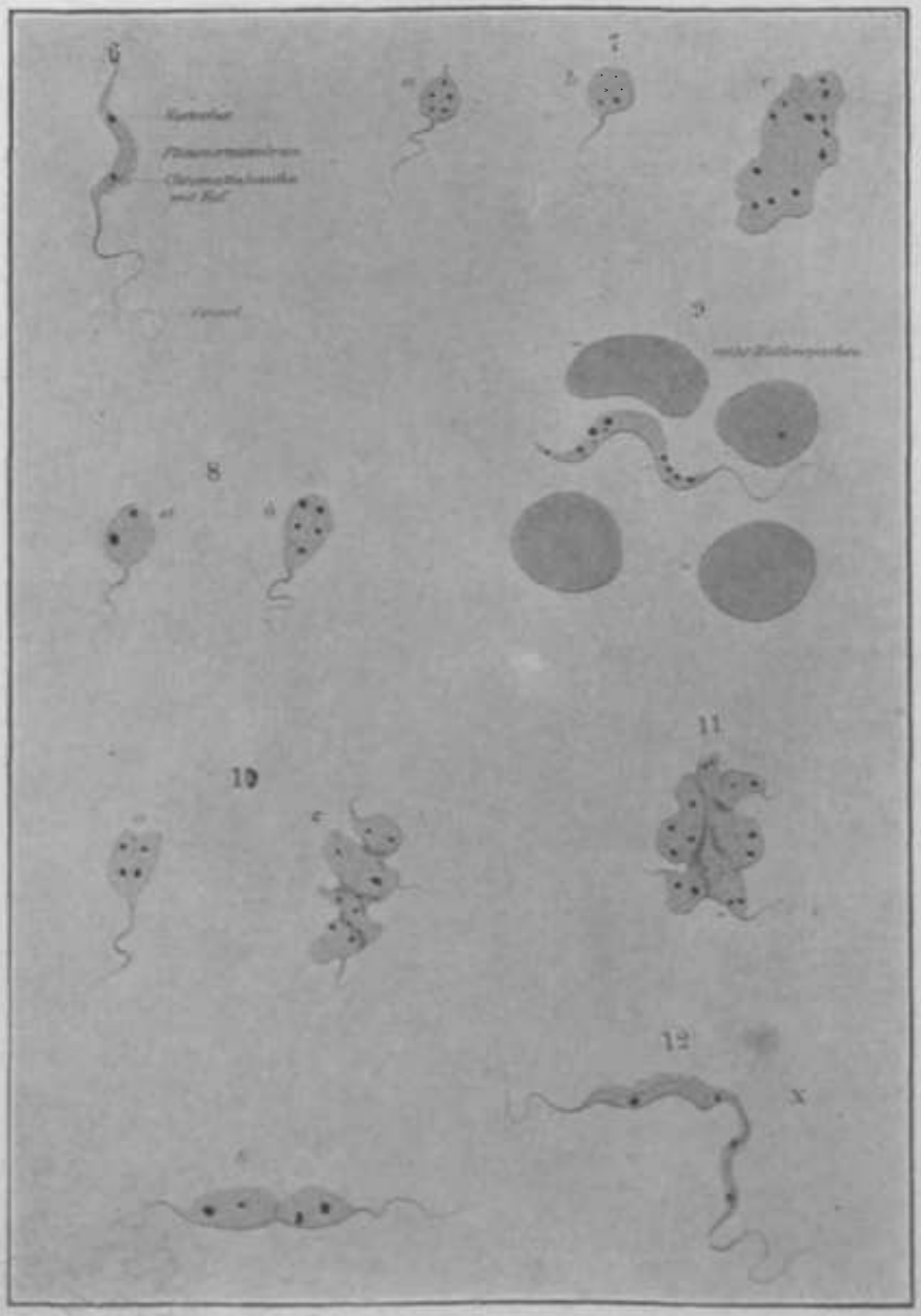
The* umlulat; ing membrane extend Iff alon. one border of the org..inism from m-ar thi- centrosome in the posterior portion to the anterior en ; of the p be, from wb it continues as the free flagell unu Its brea dth a»tl folds vary considerably in the same and in dif Ferent species of para- sites . and alwi. im doubt, to HI considerable exte nt with tl age of the Tn| anosoma. Many authors asser t that th*1 youn^ form- are entirely free from thifi membrane.

Tl e nucleus is nsually situate i in the anterior half te an{j i a 1 or round, and varies considerably in size and shape. It is generally 'iffen!! assumes other contours with the d t stages of divisi„n.

The centi some is usu illy in the p- posterior and more blunt end, and appears to have an i intin ate association i with the flagdlum and undulat- ing membrane. Its varying distance from the posterior end has been used as a diagnostic point in determ linin P the species; but not much im- portance can be attached to this, for it has been sh^wn that the posterior rnd of the Try ;ian»»H oma is undoubtedly contractile, so that the distance

from **the extremity** at which the **centroeome** \a **found** and **also, to** • certain **extent,** the degree of bluntncss of *tYii* [mrt.* ***a*** **feature** which h«^ I so much discussed, depend? partly **upon** it? contraction or elongation at the time of fixation for **staining** and **study.**

The 1l]otoplas*n i>* homogeneous or **granular, depending upon** the **age**



Figs. 6-12.—6. Young adult *Tr. cyclops*; 7. Degeneration forms; 8. Young *T. gerbillonis*; 9. Multinuclear adult *Trypanosoma*; 10a, Longitudinal division; 10b. Transverse division; 10c. Multiple division; 11. Irregular form; 12.-Two young *Trypanosoma* not yet separated. (After Vages, 1903.)

of the parasite, its environment and no doubt, to a certain extent, upon the species. The granules may vary in number and size from very few to numerous large ones scattered throughout the protoplasm.

Multiplication.—Voges gives three forms of multiplication, i. e., longitudinal and transverse fission and segmentation. He did not observe conjugation. The chromatin divides into from 3 to 10 pieces, which assume irregular shapes and locations, and one of which are often found well up in the flagellum. The nucleus usually divides into equal parts, but may break into several segments. After division the protoplasm may assume various irregular forms. The young nuclei arrange themselves in groups, and the parasite twists and splits by longitudinal or more often by transverse division. The new division forms are often bowl-shaped, but gradually assume their regular outline. Sometimes a parasite assumes the appearance of a globular mass; nuclei, showing a number of flagrila, form around the periphery, and division into several segments occurs.

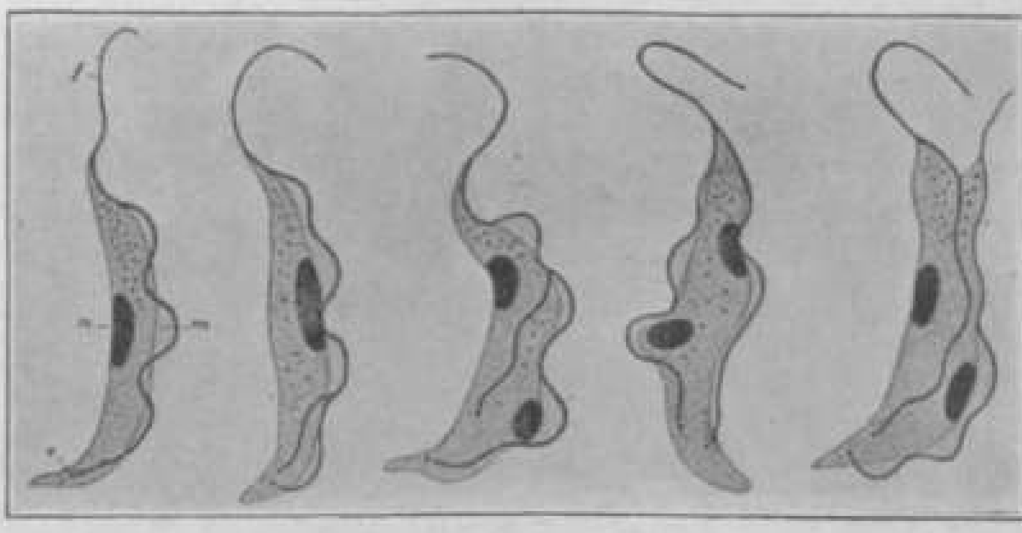
Plimmer and Bradford consider longitadinal and transverse division the more frequent modes of reproduction, although they observed also conjugation, which consisted in the fusion of the micronsclei, followed by an ameboid stage and division by segmentation. The ameboid stage may at times occurred independently of conjugation.

Martini, who has recently worked with Trypanosoma obtained from an infected pony imported to Berlin from Togo, gives five stages of multiplication, as follows: First stage: Broadening out of the chromatic grains of the nucleus; flagellum thickens; nucleolus appears to be a thick streak: ehromatin granules loosen. Second stage: Two chromatin heaps; two nuclei; pairs remain together; beginning division of the undulating membrane. Third stage: Two distinct membranes seen. Fourth stage: All nuclei one slightly shorter than the other. Fifth stage: Two long Trypanosoma attached only at the posterior end; sometimes one of these is already seen in the process of division. He did not observe any other forms of multiplication or conjugation.

Schilling did not see multiplication forms in the circulating blood in connection with surra in Togo. He considers the mode of division to be influenced by the number of chromatin granules found in the parasite and to be usually by longitudinal fission. He did not observe ameboid forms or conjugation. He gives two stages in the usual mode of multiplication. In the first one a double undulating membrane is seen, and in the second the whole undulating membrane divides longitudinally and gradually separates the parasite, the posterior end being the last to part. Young forms have no undulating membrane. Daughter parasites are always smaller than the parents.

Laveran and Mesnil have studied the forms of multiplication very carefully, and consider that with the Trypanosoma of nagana, multi-

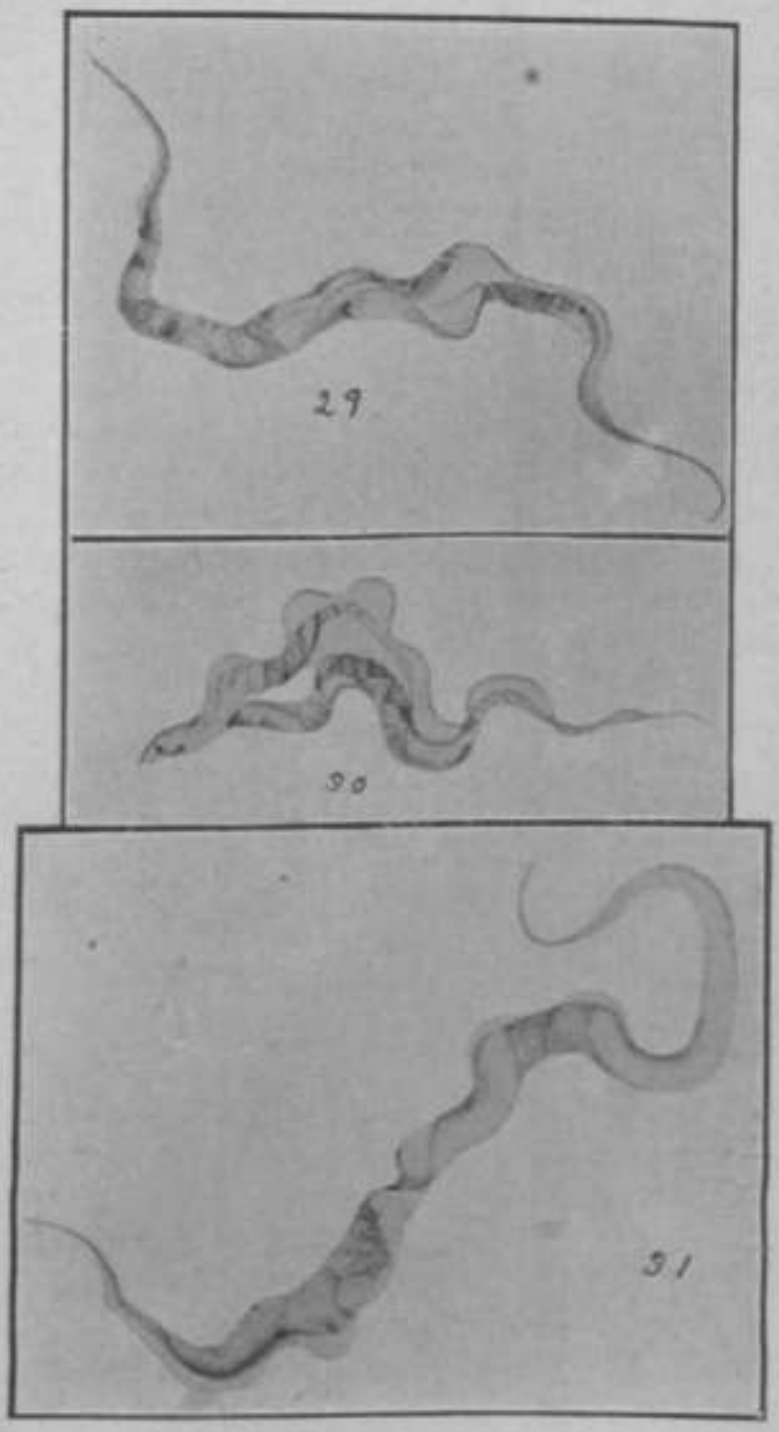
plication in the blood is by longitudinal division only tnd into young of equal size, which are also nearly as larpc n>; the aduita DiFidiiig forma tre ohrsya preeeni in tin- blood, and fud before division begins the parasite increase a in size The order of division is as follows: (1)



13 15 16 17

Figs. 13-17.—13, Tr. brucei (n, nucleus; c, [illegible] ceninwmn-: m, tuidiilm ing membrane; f, Dudhmi [illegible]) × 14, Beginning division, showing two centrosomes and partial division of [illegible]. Further stages of division. [illegible]

Figs. 18-28.—T. equinum, showing various stages of division. (After Sivori and Lecler, 1902, Pl. III.) 1, Trypanosoma with two chromatin corpuscles of the flagellum; 2, Trypanosoma with two nuclei; 3, Trypanosoma with a nucleus, two chromatin corpuscles, and a short flagellum, which starts from the posterior chromatin corpuscle and is united or not to the other flagellum; 4-7, Trypanosoma with a large nucleus, slightly elongated, two chromatin corpuscles; two flagella, one shorter than the other and united to it or not; 8-10, Large Trypanosoma with two separate nuclei; the protoplasm is accumulated toward the poles of the nuclei and is rarer in the middle; two flagella, one longer than the other, or equal and separate; 11, Trypanosoma similar to the preceding, but the flagellated or anterior extremities have begun to separate.



FIGS. 29-31.—Tr. evansi, short v nv <tn I.IJUK form*..

Centrosome, (2) Bagellum, and (3) nucleus and protoplasm. The centrosome first elongates (fid divides into two round bodies, followed by 8 division of the flagellant. The nucleus increases in size. New nuclei are then formed liv direct division. The protoplasm follows the nucleus in separation and may begin at the free end. Two parasites may re main attached at the posterior ends for sdme time after division, ami both liuiv iInn divide again befoft separation is complete. These authors have not yet seen the young forms of Kantlnirk. Durham, and Bhmdford, or the ameboid forms of Plimtner and Bradford. They #i\e some variations from the parasite as described by Lewis, but this point will be moiv fully discussed under "Differentia] diagnosis of Trypanosoma."

-Civ<>i and Jjeeler agree with Laveran and .Mesml as to the modes oi multiplication illustrated by figs. ls-->s.

Rosette formations of Trypanosoma have be n •\i- nsively noticed, but considerable difference of opinion as to their cause has been expressed. Some consider them as entirely a multiplication phase, others as agglutiuatinn. while the tuajority agree thai such formations may be the rest:tt oi either of tlusc phenomena. There certainly can be no question that tiese figtrea occasionally resuli as a phase of multiplication. Babi-Etowitsch anrl Kempner compare them to the segmenting malarial parasite.

Tlie methods of reproduction described comprise iln-se. of the most importance and represent the views *oi* many of the writers whom we have been able to review. Sehat, as has been seen in the discussion of the life eyrlc of Trypanosoma. holds M>me very original opinions. So far as his work has to do with multiplication, he maintains that the asexual, longitudinal division oeeurs in the blood of infected animals and that the sexual reproduction takrs place in certain Hi.s.

In our studies *we* hire never observed conjugation, and in blood under normal conditions reproduction by transverse division or segmentation is very rare. Longitudinal division is by far the most frequent form, and usually takes plaee m the order given by L&veran and Mesnil. This is not constant, however, for in the same specimen of the parasites taken from tin- blood of an infected dog, horse, or other animal, we have seen individuals showing this order and others in which the division certainly differed from the course described by these authors. (Figs. 32–35 illustrate this point.) Flma-sian. working with tlie South American di-<>ase, ha? recently repotted results Bimila* to ours.

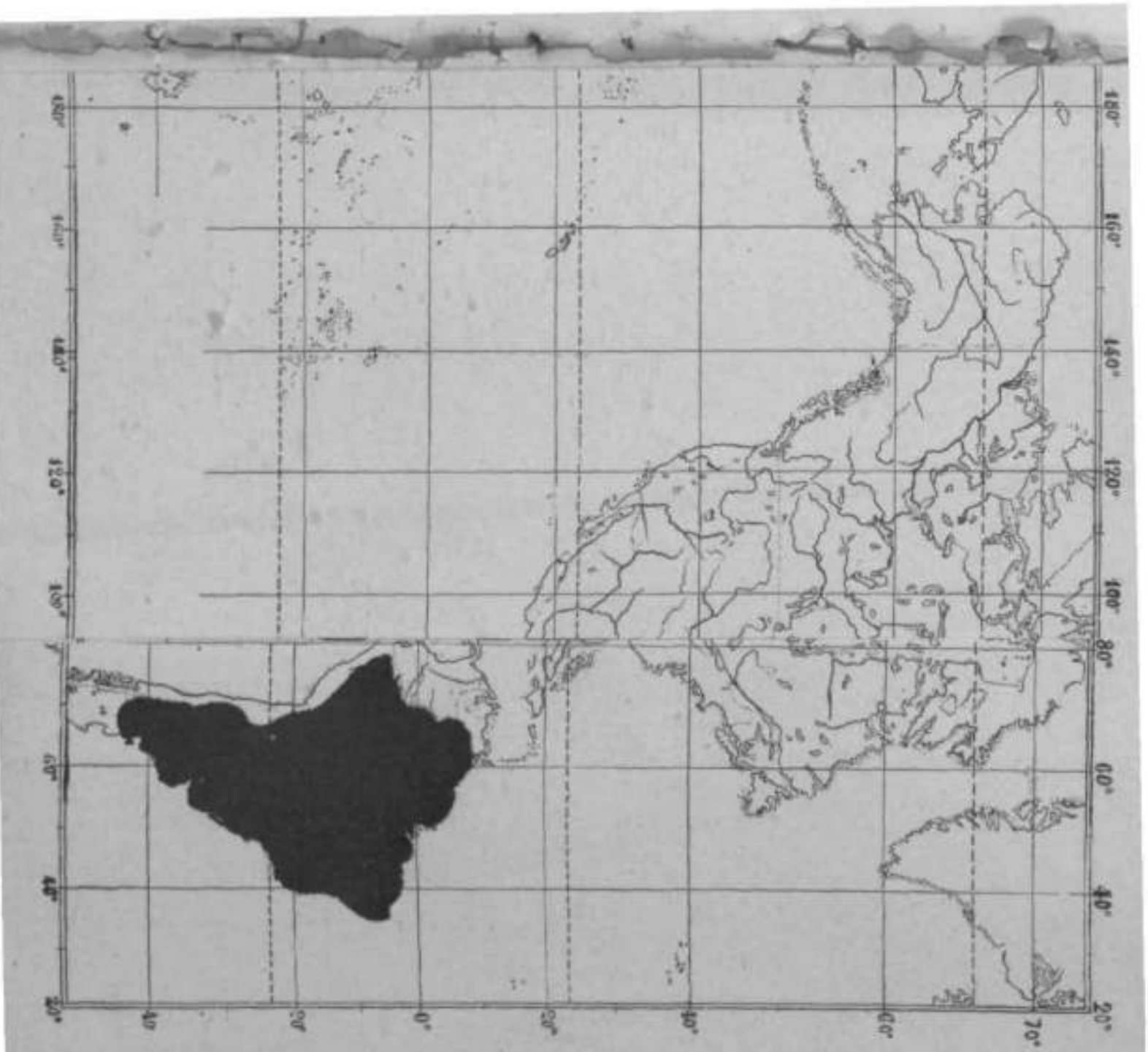
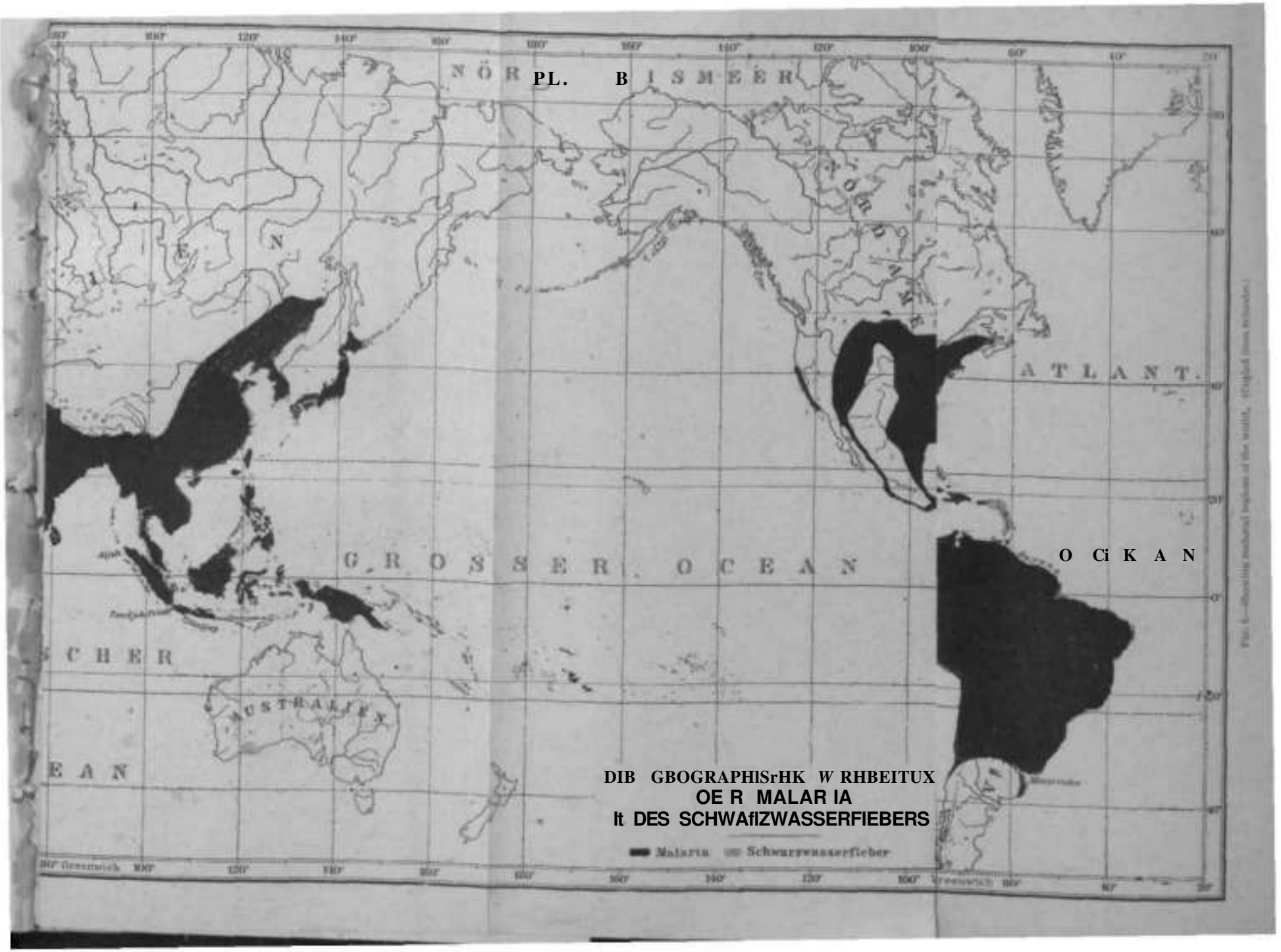


Fig. 1.—Map showing i[illegible] of the world, as compiled from literature. (Scale copied from Schouw for comparative purposes.)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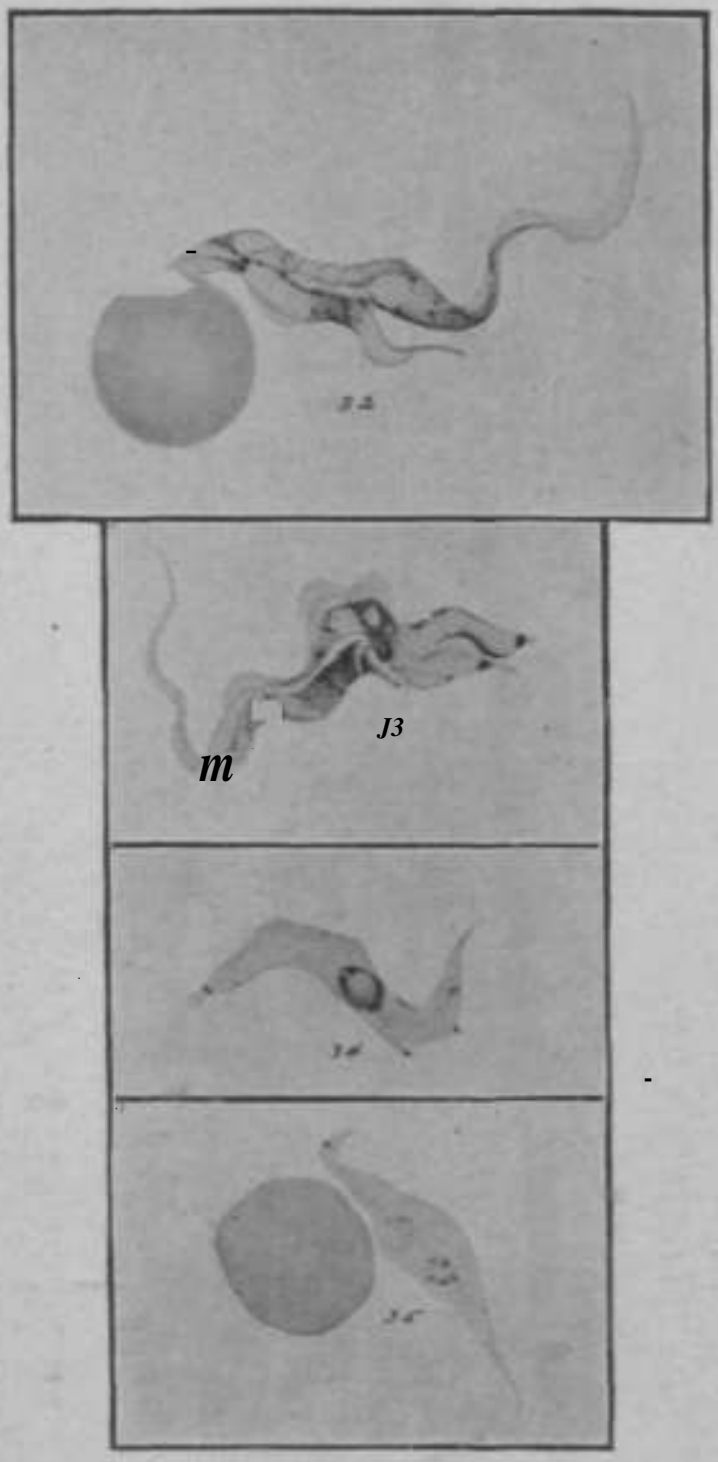
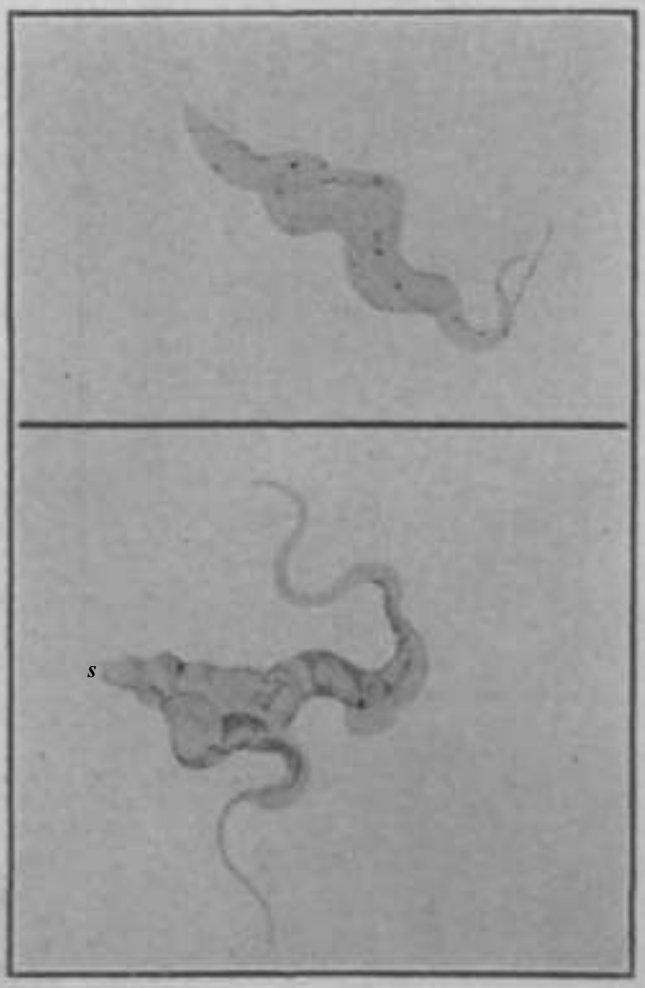


FIGS. 32-35.—Dividing forms of *T. evansi*. 32, Irregular division into larger and smaller parasites; 33, 3[illegible] division complete except at nucleus; 34, First stage of division, showing thickening and elongation of nucleus; 35, First stages of division, showing thickening of parasite and splitting of nucleus.

The parasite, just before beginning division is evident, usually becomes thicker, but sometimes this stage is not perceptible. When it occurs it may proceed to such !in extent tlmi the transverse diameter of the Trypanofioma will measure from 5 to ^ microne before any other evideno of division can be observed. (Fig. 35.) From this point tin* picture ia not constant In many forma the neart change to be noticed ia i division of the nucleus info fcwo or mow]>nrts. The centroeome usaallj dividi s first, although in some instances the flagclln show beantifnl division extending \M'll down into the undulating membrane, without the slightest anpar nt change in cither the centreline or the nock ns.

Schilling*! statement that Qu mode of nniltiplkation depends upon the number of granule* which the parasite contaii is appears to u> deserving of careful consideration. Longitudinal division in an individual inniaining numerous large granule is rarely se<:n. These parasites aas&XBfi nnu merous shapes and often arrange themselves as if >egmentation were in progreae (1. s. 36–41). ftnd in the majority of cases they are the ones that produce the involution forms.



•A, i HK vnr. Ling ionns.

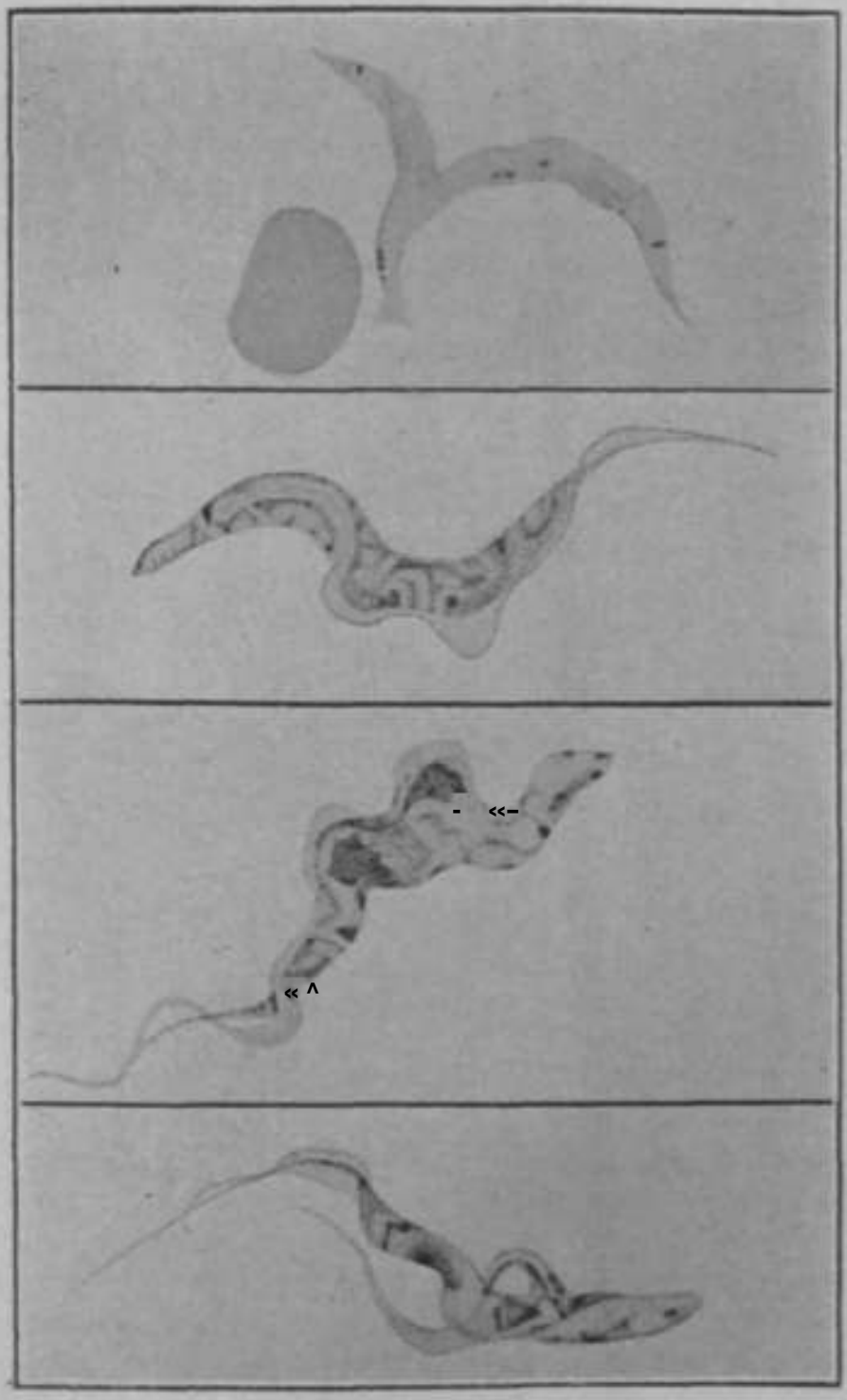


Fig. [illegible]ac-»t._T[illegible], crassi showing various dividing forms.

Agglutinatio-n.—Several observers have noted the bunching together of **Trypanosoma** under **certain conditions, and** have **described** the phenomenon **as** agglutination. Some, as lms **already been mentioned, consider** this to be a multiplication **phase,** while others **suppose** it to be the natural position assumed by the **parasites** just **before dying**. The process has not been seen at **all by** some of **the** most careful **investigators**.

Laveran nml Mrsnil regard **the agglutination** of Trypanosoma as a **phenomenon similar** to that **produced in bacteria** and **believe** it to be brought about **by** a **number of conditions.** Among their **reasons** for this **conclusion they mention the continued motility** of the puniMti's **after** elm11ping and tht,[j] **bet that the reaction i^ most** marked **with** weak

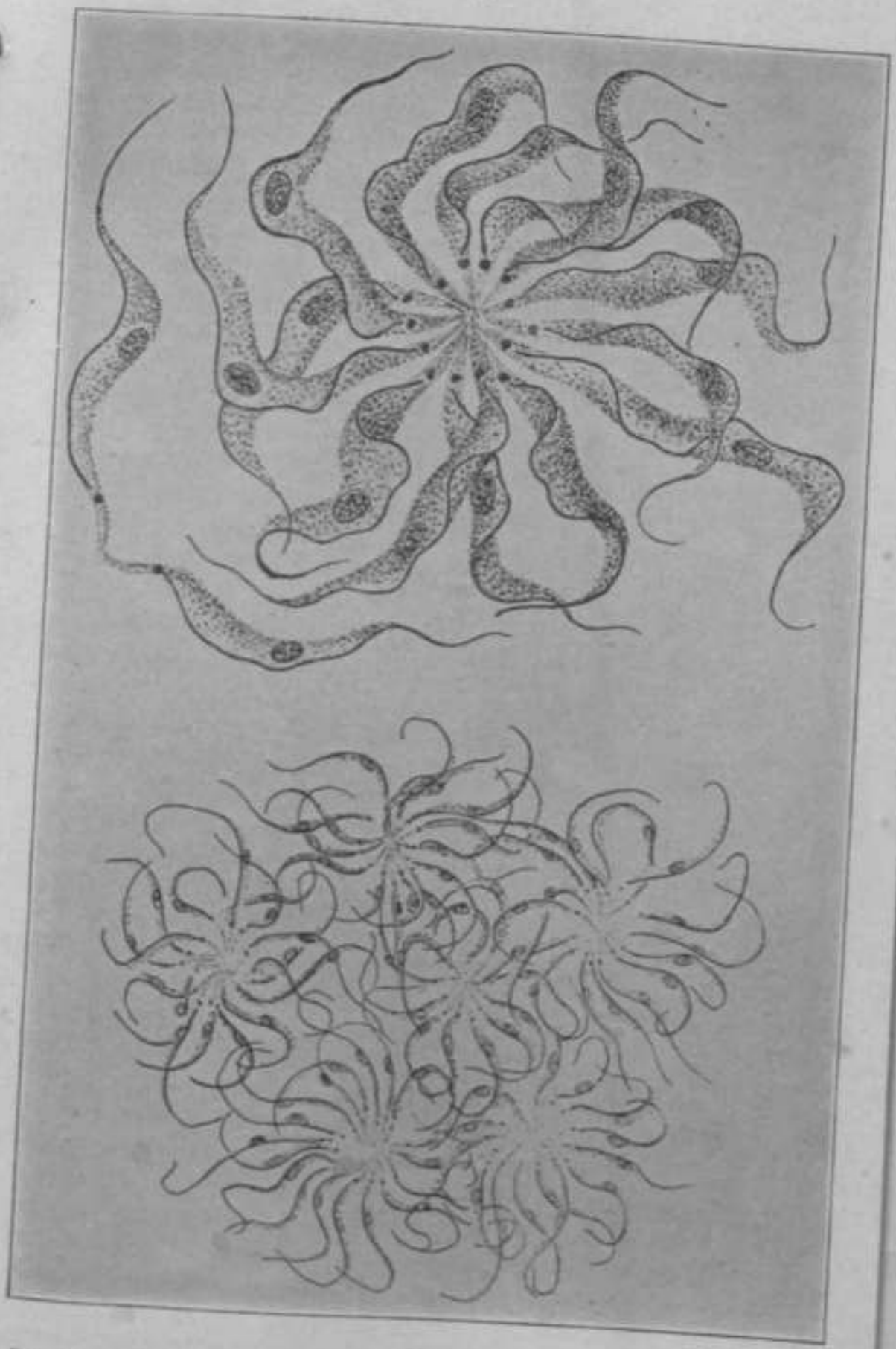
FIG. H.—Showing a (rt.*ciilinr phase of innlti|<ti<ation (*Tr. evansii*).

specific seta and less so **with strongly** fortified ones. **Rabinowitch** ami Kempner. howc\'er, were unable to obtain agglutination with th< tr specific serum. According to Laveran and **Ifesnil, the** reaction may **be** obtained \»>\h **with** living **and with** dead organisms and it **does** not stop tlie motility *of* **either** thv individual or **the** aggregation of parasites.

The reaction always begins in the same **way.** Two parasites are seen to join by their posterior ends (fig. 45\ **and from a** number of these, rosettes are built **up,** tli- **posterior** ends of **the** individuals **pointing** toward the center and their bodies extending outward **like the** spokes of *A* **wheel** (Figs. **43-46.)** **Such** masses **may, under certain** conditions, group themselves aud form **secondary** axes. ^igs. 4-i and 47.)

Agglutination often **occurs** in defibrinated bliwd **containing** Trj-panosoma and ki*pt on ice. The serum obtained from *a* rat **partly** bam munized **by** tlie **injection** of **blood containing Trypanoaoma, when mixed** with infected defibrinated blood, causes agglutination.

Parasites vhit-h **have been killed** or **paralysed by** formoL chloroform, or ;. specific serum are agglutinated **by** the same agencies which produce the reaction in the living organism.



FIGS. 43-44.—Showing union nf two *Trypanosomes*. 43, Primary agglomeration; 44, Secondary agglomeration. (After Stiles and Salmon, 1902, Pl. II.)

Agglutinations often art.[1] not permanent, and under certain conditions, according to Laveran and Stesnil, "disagglomeration" takes place. In this the secondary fonnationfl are first broken up, ami the primerj rosettes disunite or lust* a part of their elomeni s. The} consider this "disagglomeration" to be in inverse ratio to the agglutinating value of the serum employe d.

V>rni;il rat's blood has no agglutinati ve act :on, but when fortified by inoculations does gain this power. Fi\- to ten c. c. if Trypanosomatic blood injected into a rat will produce a serum capable of agglutinating Trypoaosoraa in defibrinated blood in a dilution of 1-5 to 1-50.

One of Lareran and >! snil's rats, w;iich is seven months had received 13 inoculations of blond containing Trypanosoma, gave a serum which in a dilution of 1-10 so paralyzed the Trypanosoma that rosettes were not formed.

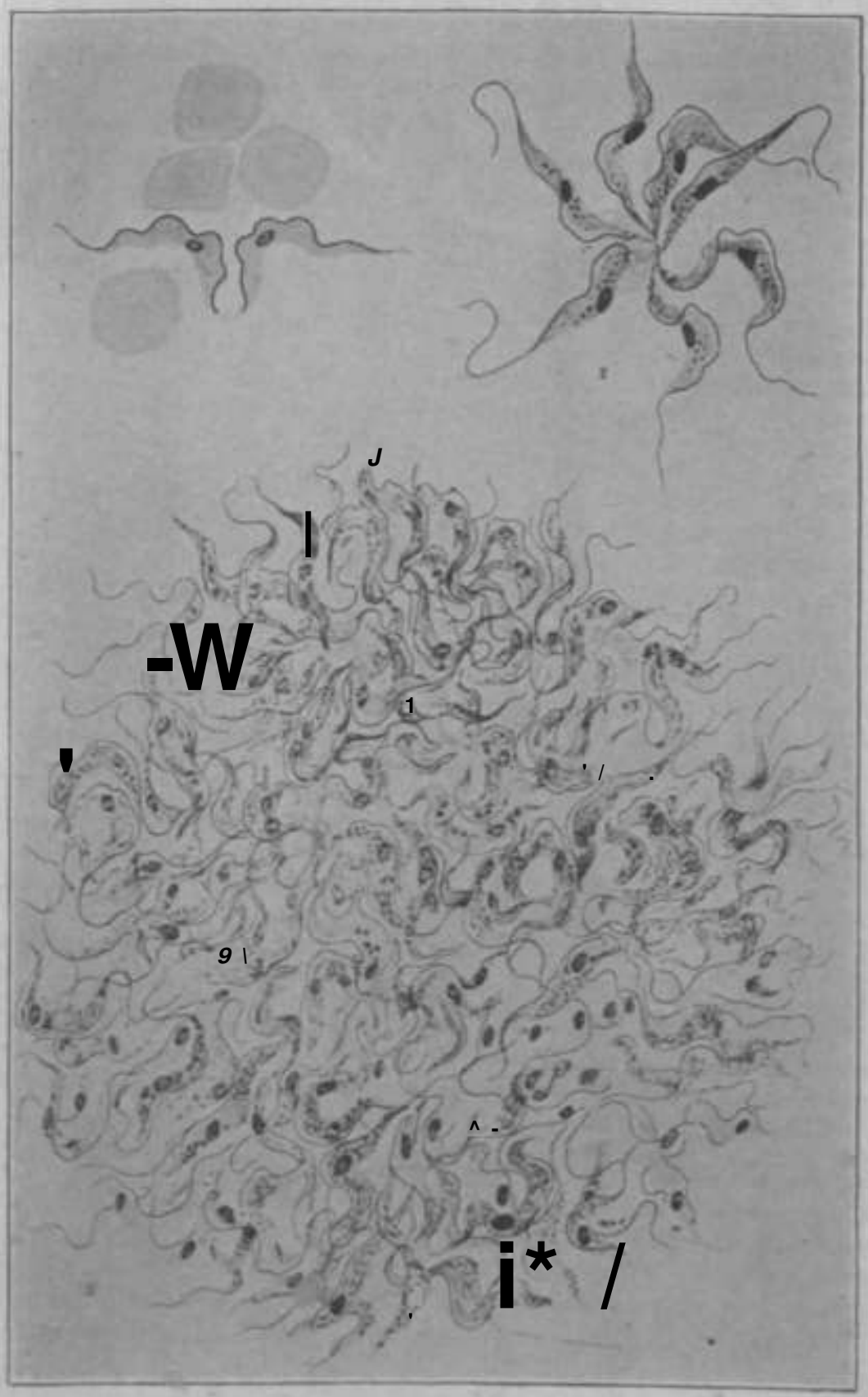
Serum e rpoaed to a temperature of 55° to 58° C. during one-half to thm'-fmirths of an hour did s ot lose its powex to ag jrlutiimto. but was materially weakened. j xposure to 63° to 65° C. for half an hour co apletely desi roye I its agglutinative propertii s.

Adult guinea pigs wire iimuuniiU'd by Berera] injections of infected blood. Their seram had a feeble agglutinative reactio m for *Tr. On-cei.* With a similar serum from yon ng guinea pigs n 0 agglutinate e reaction was obtained. The serum of a pigeon, guinea pig, or f rog did not show an agglutinative reaction *iorTr.l wisii* but that of a sheep, dog, or rabbit ga\e a slight one for ti ese parasites. With ser a from the horse and tl e thicken agglutinations were m<re def Inite and i ccurre d in dilutions of 1 -v to 1–LO.

Of all the animals •\;nni: ed, the serum from the horse was the most active and that of the c bdeken second, Imt in both of th- se the reaction was greater for re i blood cells than for Trypanosoma. Human Benin) did not agglu linate *Tr. bnua,* but the sera of guinea pigs and of pigs, which have no curative properties, g;i ve bea utiful agglutinations when mi xed with trypanosomatic blood. This would seem to prove that agglutinating antl curative prop rties are separate and di stinet Agglutinatio-s *on* e formed had a tendency to disaggltttinate in most sera as well as in othez substi mces. In the rabbit this i as accomplished at • he en1 of seve ral hours. TI;ey persisted best in the sera of the dog and the sheep. Rats i minimized by rej eated injections "f *Tr. lewisii* showed but feeble agglutinative reaction with their o wn parasites.

Ac• ording to Rost, -urra blood mixed with goat serum in the hang) ng drop in a moist chamber killed the Trypaw soma in two and one-half minutes, sometimes with agglutinatio: ; cont rol parasites were all dead in twenty-thr e hou re.

Sivori and Lecle r, in a preparation of h< rse's blood containing numerous Trypanosoma, sometimes observed two, three, and even six individuai- or more, united at th fir DO* terior extremities and arranged in a



FIGS. 45-47.—Trypanosoma of Surra americain, showing phases of agglomeration. 45. Two Try- united at posterior extremities, in a preparation made from the peritoneal exudate of a pig twenty-four hours after intraperitoneal inoculation; 46. Rosette formation produced by mixing equal parts of infected blood of one horse and serum of another some time before death from Surra americain; 47. Large agglomeration making the mixture above mentioned. (After Rivori and Leclor, 1902, pl. 5.)

radiate figure. **The center of the figure** was sometimes near a rod corpuscle or a **leucocyte.** The **parasites BO united preserved** their mantlity. In **the** blood of **a young cat, containing numerous** Trypanosonu and **prepared** in a hanging drop, **there** wen* **visible** at **the** end **of** an **hon**r 8, **10**$_r$ **or 12** agglomerated **paraaiteB.** Many of these **agglomerations separated after** a certain **Length of** tit:ne.

Laveran and Mesnil write:

The **Trypanoaoma** of nagana sometimes uniic; un.ler certain conditions they **form primary agglomeration*** in ***n*** settes; rarely large se**condary** agglomerate**ns,** which are commoD in **Mood containing** *Tr. lewisii,* a•• **observed.**

These **Trypanoaoaa anited two by two** would suggest conjugation, hut this interpretation *U* not **admissible,** *:** the **agglomeration** is not observed in pure, fresh bloody and is prndini-d **only under** condition.-; which may be called abnormal. **The number of individuals which agglomerate** is **exceedingly variable.**

In *Tr. brveeii,* as in **I**r. *lewIgii,* tin- **agglomerations may** ***U-*** **teen I**o separate after **varyii**ng length **is of** iituc.

\\> **have KCB agglomerations -** f **Trypanosona** in **the pare Mood taken** from the heart, after one-half to **one** hour, in the peritoneal **cxndatea,** lifter an injection of blood rich in **TrypaBosoma** into tlic peritoneum **of rats** or mice, and in blood **raized with physiologic water after being pn**served for **twenty-four boon** on ice **or bttted** for hnlf nn hour at 41° C.

On mixing, in *equal* part**s,** the d**lefibrisated blood of a rat** or mouse, **ridi** in Tiypanosoma, and the scrum nf n hnr><\ \vr**tained** beautiful persist fin agglomerationa. The **TrypaacM**oma se**paratetl** at the end of u **few hours.** On mixing one part of the se**rum of • horse** ami **baa parts <'f blood no aggtomeration? *wen* produced.** The **aenan of the blood** of a pig **also** pave beautiful agglomeration^.

The serum of a sheep, mixe<l in eqmi) parts with **the** blood of *&* rat or mouse, rich in **Ttypaaoaossa, gave,** in one **eai**e, a be**uniful agglomeration]** in another the agplomerationa **were not W beautiful tad lee**s persi-lent. The serum of a deer gave s**roall** iiMiipcr-i-icut **RgglomcTati**ons.

T)ie x'rum **of human** blood **did** ii'>i **ibon** it-.-li" **either agglutinative** or mierobieidal.

The **following acm** mixed in tH[ual pa its with the blood of a rat or mouse, rich in *Tr. bructii.* did not **show** any agglutinative **prop**erties: The se**rm**n of a rat. normal or immunised **agaiosi *Tr. leuitH,* and agglutinatire** for these **Trypanc**soma, t**ic ierm** of a **normal chicken, the wnm of** a chicken inoculated sev**erai** tinit** with ***Tr.*** *brucrii,* the se**ran** of a **normal** goose, and the se**ram** of a goose inoculated sev**era!** times with blood rich in Trypnnosonia of nagana.

If **tbere i* added** to a few drop* of blood rich in Tr. **frntoett** a drop ol water slight tTy acidulated with **acetic** arid, *1*rypanosoma are se<*n* t<> ii^iriomerate (mj <'han^e tlu-ir fonu> rapidly. On add hip a drop of water itifflitly *n*/\.alized \rith sodn no agglomeration furu**rs.**

Trrpaaosoina when **dead** stilt **tend** to agj**lomers te, but the** prooes« then takes place very irregularly.

Hefferan, commenting on Lavew and kfesnii's statements regard mg agglutinaHoi) of *Tr. lewisii,* doubts the correctness of t**beir** ob^n'ations, giving ier rca-ons for so**doing.** | (Centralb. f. Bakt., etc., bd. 8, No. 22, May 26, 1902.)

[1] Curry notes I thai pan**sites** in infected *I* **monl**eys' blood mixe**i with**

osl their motility in twenty minutes and agglutinated blood mixed with infected monkey's blood gave similar results. Schilling states that in cattle immunised with the peritoneal exudate of doge inoculated witfi infected blood, the serum killed the TryDanosom un the fourteenth and fifteenth days, and in the hanging dron in from thirteen to twenty-five minutes; but he has little to Syof a^lu

On reviewing *tin* work done on the agglutination of Tr. , it 11 be seen that resulfe have been uncertain and in, V. rh(. J£££ teua in an unsatisfactory state.

an and Mesnil's work in this line and i-nent of Hal.inowiroh and Kempner that no agglutination obtained with their spa rum makes the value of other ,results ,ioubtful.

So far our work hat developed nothing convincing. We have seen ind other described figures of aggiui tl, but they I have been too inoonsi have occurred under too many conditions T which these time appeared have at otl, !jrn(hlced no ills; and the] have even occurred under conditions which are nnt supposed to favor agglutination.

Our results in il, „n of *i* w by various subsl ances n'-l a> producing this phenomenon ha ari ance with mucli of the recent work done along this line and more in accord with Rabi b and Kempner's conclusion- not observed ition which constantly gave agglutination figu T. - 9 lch obtained tonally with various substances, but reactions india ahable from these sometimes occur in infected l»lood withoir any additions.

mmunised up to 3,000 blood ; ikd to produce a serum which would agglutinate T ry- •woma with any degree of constancy. Similar with chicken and human serum as well as with those secured from numerous other source- a mixtures of these sera were likewise factory. Several chemicals, such as thymol, turpentine and chlQral, would occasional re what appeared to be agglutination- 'mt no regularity could be observed.

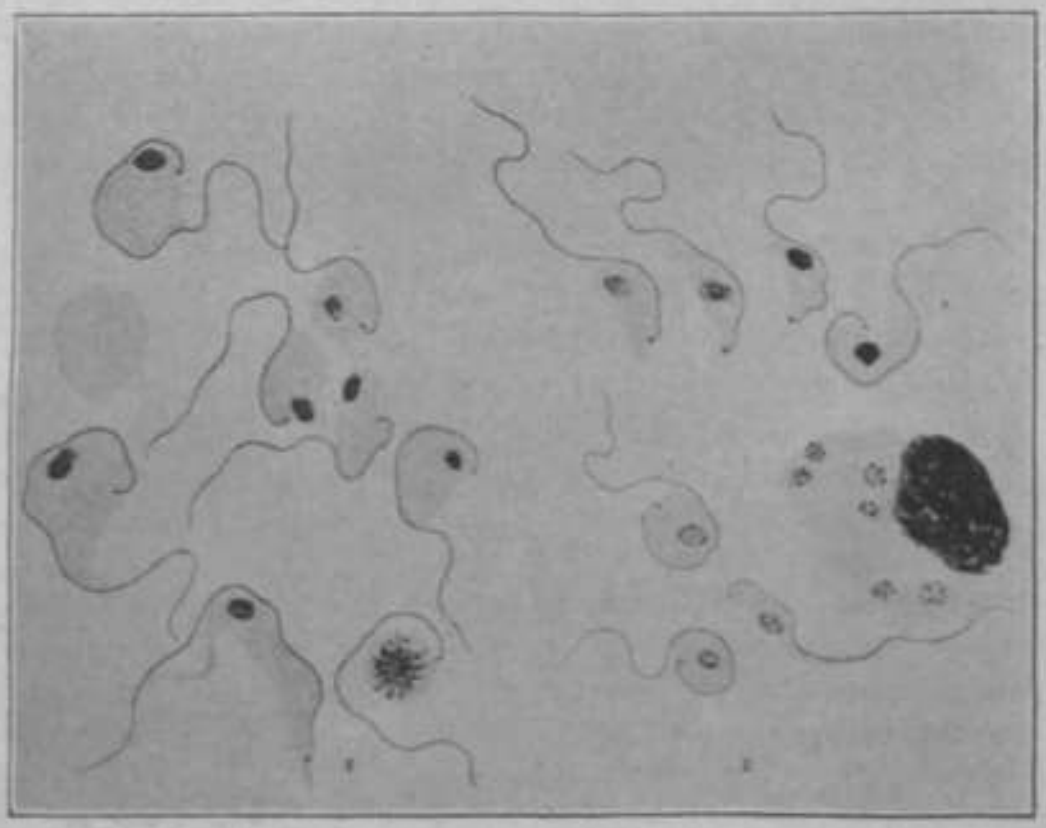
agkkg al! ae and applying our own resn[1]- we must conclude with several others that the Bo-called phenomenon of agglutinati- of no value from a *diagnostic point of* t *nd* *lfii* *ncertai* *ty or susceptibility.*

Inrolutwn ^.rM^.-lnvolution forms are produced bv surroundings unfavorable to the life of the parasite. ^ven,D and Mesnil mention

among the conditions which favor their production (1) tin.- blood of rat rifh in Trvpanosoma, mixed with the serum oi some other animal Mitl kept for several hours in a hanging drop; (2) blood containing Tryp&nosoma ami heated to i I° to 42° i'. for Aie hour or more; I'> > infected blood injected into the abdominal cavity or the conjunctiva of birds and withdraws aJter one to three hoots; i I) parasitic blood placed in an be box or in aome other way subjected to breezing, and (5) ratV blood containing Tryji;i nosomi and treated with a rsenic. etc.

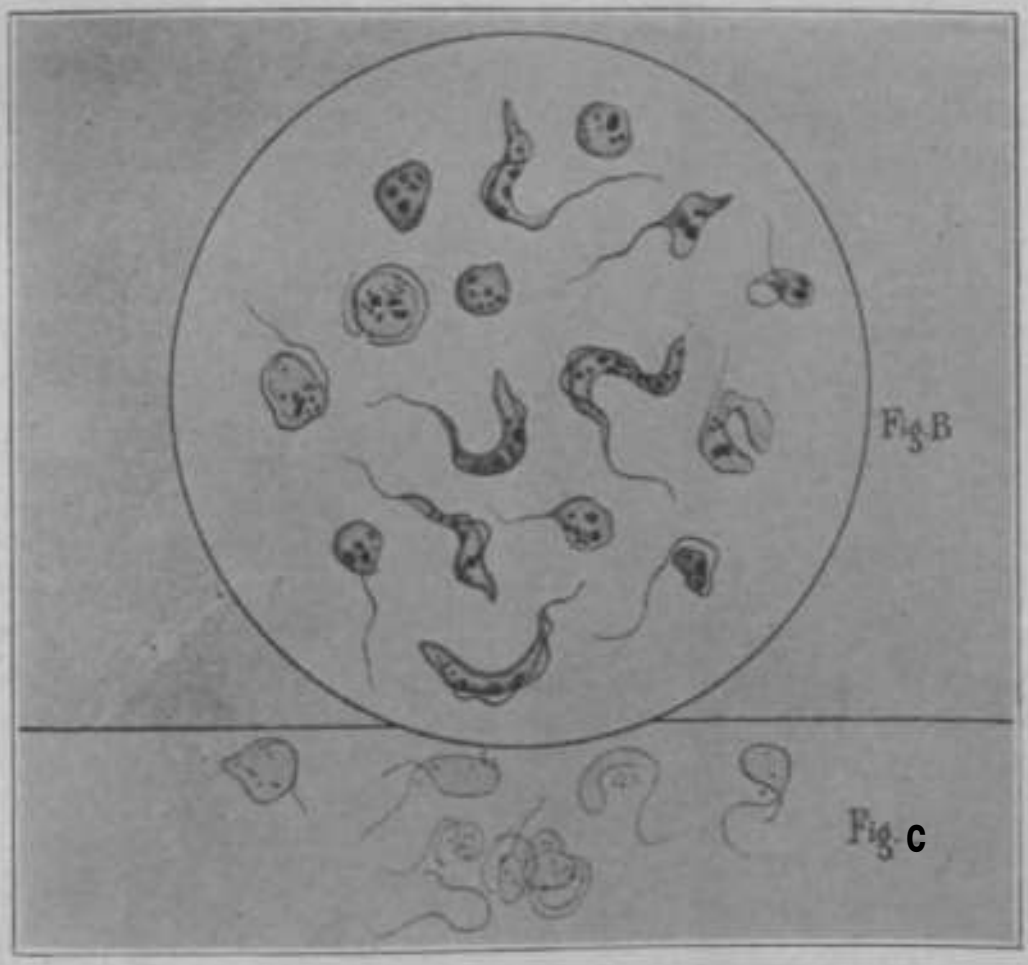
The same authors give the following as the principal type >>r involution forms. Round, fiaek-ah&ped b< dies, in stained specimens usually showing nuclei, centrosomes, and ftagella. If dividing forma have asmined this shape, two nuclei, Iwo centrosomes, and two flagella may be seen:. These i'tfdi• may for in small agglutinations, and it is probable that the latter are what Plimmer and Bradford sailed plaamodic forms. Flask-shaped Trvpauosonta are n<i always dead wheu not moving, as they ma; still !• capabk oi conveying the disease i o rats.

Trvpanosoma in dying undergo profound alterations: (1) The protoplasrii disappears and takes no color; (2) the shape is indicated only by a faint line of countour; (3) the nm.leus stains faintl; ; (4) the pro* uiplasra and nucleu- disappear, leaving nothing but the flagellmu and centrosome and forming a knob at one end, and (5) the flageUnm may be found alone or attached to the oentrosome.



FIGS. 48-49.—Involution forms of *Tr. equinum*. 48, Involution forms seen in horse twenty-four hours after recovery; 49, Involution forms in the blood of a horse twenty-four hours after death. Large mononuclear cells containing parts of *Trypanosomes*. (After Nivert and Lesler, 1902, pl. 6.)

Figs. 48, 49, 50, and 51 **illustrate some oi (he involution** forms given by various authors and figs. 52 to 59 others which have been observed in our work.



Fi.. s. 50-51.—50 (Fig. B), *Trypanosoma* of mal de caderas mixed with serum of chicken and preserved on ice for six days, maintaining their vitality; several have assumed abnormal forms; all have their nuclei reduced to large granulations, stained according to Laveran; 51 (Fig. C), *Trypanosoma* in the process of destruction; the free filaments have no centrosomes. (Albert Lignières, Recueil de Méd. Vet., vol. 10, No. 2, Jan. 30, 1903, Pl. II.)

DISTRIBUTION IN THE BODY.

The great majority **of** [illegible] animal are found in all the body juices, and are not present at the same time in enormous number in one part of the body with but few in another. Animals having many parasites in the blood when killed **show** [illegible] in the organs; but if they are not demonstrable by microscopic examination in the former they are **also** not found in the latter. The **blood of animals suffering** from the disease is always infectious by animal inoculation, although there are periods during its **course** when **the** parasites can not be **found** for days by microscopic examination. Plimmer MK Bradford, and others state that the lymphatic B near the point of inoculation first show the parasite, and **that the animal's** blood may **be infectious** for two days before the parasites are found therein.

There are, however, a **number** of writers **who** do not accept the general

statement given above, l>ut who **believe the** parasites to be more numerous in certain organs **such as th»>** lymphatics and the bone marrow, than in others. Martini **regards the** spleen, lymphatics, bone **marrowy** and, to a less extent, the liver and **IridneyB,** as? the **places** for the destruction of trypanosoma.

Elaborate experiments hav- been **performed** to show whether or not **reproduction occurs** in any **special organ, but practically** without success, h has **repeatedly been** shown **thai** a **hyperplasia** of **the** lymphatics

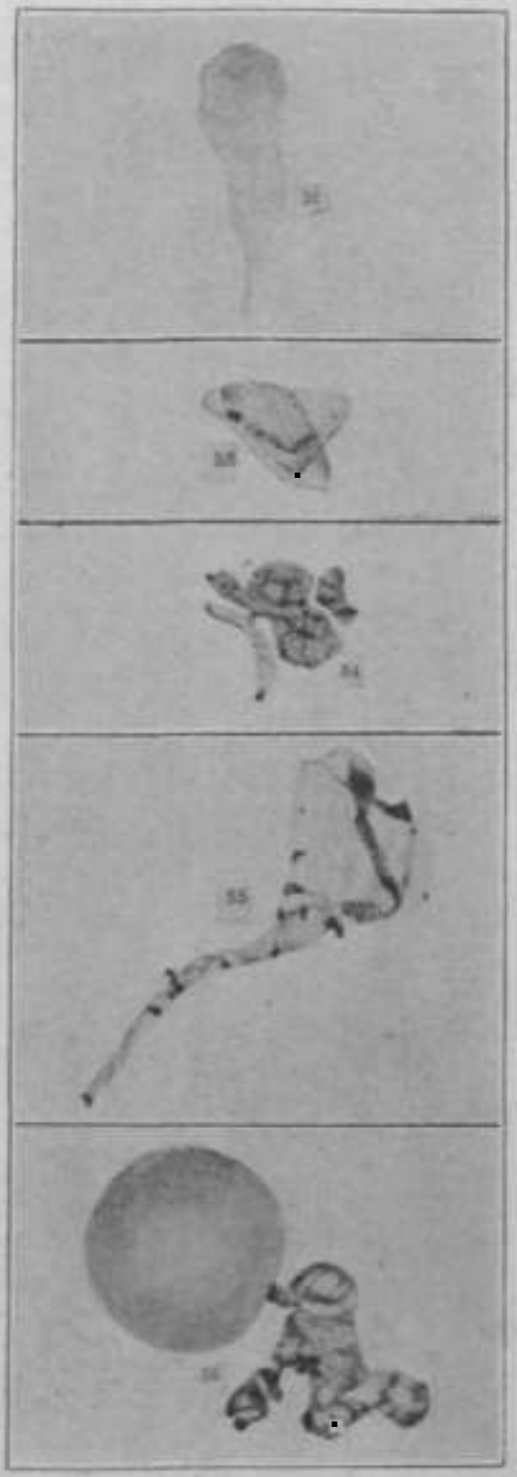


Fig. 50-•<.,—V«rii«w Involution form* of *T*.

Fw. 57-59.—.Var. ...on involution forms of *Tr. evansi*.

occurs to a greater extent in an animal inoculated after splenectomy than in one un **which th**...is operation has not been performed.

Here again ve revert to Voges's statement that the wliole cycle of the **parasite is** a...cted o**at in the bloed** ; and it would seem that **the experiments** com!ucted to determine the place of **multiplication** in the body Und to

sn; port t:tis **statement.** 1t is ce **rtainly** true that **the** Trypanosoma a:e pr.etty eve•nly **distributed** in the **body** juices **and** that Minilar forms are found in all par[1]s.

It seems to be a very **generally accepted opinion** that Trypanosoma inoculated into the **peritoneal cavity** undergo a considerable multiplieation befcire **entering** the **circulating blood,** and by some this time has beeD **considered** as **constituting** the **true** period of incubation.

Parattle in the dead bod;/.*—Trypanosoma **live** only ti **ahorl** time in **the** body **after death. Within two** hours signs of **degeneration begin;** the **parasites** shrink, assume irregular shapes and then disappear. Motile parasites are not usually found two **hours post-mortem.** Ample[1] work fully **demonstrating** this important point has **bees** dune. In **exceptional!** easts living parasites hav• been found as la;e as sixteen hours **after** de**ath;** hut this **condition is** rare. Our work in this line has consisted in **determining** the **longest** time post-mortem during which the blood **could** he **proved infectious by** inoculation **into** susce**ptible** animals. Resiilts **are conclusive** that this is rarely greater than twenty-four hour*. However, in one instance blood 1as bee n **found** to convey **the iifi**ense forty-eight hours after death.

When an animal, in the **blood** of **which trypanosoma an**e pre-ent, dies, the parasite- are then found in all the organs; ami **conversely,** where none appear in the f<rmer, they are also absent in tin- latter. They are generally **distributed,** and multiplication Iorms d•• not appear in ex-ceptional **numbers** in any one organ; **however,** they an- usually somewhat **more** numerous in the **spleen,** liver, and **lympl**atie glands than in the bone marrow, mid are **seldom** present in the medullary **canaL** They are found in the **serous** iluids **and exudates** of the joints, but rarely in the urn**e.**

Schilling's resuits wen- somewhat **exceptional.** lie says that "Try-pan osom a were not found in the spleen when positive in the blood, and the **peritoneal** exuda**te** and hone **marrow** showed **parasites** of a budding form;" and again, "that Try]..anosom,i might 1e absen t from the fluids and ti-sues, but were constar1l**ly** present in the **bone** marrow. The number of pirns;tes in **the** spleen varied **greatly,** but there was never **a great accumulation or multiplication** of forms." He draws the eon-clu-ion that **multiplication of** par**asites** occurs in cer**tain** organs, while oth.ers destroy them.

TRYPANOSOMA OUTSIDE OF THE BODY.

Although Tr\panoso**nia** in a natural **condition** are not known outside the body and p**ropagate** only to a **limil**ed degree in nny known nrtit**ial** meilia. yet uini**er** fav**arable conditions tin**y can be kept for a consid-arable tim- outside the body, **a** fact whieh lias **been believed** to afford certain diagnostie points for different species. i**berg** kept Trypanos>ma of fish for six days in blood at 12° C., and Mitrapha**mow** from thr<se to

four days in salt solution. Laveran and Mesnil showed that during warm weather Living forms of *Tr. Lewisii* were found in blood which had been maintained at room temperature for four days. Once during cold weather motile parasites added to chicken's of pigeon's blood in a hanging drop were observed after eighteen days. Kept on ice and in blood mixed with physiological water, they were observed during thirty to fifty-two days, the blood at the end of this time being virulent. They withstood 41° C. very well, but when heated to 50° C. for five minutes were all killed.

Voges states that outside the body Trypanosoma of mal de Caderas disintegrated rapidly, blood usually being noninfectious after from three to four days. However, he noted one exception where infection occurred with blood which had been kept aseptically for fourteen days. Several writers have tried to attenuate Trypanosoma with formalin, heat, and several other means, but entirely without success. The parasites were either all killed so that no infection resulted, or they were as virulent as in control blood. *Tr. equiperdum* (Dafanaasianii) continued motile for Forty-eight hours at a temperature of 36° C.

Laveran and Mesnil state that when human serum and blood containing Trypanosoma were mixed in equal parts in a hanging drop the Trypanosoma showed feeble action in one-half to one hour, and generally were not motile at the end of two to three hours. Kanthack, Durham, and Blandford determined *Tr. Lewisii* to be destroyed by complete drying; they also demonstrated four days as the greatest length of time during which they could live in aseptically drawn blood. Laveran and Mesnil, Voges, and others have shown that the blood of an animal infected with Trypanosoma was not capable of transmitting the disease after twenty-four hours.

Martin and Battelli state that the warm stage does not increase the life of Trypanosoma in vitro. He noted a bunching of parasites in dead bodies, and considered this a form which they assumed on dying.

Laveran and Mesnil state that the serum of immune deer mixed in the hanging drop with infected blood showed no parasiticidal action, and this was found to be true with most other sera. Infections with blood exposed to a temperature of 41° C. for one hour showed deformed and nonmotile parasites, but was still capable of transmitting the disease. Exposure to a temperature of 41° C. for a short time and 44° C. for a short time killed the Trypanosoma and the blood was no longer infectious.

Many chemical substances quickly destroy the parasites outside the body. Laveran and Mesnil report that they were rapidly killed by the newer silver salts, and that a 1 per cent Solution of Tolnidin blue attenuated them somewhat, as was shown by the prolonged incubation period. Sivori and Leeler consider the life of the parasite in vitro to be variable, depending upon the conditions produced, but never reaching four days.

Schilling noted that Trypnnosoma were soon destroyed by a 60 per eent solution of bile.

Bruce showed that dried blood was infectious after twenty-four hours in one out of three experiments, with an incubation period of sixteen days. In two cases it was not infectioBfl at the end of forty-eight hours. Aseptically drawn, virulent blood was infectious for four days, and after seven did not produce the disease.

Laveran and Mesnil state that the movements of Trypanosorna are retarded by cooling and accelerated by wanning the blood in which they are contained. They were not immediately killed by a temperatuv of 30° C. to 55° C. below zero. Their experinn nts were as follow-:

Experiment I.—Rat blood with many *Tr. bruceii* diluted with pol as-sium citrate solution and kept at 18° C. for one-half hour. One a nil one-half hours after returning to room temperature it si ill showed many normal looking motile Trypanosoma. nice injected in the conjunctiva with this blood died in the usual time with Trypanosomiasia.

Experiment II.—Similar dilutions of blood exposed twenty ininvi; es to 15° C. and eight minutes to 25°-30°. After two hours warmed blood showed normal looking motile Trypanosoma and was infect! ous In the usual time for mi>se.

Experiment III.—Similar solution of blood exposed for one-half hour at 15° C. and five minutes at 50°-55° *. After two hours the thawed and warmed blood contained normal looking and motile Trypsu nosoma and was infectious for mice in the usual time.

Experiment IV.—Same as Xo. 3. except thai the freezing and thaw-ing was repeated. It was still pathogenic for mice, but wis sligiuly slower in its action.

These authors demonstrated that blood infected with *Tr. brucei* heated three hours at 40° C. or one hour at 42° was still virulent. Blood in-fected with *Tr, brucei* heated twenty miaules at 40° to 44° C. killed nearly all the Trypanosoma. and when heated to 44° to 45° C. all the pamfiffeefl were quickly destroyed.

Blood takei asticaBy and mixed with citrati- solution at room temperature, accord]]ng to Lavera a and MesniL, was uruhm for three day>. and Trypanoaoxna lived longer in a mixture of blood and serum than in blood alone. In tb< Tina ted blood of a rat mixed with the serum of I be hoc-;. motile Trypanosoi.ua *wxw* still obeervi d after three days.

Human serum and that of refractory animals was noi considered l••as adapted to the preservation of Try]panosoma than that of more sus*eptible animal-. *Tr. lewisii* lived longeron ice than fl1 rooui temperature; but this was not true of *Tr. brucei.* Blood containing *Tr. brucei,* after b ing ktpt on ieo for three to :ive days, was often noninfc etious, though it still contained sligiitly motile Trypi nosoma. Involution forms quickly ap-

peered in blood kept on ice, their morphology differing in no respect from that of the involution forms produced by other causes.

We have **experime&ted** extensively **with the** object of determining the length of life in vitro of the Trypanosoma with which we have been able to work, and on the whole have obtained results similar to those arrived at by most recent writers on other Trypanosoma.

Our experiments made to determine the action of heat and cold on parasites confirm, in the main, the conclusions drawn by Laveran and Mesnil, including the differentiation of *Tr. lewisii* by its ability to live longer than *Tr. evansii* in the ice **box.** *W** failed to find any conatancy in the agglutinations these authors describe. They did occasionally occur, following exposure to conditions especially adverse to life; but they were not constant and also took place in the hanging drop.^We can not attach to this phenomenon the importance given it by someltathore.

Several specific sera mixed in the hanging drop in equal parts with Mood rich in Trypanosoma gave no appreciable results, with the possible exception of the mixtures containing autiplague and antirinderpeet sera. The Trypanosoma were usually nonmotile in the plague serum at the end *o'* forty minutos, and in **the** rinderpest serum sometimes as early as thirty minutes. In two out of five experiments made with the latter, the blood was noninfWtious for rat* at the end of one hour. In most of the experiments made with serum the parasites lived *R~* long as in the control drop, and in some instances much longer.

A 1-500 solution of quinine mixed in equal parts with blood containing Trypanosma arrested the motility of the parasites in from five to ten minute?. With a 1-1,000 solution of **methytene** blue the Trypanosoma lost their motility from five to twenty minutes earlier than in the con**itrol.** TVv ure I.-s affected by solution- "f alcohol, ^lveerin. or ether.

No perce**ptifaie action vu pn**duced **M the** Trypanosoma by mixing the infected blood with equal parts of the following substances:il-1,000 solutio a of acetozono; 1-1.000 solutions of the solul le eosi nr **nhnnh>li»** potassium acetate; potassium chlorate; potassium cyanide; salt solution ; picric acid; oxalic acid; and the chlorides of magnesium, calcium, and barium. Indeed, in many of **these rotations the** parasites remained active longer **than** in **control.**

The Trypanoson a were quickly destroyed *by* mixing infected blood in the hanging drop »ith equal parts of the following substances: A 1–1,000 Bolution of arsenious acid; a 1–1,000 **solution** of turpentine; a 1-1,000 solution of corrosive sublimate; a 1–500 solutio Q of chloral hydrate; *i* 1-500 solution of carbolic acid; a **1-500** solution of formalin * a 1-1,000 solution of potassium pernuganate; and a 1-800 solution of quinine.

CLASSIFICATION.

Authors differ **considerably** in tin- **ebkseificatio!) of** this family of **the** *Protozoa.*

Doflein (1901) **divides the genus *Tr. Qruby*** into **three** subgenera. as follows:

L Major fagrilmn pratani 2
Major BageUma abeeat, or very short **and** thick . . . . . *Tn/panasoma*
2. Vmlulating membrane <ontiniic-| **posteriorly** in a **flagdhm** so that Rubella are present . . . . . *TriifniHniiionat*
Posterior HajprThnn afamat, undulating **membnjte endiag on** or before end of body. . . . . *Herpetosoma*

Laveran and **ICesni] (1901)** have **shown** Doflein's ***Trypanomotuu*** to be a distinct **genus and** have **grtea** it the **name *Trgpanop*la-ma, with** *Trypnnoplasma bnnrli* U a type **BpedflB.**

^nlmon and Stiles ***crii&tiue*** **Doflem'fl classification** and divide **the** family ***Trgpanosomida*** intn two **genera—*Trypanosoma and Trypanoplitxuifi.*** With a few minor **ehaagea** this chi ssification is **adopted** tentative] y in this report. **However,** as will he seen **by following** the **dia**-inns, **we** i re strougly of the opinion that ***tA*** **Least two** of the **parasitee** of niamnials and probably others are **identical** with 7V. *evan* ***tii,*** and in reality the nanus of these should full as s)Tionym^ of *Tr. enin-*ii.

1'iiuTozA. **dan *MasHgophora,*** sulidas? ***FlagelUUa,*** **order** *Monandir*a, family *Trt/jninus'ti/tuhf,* **gemii** *Tn/fiannaomii* (iruhv.

Trypanimnnn: One iia^elluni present **extending** from the **og^TOBOme along tbe andolftting membrane** and b*/> free nt the anterior **extremity,**

TrgptMopUuma: Two **flagella, rtendiDg anteriorly and** the other **posteriorly.**

TrypattfisoftiQ rotaiorium **Mayer,** 1S4:1. **L. ft** M.. 1901.

Synon.>*tmx.—Amceb* ntmtorta* Mayer. iss4:i. July: ***Pmramtaeittm UtHtatum*** Mayor. Ift4:i. July: *Purnnntrinm nut at um* Muvcr, **1848,** -Inly; ***Trypanqtoma mn$m*fa<a Groby. L84S,** SCT—IWT ; Globiloria **mdKota** WM^IIMIU Wnll. ls,">o. / IM(l//I)I<] **rMinw** I-nnkf-ti-r. 1^71; *Htrpthnnonns* **Kent, 1880;** Pd rauecioides *costatum* (irtissi. 1SSI ; *t'tiramrcivulcs* ***cotUttm*** Grassi, 1*H*; "Trypa**mMMM** sanguinis Gruby" Of].;iiicssnn. 1882; "Globularia *rtidtahi* Wr.ll. **184»,M of R. BlftBCfaard,** l^S">: //"metomon"t« Mitrophanow. 1SSH; *Tryf>anomonas ranarmn* Danil.w-ky. **LS86; "Jtyptrodkofc** nf -teele," 1885; HB«MO<OM«M^>' of Hlamhard, 1888; "*Trirhomouns aanffui****" «f '"niokshank, 18S6; *Tr»(tan^soHin ntnurtim.* 1889 : ***Trypa***nosoma costatum DiinilcWfiky. Issit: *Trupuno-*oma co ***ttatmm*** *niunrum* DanitewT.ky, 1M; **rneAoaunwa raMtontm** (l.;uike>t«-r i **Danilewaky,** issi); Tn chomonas bat ifAortim Danilewsky.)^s<t; *-'Tri/i>anosamv-* Gruby" of Lav.-ran,]sjw "Trypanosomum" Ch **iiivrat.** :-96; ***TiitjHtMtKomr*** **(Jriiliy" of Biiffanl 4^0** Schneider, 1900; **"PtammoflOHHa** *loricatutn* **Mayer"** and *"J'tirttmn*cioides costatus **Oraaat"** of Laveran and Me-nil. 1001.

*Tri*ypanosoma a*ium* Danilewsky, 1885, of birds.

Synonym ff.— ***Trgpont*** **M DasQewtky,** lss,">; iVi;j1.jmj.w»m *fust forme* Dtinilv sky, 1889; **pam>«oi M** Danilewaky, 1889; *Trvpanotoma ma jus*

••

Danilewsky. lss:i; ***Ttyp€Mtoaoma aanguinis*** *»rium* **Daaitewaky,** tssji • *Trupanosoma eontatum* Danilrivsky. I$89; 7[1]/*ypanoso»m major* Danitewsky, 1880.

? FrypaJKNNHiM *'Inrliiii* Knit. 1880, c>f fowls (intestine).

S>/ii< *out ins.*—**7VyjKM00ONM** *cbcrthi* Kt'iit. 1880; **"TVypmOMMM** *>-bi>-fhi"* of I Lanessan, 1882; (!) *Cercomaortas (fulliuiiritni* Davftine. 1877; (!) *Cercomotias gallimr* Kivohn. **1880J** *Tn/iianoaoma* ***g&ertti*** nf Lewrlq. **L890j** *Tn/rhomonan* ***eolumbarum*** Kruse, 1896.

Trypanosoma cobitii **Kitrophanow,** 1883, of mudfish.

Syn•ton&mx.—llama tomonu cobiiis* **liitroplumpw,** lss:!; ***Triekomima**** *cobiti** (Mitropli;iu..\\ i **Craoksbank,** lssn; *'/»ypanosoma pis**turn*** **Danilewaky, L8E** ***pmtOBoma (HerpetOBom*) cob&i**** i Mitmphanow) **of DoDeiB, 1901;** ***Hamate*** *monas cobi'itih* Lut'he. 1002.

Ttyponosoma eara&sn **Mitrophanow, L8f** ***at*** **fish.**

Synonyms.—Hæmatomonas carassii Mitrophanow, 1883; *Trivh--monas carassii* **(KQtropbawnr) CrookalMuilc** issu: ***Trypanwtoma*** *i>ix<'itti<>* **Danilewaky,** issft; *Trypanosom•i fttxiformr WunWwxky.* 1«8I); ***frypemO90ma*** *i ll> >i-< tomma) rarnssii* (Mitroplianow) 1883, Doflein. lf)01.

Trypanosoma *solea* I^averan and Mt'snil. **1901, of B**oles.

Trypanosoma ball *bianii* **Oertefi, 1888, •:** oysters.

*Syn**vonyuu.**—Trypanoaoma bnibinni* **Oartoa, 1882** j *Truj,ano»oma baibianti* (Cert— I Italhiiini, 1S88; *"Trypavosoma bnlbianii"* **of** Panitewskj*, 1K-9.

Trypanoj-lasma da ***wibvskyi*** **Labbe,** 189L

Syno•ni/md.—**Tr>panom DMM** *ihmiUtcfikyi* Lal)W, 18»1 : *Trypanottoma* ***(Ttypan**** *omonas) danileiwkyi* (Labbl) Doflein, 1!>01.

Tnjjwno,plasma barrelii **LflveraB tad Iteanil, 1901,**

Tfypemoa *loma lewisii* Kent. **1880, of r;i**ts.

Synouyms.—Htrpetomona Utrini* K«>nt. **[880;** *" II < i)>t numaz letrisi* **Kent,"** 1880; **WwftomoiMi** *lewisi* (Kent) CrooksJiank, 1886; *Herpet* **omofw teipjag H^nf.** lewsky, 1889; *Trypanomo*„*(x winrniut **Daoilewaky, 1880; 7V#/...** *nomonas lewisii* (Kent) **i.;il»t>#. 1801: 7"'^v/'"""-""" '•'"«• Ki-nt:** *Trj/pfDitrnjiHa* Kanthaok, Durham ami Hhuidford. 18S>8; *Trypanottomtt rattorum* Boomer. 1901: ***Ttypan**** *osoma (Herpvtosoma)* ***letciti*** **(Kent) ppflwH, L90I.**

Ttyptn *rosoma evansii* **-**Steel, 1885, of **surra,**

*Synonymn.—Spirvrhratr >vansi *-eel; "Spirocharta evan*H Stool." 1885. of Crooksiiiuik, 18SU; ***Hermatom*** *~ -hunk.* 1886; *Trichomm**as evansi (Steel) Crook**thank, !^>«'<:*** ***"Bonwtomoitat*** *evansi"* **BiaadMrd,** 1888: *Tri*chomonas sanguinis* C ux)ksh^k" of Balbiani. 1>-•; *"Spirochetæ evan„•,'* of ^»ariinan and **Vaj**, 1893; *"Spirochetæ evansii* 3 **el"** of Lavpran. **188**5; *"Trypanosomum evansi* (**^eel)** t'linuvmt." 1896; *Trypanosoma evansi* (Steel) Pease, 1897; *Trypanosoma evansii* Pease, 1897; *Herpetomonas leucisii* Steel, of Danil*wsky, 1880; *Trypanotoma (Herpetosoma) evansi (-"i-)>* **Dofleia, 180]**; *"Trichomonas sanguinis evansi* Crookshank" of Doflei:i. 1001.

Trypanosoni'! brucei Plimmer and Bradford. 1899, of tsétsé disease.

Synon/!«««.—Trtffin rnosoma brucii Plimmer a nil **Bradford,** 189!>; *"Trypanoaomt brucei"* of Schneider and Buffard. li»00; *Tij/ptmoaoma (Hvrpctoton-a) brucei*

l'linimtr ami Bradford, of Doflein, **1901;** *Uvrpctomonas brucei* (Plimmer and Bradford) Laveran and **Ueuril,** 1001.

Trypanosoma nepveui, of man.

*Synonyms.—**Trypanofomc pambienM*** Dutton, 1002; ***Trypam**soma fordii* Max-ucll. Adams, 1903; *Tr. ugamlu-nsii,* 1903.

Trypanosojihi nmgetii Lavenin and **ICesnil,** of dourine.

Synonyms.—Trypanosoma equipcrdum Dotlein. 1901, July; *"Tryjianasoma" (Herpetosoma) equiperdum* Dottt'in, 1901; *Trypattosoma (Htrmutomonaa) equiperdum* Dofloin of **Lad**e, 1902.

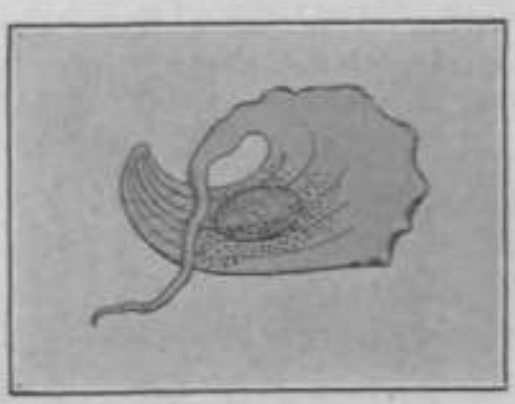
Trypanosoma equinum Voges, 1901, of mal de caderas.

Synonyms.—Trypanosoma equinum Voges, 1901; *Trypanosoma equinum* Vogea Of Railliet, 1901; *Trypanosoma ehnusxiani,* 1902.

Trypanosoma tkcilkrii Laveran and Mesnil, 1901, of cattle.

Trypanosoma transvaaliense Theiler, T*;ivoran and Mesnil, 1902, of cattle.

*Trypanosoma rotatorium Mmjrr, **184&,***—**The Length** of tlus parasite including the flagollmn (whitli is 10 to 12 microns long) is usually



Flu. «>.—*Tr. mtnrpimif* Grttby. **(After** lh.flcin, **J901, *tig.*** 32.)

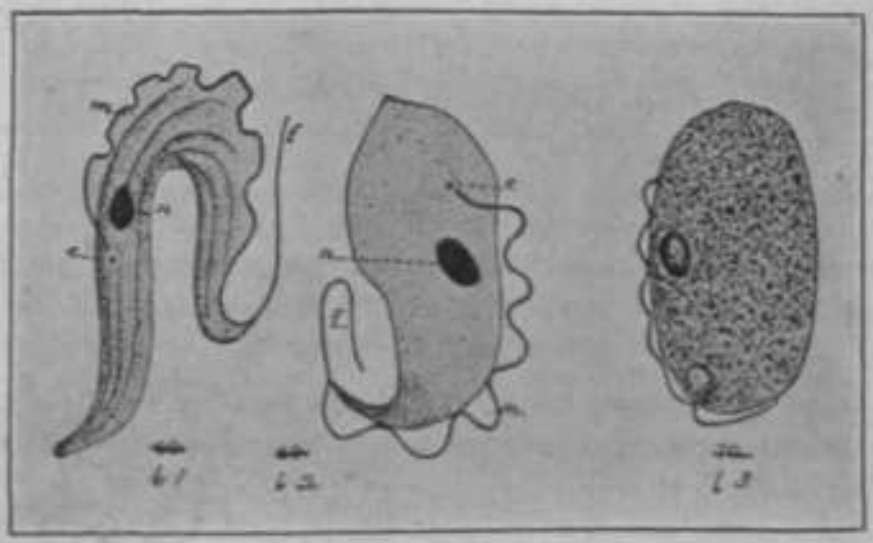
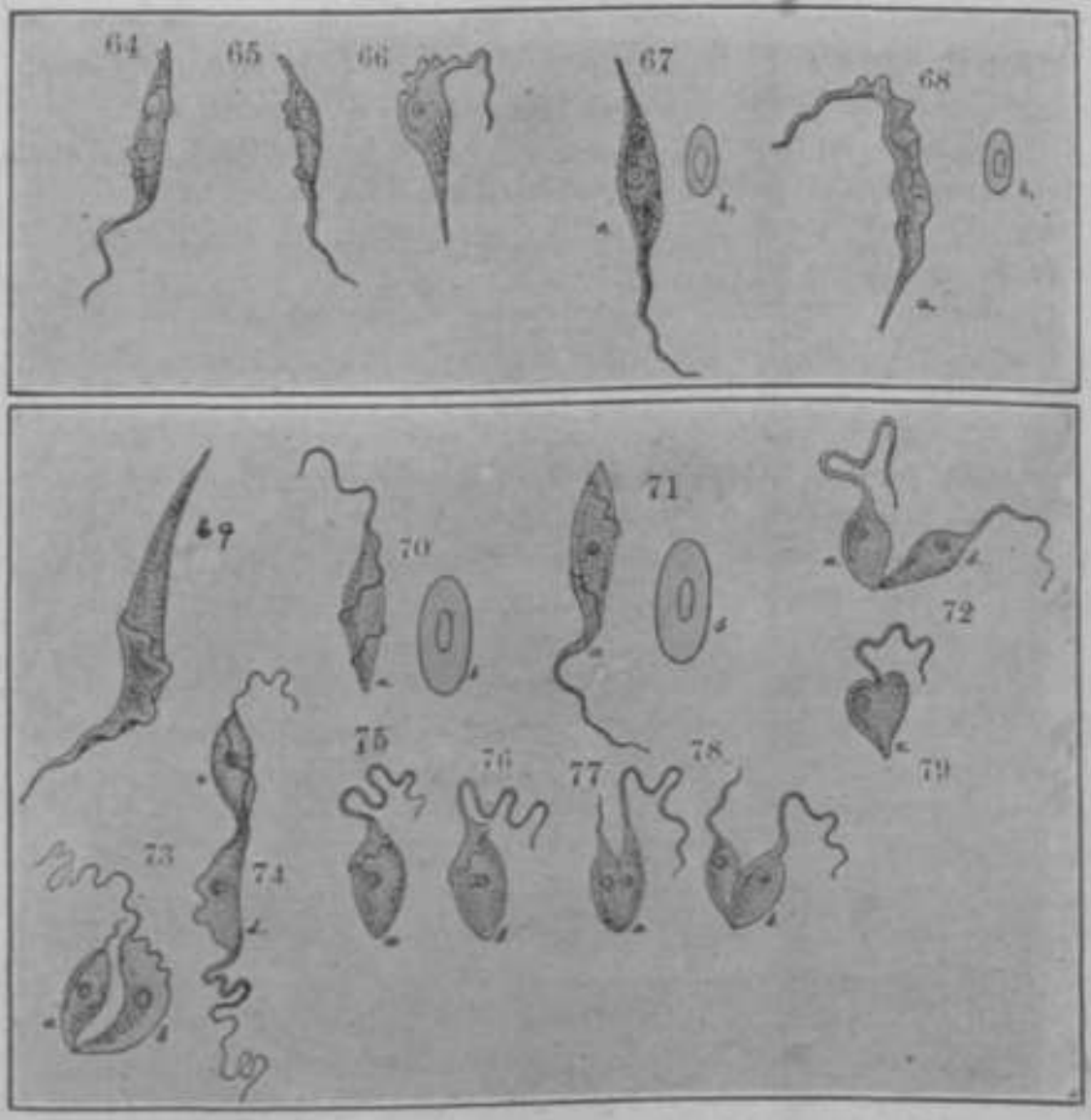


Fig. >.1-63L—Showiiw (UflerMit Iftrnwol 7V. **rafaJorfw** FUxellam; m. Undulating membrane; ntrc«om> mill Mwnil. 1«H, **flj[»-1-3.)**

given as being about 40 to 80 microns, while the breadth is 5 to 10 **microns.** Doflein says it has a broader body and undulating membrane than most of the **other** *Trypanosoma.* It has a granular protoplasm and a large clear nucleus. One end is somewhat blunt and the other is provided with a short flagellum.

Salmon and Stiles in their specific diagnosis of this parasite, after giving the dimensions, state that "the body is compressed, semi lunate,



Flo*. <H-TV.— Varioi:s forms of Trypanosome of **birds.** < After Salmon and Stiles, 1902, figs. 53-6*.)

twisted; the convex border rffcwbranous and undulating; the posterior extremity of the body portion pointed and curved inward, the opposite one produml into a long tag or tail like appendage, which almost equals in length the remainder of the body; surface of the body coarsely striate longitudinal]y; endoplasm or parenchyma slightly granulir; endoplast ovate, central."

Habitat: **Hlood of frogs** ***(Bana esctdenta, Rana temporaria,*** **and** ***Hana*** **I** *arborea).*

According to Doflein the mode of transmission is not fully determined, ;iinl tliis statement is confirmed by Laveran and Mesuil. There may be more than one specie of tliis? parasite, but so much of the work regarding it is unsatisfactory thm tor the present it seems advisable to consider it a single species. It apparently has no special pathologic sig. niCn-ance. and for that reason is of but little importance in this paper.

We have examined the blood of a large number of several varieties of frogs here, but hare failed to find this or any other *Trifpano&onuL*

Trypanosoma avfum Danilewsky, 1SSJ.—Salmon and Stiles give as its specific diagnosis: *"TrypcmosotM* 18 to ‹‹' microns long; body eyliudriral. compact, fusiform, and homogeneous; anterior extremity gradually attenuate, and continuing directly into a long or short fiagellum; fiagellum intimately united with the andulatixtg membrane, which extends from the Bagellum to tlie posterior extremity; nucleus spherical in equator or anterior half of bodv."

There have been found in literature several references reporting 7V//-*ptmoioma* in birds, but most of the descriptions arc inadequate VY. have examined a large number .of birds of several varieties in the Philippine Islands, but we have failed to Sad *Trypa*09Qm#* in their blood and have been entirely unable to infect them with the *Trypanomma* with whkfc we have worked.

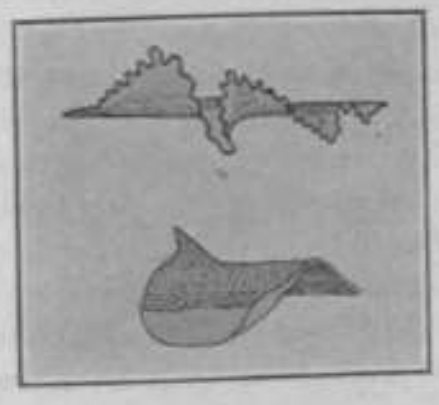
Tnipnnnsomn fbrrthii k'rut. 1S80.—Salmon and Stiles and ot!ers doubt the correctness of the classification of tin- species; Doflein believe* that two or three species have been confused in its descri it ion.

h is described by Dofleua as half-moon in shape, the concave side being the body of the parasite and the ton vex the undulating membrane, which has numerous small folds. The protoplasm Is homogeneous and contains ;i nucleus. One end of foe body is blunt and the oth.r is tapering am) continues into *a* short, motionless projection. Kent says that the membranous border is often spirally convoluted around the thicker central portion, the entire body under stub conditions assuming- an auger-like sapt ct.

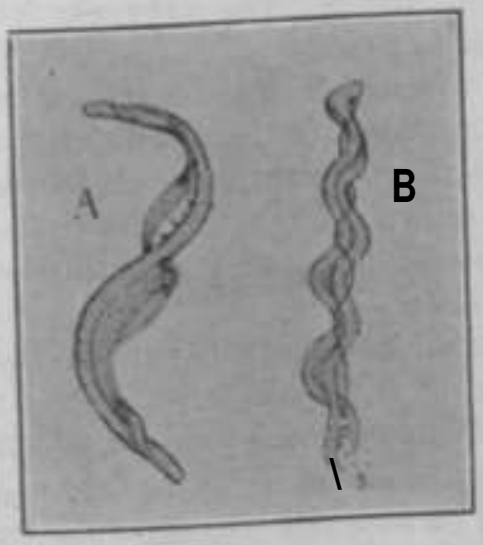
Habitat: Glands of Lieberkuhn, eeeum and ileum of chickens, dov es (?). ducks, and geese. Bivolta and Pfeifler, according to Doflet n, found this organism or a similar one in poultry diphthei ia.

In th. few chicken 3, pigeons, and small birds which we have examined in Manila these parasites have not Iteen found. It seems more than likely thai some of the *Trichomonida* have been mistaken f„r *Trt/j ano-soma;* as it i- doubtful thai so strict a blood parasite would be fourtd in Tin- iiitestina1 catial of birds.

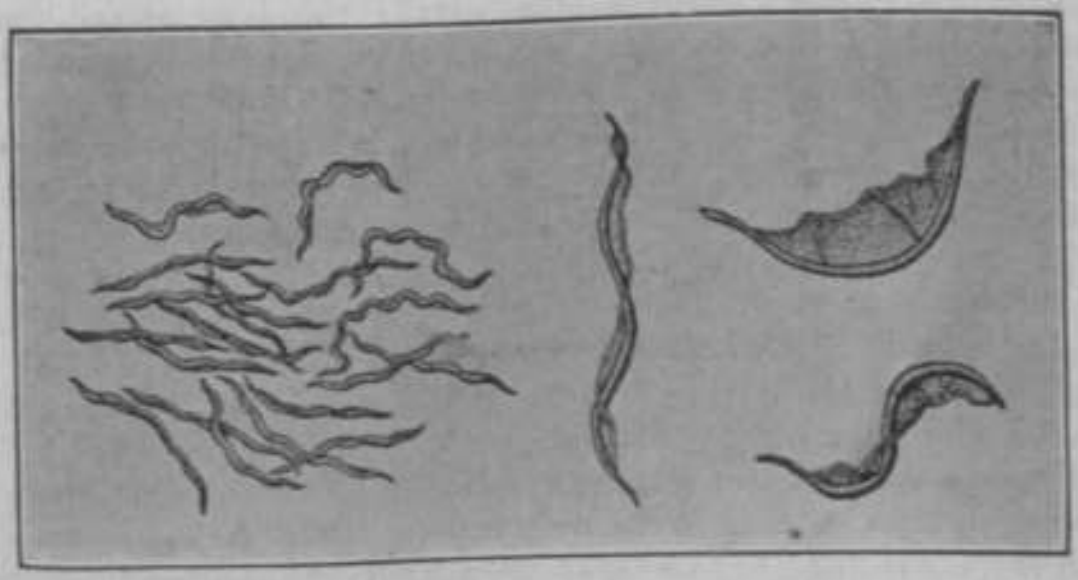
*Trypano*oma balbanii Certes, 1889.*—Doflein gives t be length of this parasite as 50 to L80 niicront and I he breadth as 1 to 3 microns. 9 aLmon and Stiles give the length as 50 to 18I microns and the breadtii as 1 to 30. It is described \\ I'ik tlein it • an elongated I parasite with slender



Flo. » . - JV. **hrrthii.* (After Doflein, 1901, fig. 33.)



Fi«. M.-7V. faMuui Certos. (After Lustrac.)



1o. 82.—TV. bofUmif' Ortw. (After Salmon and SUK«. 1MB, fist. 76-79.)

body and slender undulating membrane. Certes, Lustrac, and others have observed longitudinal division, winch Lust me says begins in the undulating membrane. Laveran and Mesnil do not consider this parasite a member of the family *Trypanosomidtt.*

Habitat: Intestines of oysters *(Ostra edulis, Ostra angulaia, Grypha angulata)* and mussels *(Tapes decussata, Tapes paUustra).*

Pathogenesis: Xot known.

-Neither this nor any **other** Trvpnnosoma has been observed by us in the examination of a large number of oysters of the Philippine Islands.

Trypanosoma cobitis Mxirophanow, 1883.—A very active and motile Trvpanosoma, 30 to 40 microns long by 1 to 1.5 microns broad. Doflein say1 that one end tapers abruptly and the other gradually, ending in a flagellum 10 to 15 microns in length. The undulating membrane is distinct in prepared specimens. The protoplasm is homogeneous, except, according to Dofiein, in multiplication and degenerating forms, where it may l»' granular.

Habitat: Blood of mudfish *(Cobilis fos&ilis).*

Patho^t'iifM-;: Described experiments have failed to convey the infection from fish to fish or from fish to animals, by inoculation.

Trypanosoma carasm Mitrophanmv. 18S3.—Doflein says that it is iv similar to *Tr. cobiti-s,* but more flattened; that the undulating membrane is better developed and the body more uniformly pointed at both ends and larger than that of *Tr. cobitis.*

Habitat: Blood of fish *(Carassim vulgaris).* Doflein observed it or a very similar parasite in the tench *(Tinea vulgaris).*

Pathogenesis: Xot known. The *Trypatiosoma* which Doflein observed \ivre found in sick fish.

Tli & t!i<- **Philippine** Islamis an- apparently free from this *Trypan.*

ieties. Very closely *lewisii,* activel

<>*soma.*

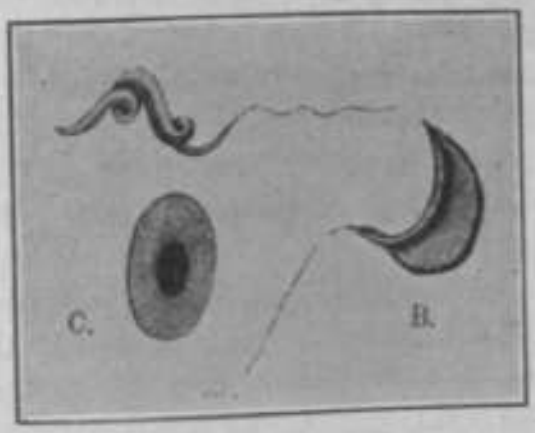
Trypanosoma rcmaki Laveran and Mesnil, 1901.—Trypanosoma ?8 to 30 microns in length and very slender. Two sizes and possiblv two va; resembles *Tr.* v motile, with undulating membrane, both ends tapering with a long flagellum at the anterior end, protoplasm finely granular. The larger forms measure microns in length and 2 to 2.5 niicronB in breadth, and stain somewhat better than the small variety.

Habitat: Blood of pike *(E&ox Jucius).*

Pathogenesis: Not infectious by inoculation.

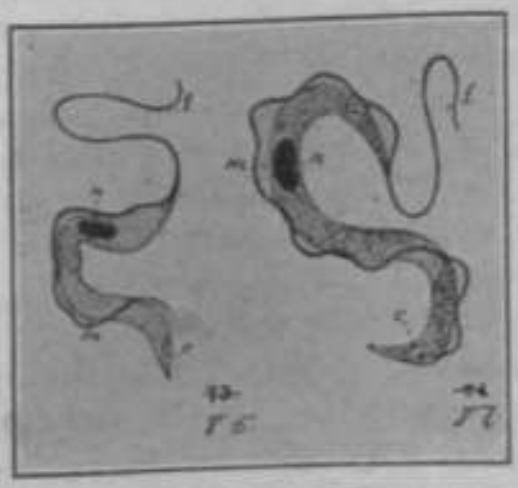
We have not succeeded in finding *Trt/inmosoma* in the blood of fia in the Philippine Islands, although several varieties of both Bait **and** fre«b water fish have been examined.

Tryp< Laveran and '. 1901.—A *Trypano$oma* resoml 10 microns in length, very actively motile, structure in general like that of the other members of the family, posterior



r » . «T—*Tr.* M M U WtroplWMm (After Mitrophanow.)

Flo. 81-7V. niftufU Mitwphanow. (After] mow.)



Figs. 85-86.—85, *Tr. remaki parvum*; [illegible] mem brane; *c*, Centrosome; *n*, [illegible]

«. 7V, rrwcitoV m*gtmm: /. FUpdltun: M, I'ndulntia? mem ur.JeWk (Aftrr Uventn wd Xwitt.im. fl*. *i.)*

end not so sharp, **nucleus oval, centrosome present and undulating** mombrane **well developed.**

Habitat: **Blood** *at* **sole** (<9O2M *vulgoru*) **nance.**

Pathogenesis: L&Yer&n wad Mesnil did **not succeed** in **infecting other** animals with this *Tiyponoaema.*

Trypanoplosma bcrreH Laveran and M«sn&,1901.—**Laveraa** and Mesuil desiribe **Qua** parasite us **a** *Trypamoplasma,* with two flagella. both extending from tin- **centrosome and** one going to **each extremity, the anterior COM** bordering a **well-defined undulating nembrane** and extending into a free flagellum 15 microns in length. The total length of the parasite with flagrlla is about 50 microns and **the** breadth ',) to 1 **micron& One** end i> more pointed than the other and very inutile. This **paxai**ite chat ges its form, sometime **resembling** an ameba. Two chroinatin masses lie (lose **together** near the **junction** of the posterior and anterior parts **oi** tlie **body,** one of the.se mas:-es resembling a nucleus and the other a **oentroaome.**

It is to be noted here that Labbe **(1891)** had already **Been** a *Trypano-pHatmo* with **two flagefla in** the **blood** of **leeches and** that Xunster (1*98) had mentioned a similar organism found in the blood of a **guinea** piir. Fig. Si) is **Labbtifa** illustration of **the pai**rasite observed by **him** in leech*ha* m **189L**

Habitat: Found **by** Uiveran and **Sfeenil** in the blood of **the** re<!. ye i /.<uciscu | *{•rythroptluilmus)* of Fran.e.

Pathogeneais: N^t infectious **by inoculstion.**

Tiypanoeoma LewiiX** h'tnt. **1880.—Gros in 1-345, Chaussat in 18",0, and later other authors found remarkable parasite, **which** for a long **timewere**tin cause of **controversy,** in tho blood of rats and hamsters. While sout* consiitTed them as umrba'. **flagelL** etc., **there** wore others who did n*»i **recognise** them as **independent OTganiama, but as raennar taao**a, or, as -iebold, even **considered them** small patches that **some)** now had been torn loose from the walls of the circulatory and lymphatic systems.

After a long pause interest in this organism was again aroused, and a large numl>er of articles dealt with tin- **subject,** without mentioning or recognizing **the** curlier works. Lewis (18!9 and **1880),** Winich (1881), **Robert** Koch /*s\\ **Oookahank** <is>:) **published** several treatises oi *Tr. /ewisii* **to which** Kent in 1882 gave its name; but he placed it in **the genna** ***Ht<*** **-\ which** according Io diagnosia **ai** present accepted possesses M> undulating **membrane. Labbe\ DttnOen** and **Ifitronhanow ait** o deali with tiis species, while **all** investiga'ore **of** surra **Likewise refer to** it. **(ntaresl** was awakened thr-mgh **thi** tigatif irra an -c fly **disease, and** by the observations of **Koch, Bouget,** and **others,** but .illy **by** the

important worka **of** Rabinov Wasiel^wski and Sean,

and Lave ran and Mesnil, **which explain** tho methods of multiplication and widen our knowledge **ecaasiderably.**

Rabinowitch and Kc'inpiuT, as **well aa Waaielewaki and Semi,** have

FlO. 87.-7V. *noUac; /,* **Flagellum: a. Undulating mfnol.ranc: <•. OsalWOBWi. i After Laveran and Miamll, lSWl,flg.3.)**

Flo. 8«— *TrypanoplOfma borrrti.* **(After Laveran and Uonil, 1901,** *Ha* **4.)**

rn. m **(After Salmon and StOet, 1902. fig. 88.)**

studied multiplication fonns with a considerable degree of thoroughne*m.* **Their** invent igations agree on **essential** points. According to th»-m there are ihrw kinds >*f* **multiplical** ion; two **forms** of division,

and one form of **multiplication** through segmentation, a division into numerous rosette-shaped sprouts lying side by side.

Whether conjugation takes place is yet unknown, but to Doflein it appeared that such a process precedes the multiplication by division into sprouts. Some pictures of Kabinowitch and **Kemgnisr** point to **such** a course. Tin*, **howew**r, is snil very problematical, **especially** since **the** life history of *Trypanosoma* is not fully understood.

Sean, for example, considers the ordinary division as budding, since, according to his **statement,** tin- **mother** parasite is always **Larger** than daughters produced by her. The individuals are seen rapidly to increase, especially after a new infection, impetuously dividing themselves. The divisions are often multiple, and the mother is seen to separate into **two,** three, four, and even eighteen daughters. Senn considers the ro**ette** formation to be the result of a division into several individuals, and not as a special form of multiplication; but since the complete life cycle of the species has not been positively determined, this is also a mere theory.

In any case, separation into two parts is the typical form of longi-uulinal divisions; and the apparent deviations in prepared sptri turns explained by the delicacy of the protoplasm, which on being killed assumes the most varied form>. .\- yet resting forms have not been observed.

Habitat: This species lives in the blood of rats *{Uus rait us.* ***Mm dtcunanvs,*** *.Uus refuscens)* and probably in that of the hamster (*Cri-eel us a r cab's).* Thus far it has been observed in Europe (Germany, Eng**land,** France, Italy, and Russia), in Asia (India, Japan, and'the Philippines), and in Africa (Dutch East Africa and Algiers).

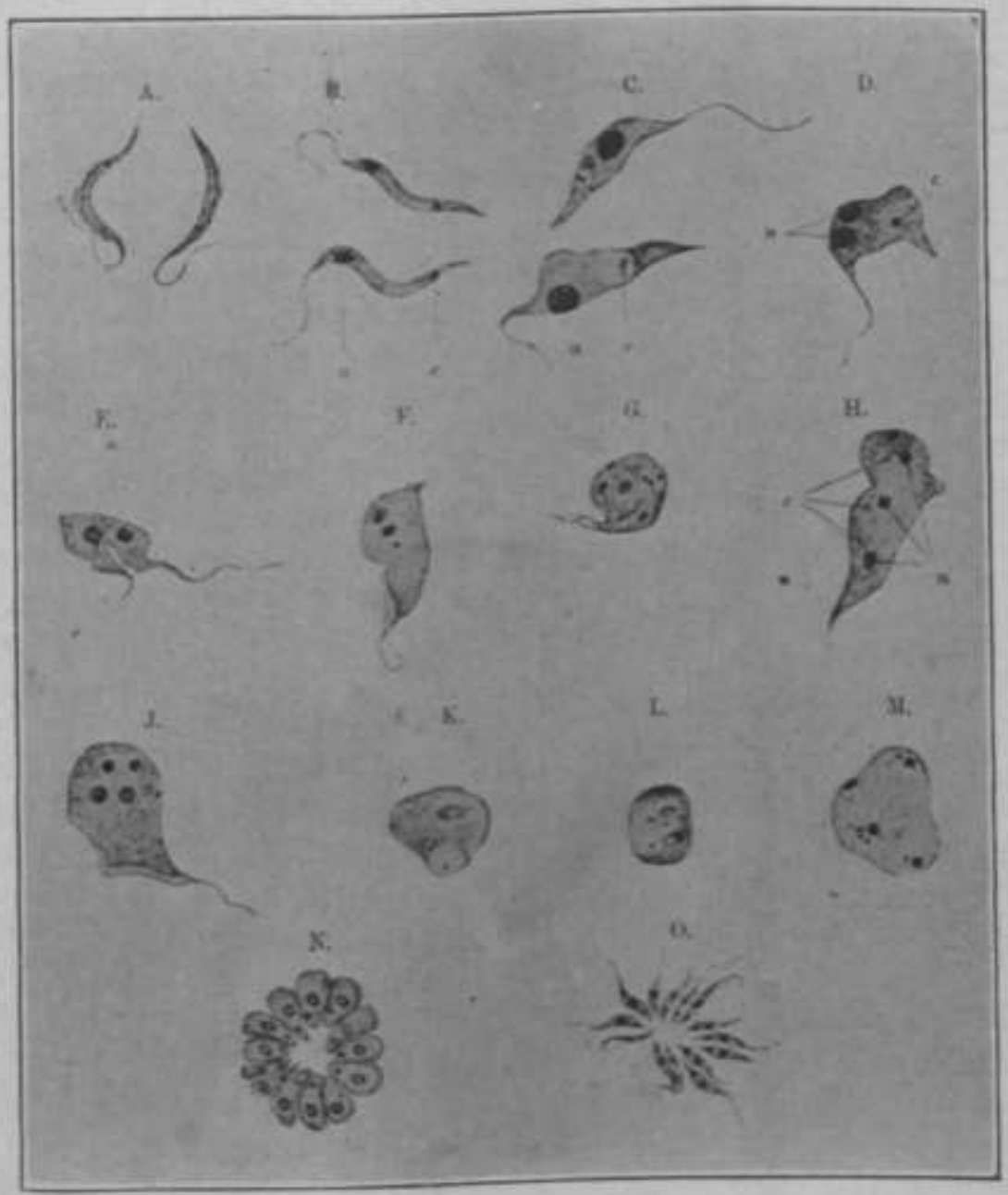
Pathogenesis: The parasite is found in the blood of animals attacked by the disease. In the case of rats it sometimes produces sickness and death, but it is generally found in apparently healthy animals. Wild rats are often found infected with it, but in tame ones, especially **in** the white variety, its occurrence is rare, although these as well as white mice are susceptible to the disease. In many instances 25 to 29 per cent. but in others a much smaller percentage, of wild rats has been found infected. Under certain conditions epidemics seem to break out.

Whether the *Trypanosoma* which appear in hamsters and tho9e found in rats are identical can not \<-i be stated positively.

This parasite is very common in rats in numerous localities, both in the Trypanosomatic zone and in countries which have apparently always been free from the disease in domestic animals. For the purpose of study it **is** one of the most easily obtainable, and because of its non-pathogenic Bignificance and **its** wry dose relation to the more virulent forms is one of the most important of the genus. The history and synonyms recognized by leading authors hare been given abo\e.

Salmon and Stiles give as the specific diagnosis:

Eight to 10 microns long by 2 to 3 microns broad; 24 to 25 microns long by 1.4 microns broad (Laveran and Mesnil, 1901); a very refrangent granule {near eentrosonit?) in place of whiuh a clear vacuolc is seen iu stained preparations. **"Animalcule*** exceedingly minute, **roata** and vermicular under normal conditions hut liL^hly **polymorphic** »nd capable of assuming a variety of contours; flagellum single, **termini,** two or three tiroes the length of the extended body; no contractile vesicle * • * as yet detected."



Fn;.4W.—7V. *levieli* KcnL A, Adult living parasites; B, Adult stained parasites; C-F, Stages of longitudinal division; G, multiple longitudinal division; H, Beginning multiple transverse division; I-M, Other forms of division; N-O, Rosette forms of division; n, Nucleus; c, Centrosome. (After Prowitsch and Kempner.)

Doflein's description, translated, reads as follows:

The *TtypanoMoma* of raU *is* l*tuce-shaped m<l reveal* a Terj* finely granular protoplasm, around which a thin hyaline b«* ***dmrtj*** visible endoplasm **li.-s.** Kror the latter encircling the flmgellum and the undulating membrane. The flageliuin is

almost its Itnijj JIS tin* body **Itself,** ami >|irini;^ from the posterior end of the parasiti- with a cent nil nuHeus-tike **strtictun** nuiridlTflfl **M** ii- **origia, tad** thrn continues ;i- a thickening of tin- **edge** of ilit' undulating membrane, tirsl **becoming** free at the anterior end of tin? **parasite** and **wriggling about** in **the** Tiii'ditun surrounding it. In the anterior **part** of the parasite is found the **somewhat** large **NMttau,** staining deeply and filled with a dense cltrouiutin network. A contractile va<uoli' lias not lwn **seen.** The **length of** ***Tr. tewitU*** varies **between** 8 and 10 microns **sad** tin* breadth between '2 ami 3 microns.

As is true of other **parasites,** *Tr. Ictrisii* **undoubtedly shows variations** in size. **Individuals aw** found **not measuring** more than 15 to 20 inicrons in length by 1 to **2 microns** in **breadth. On** the **other** hand. spec.....n- are seen **which may be fully** >« **microns** long and 3.5 micr ons **broad. The average measurements of adult para** ites observed **in Manila** rats**. obtained** from **htradre*** is of s **pedmens,** are 25 **microns** long **bj** 2.5 **microns** broad.

On the whole the motility of this **parasite in the** hanging **drop is probably greater than** that **of** any other ***Trjfpanotoma.*** **The** active. **darting** motion **observed** is **not characteristic of** all **specimens,** and ***m*** have **bees** unable to determine the **responsibility of** outside influences for **t&eae variations.**

In addition to ***Tr. lewisii*** **Manila rats certainly harbor** *Tr.* **m u m ,** and **we** have not wt **satisfied** ourselves that there **is** not n **third** species in **some** of **them.** This **makes observations of** ***Tr. letnsii,*** **based upon the** examination **of the** ***Trypanosomc*** **found** in rat*, more **difficult,** and in **the** past has **probably been** responsible for **the lack** of harmony in results **obtain*** d.

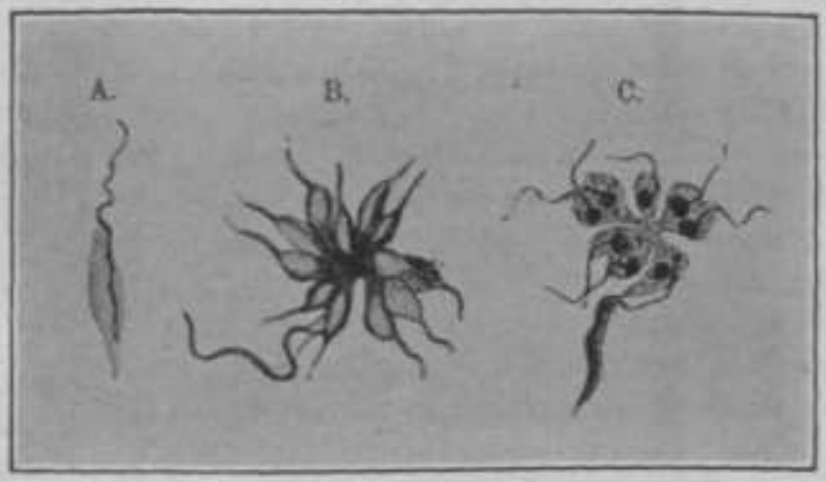
Namerons comparisons of diagnoses made of rat *Tni pnoso>tn* **by tnorphologica] characteristicfl** and **by those** determined **by** animul **experiments** with the same **organisms have** fully **convinced** us of **the** futility, in **man** y cases, of de **pending** upon **microscopic** data for the diagnosi- of *Tr. i<>v* of **other** *Try (Hl l)-,*oma.

The mod trustworthy and important diagnostic point for this parasite, **besides the** animal test, is **the** fact already brought out **by** ot);ers, particularly **by Laveran** and MeMiil. that it **lives** so long in **the** ice box, where in **solutions** of blood in **potassium** citrate ***Tr. lewisii*** retain their activity for days anil **always longer** than *T\. evansi* which **on** various occasio **as** lia\. been te **sted** side h side w ith thorn, **Thev not only** retain their activity longer. **Inn** also remain infectious for rats for a much **greater** length of time.

Ti **not true, however,** when **compared with the possible** third vari<ty of rat ***Tryp anosom a*** **mentioned above,** These ore i excessively **motile,** remaining so for a long **time** in the ice box, where they mamtain their **infect** iousness. The c-apposition that these *Trypunozoma* belong to a separate species has Ueen gradually evolved *h* rom ex **perimentai** data. **There have been** times **when we** have felt confident **we** I ere w>rking wit *Tr. lew* **PMI'I.** only to find **the** parasites **infections** for **dogs,**

monkeys, ru-.. after two or **three days in** tiu[L] ice box. **At present tt point baa** not **been satisfactorily determined ;m<l most be tefl** to *A* future **diacraaion.**

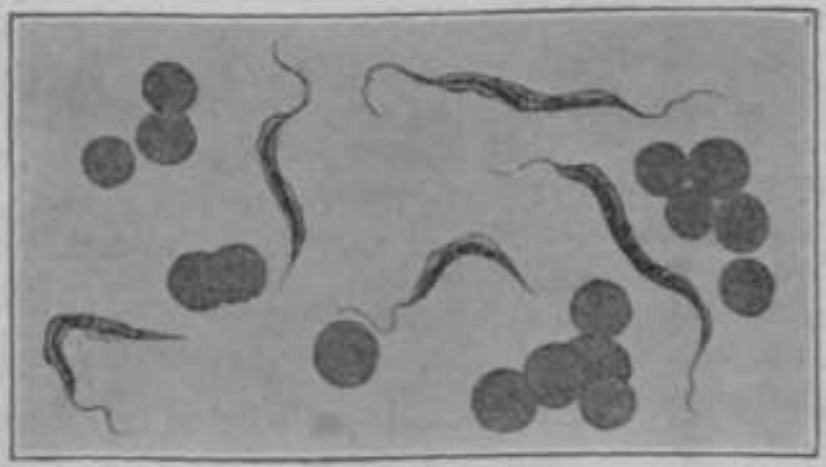
Of this **we** are **gore, thai** ***Trypanosotna*** **corresponding** in **every** respect to the descriptions given **ol** 7 V. *Irn-isii,* including their noninfeetiousness



Flo, 9L— 7V. fcumi Kent. A, Adult nanaite: B. Multi UpUcatloo forms in staintKl sj>eclraci ***tonoM*** **in fresh specimen: r. Mai-H>ky and St-nn.)**

for other niiiMJils, may be found in the *hU*n]* of Mauila rats. In **addition** to **thoee** ***Trypanotoma*** **correct** in **erci** essential **for Fr.** evdnaii occu **u** in th*>sr **rodents, fta wd] as pamrittt** whirl) microscopically resemble *Tr. leu*>wü Imt **AT** infec tinus for oth<T iiniuml^ **prodoeing disease** and death.

*Tryi*ano$oM<i evnmii Si eel, 188*"..—A **motile** *Tn/panonouia 20* to 30



Fto.W.-7V.<T<nwf. Two of them In proc«i .if divWon. (AfterCr okshank.)

microns in **length by** 1 to *'1* **mi raadth,** some **what** blunt at the posterior end **and** gmiiually **tapering** at **the tinteri** The 'induls:ing in.'inltr;; ne is **fined, beginning** at or near a small bo<i y (centrosome) in the po **sterior** |>orti<m of **tb** para **site and** i-xK'uding **forward** as a free flagel uni.

This *Trypanosotna* is provided with a nucleus and a granular protoplasm.

We have classified the parasite causing *Trypanosomiasiti* in tlu[j] Philippine Islands as *Tr. evansii.* This is **the** name adopted for the original organism causing the disease in domestu animals, and the one in tha Philippine Islands answers the descriptions of this *Trypavosoma* as well as those of some of the other parasites later to be discussed.

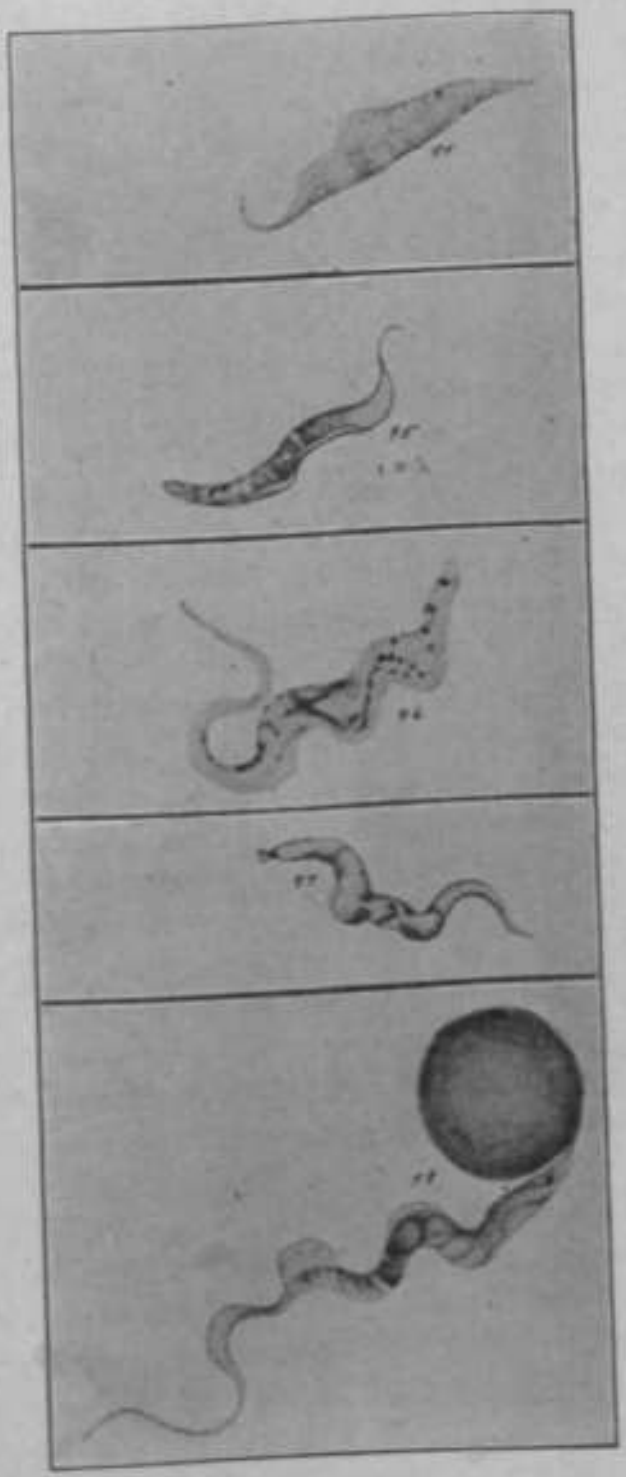
It is a *Trypanosoma* from 20 to 35 microns long by 1 to 3.5 or 4 broad, including the flagellum. The **gradually** tapering anterior end is provided with a long flagellum, which in **the** living parasite has a very active motion and is a free continuation of the thickened border of the undulating membrane. It extends buck ward along this membrane to its end, about one-third to three-fourths the length of the parasite, and terminates at or near the eentrosome (micronucleus). The undulating membrane extends from the posterior portion of the parasite along one border to the anterior, where it gradually tapers into **the** free flagellum. **This membrane,** active in the living parasite, in fixed specimens is found to be more or less folded, giving it a ruffled or fluted appearance. It is usually homogeneous, but sometimes contains granular matter apparently identical with that found in other parts of the parasite. The posterior end of the parasite is more or less blunt. In the living state this part is undoubtedly contractile, a fuel which accounts at least in part for the varying degrees of bluntness seen in fixed specimens. Too great importance has been attached to the shape of this extremity, which in the parasites observed by us varies too much to be very significant as a diagnostic poiiu.

Thf *protoplasm* of the parasite alters considerably with conditions, one of which is probably the age of the organism. In some it is almost homogeneous, as viewed with *a* Z« 1/12 **objective,** ocular 4. It is usually granular, especially in the anterior portion, the granules being either small or large but more of tea a mixture of the two kinds. A number of the larger chroma tin granules, which may measure as much as 1 micron, are often seen near the eentrosome, again in the anterior portion, and sometimes well up into the fiagollum. We have observed ***them*** a few **times** in **the** undulating **membra**ne.

The *nucleus* is situated somewhat anteriorly to the center and is oval or round and of good size. A nueleolus is not usually observed. The nucleus takes a c ha rat-tori *• imogeneous or slightly irregular in structure; but we have been unable to bring out the beautiful effects >f karyoki netic division illustrated by some authors.

The *eentrosome* is situated in the posterior portion, its distance from the poeterior end varying from one-fourth to one-third the length of the parasite, depending no doubt upon the degree of contraction of this part at the time of fixing. It is , hromatie, and within small limits varies in size. It is intimately associated with the beginning of th- undulattng

Fig. 93.—Typ«»'some showing l-aru.'Ularly feUta* ..(ini.lulatingmembn.iie.



Figs. 94-98.—Various irregular forms of Tr. evansi.

membrane and Bagellum, and while difficult to demonstrate satisfactorily, is probably the head of the llagcllum.

In fresh specimens the parasite has an eel-like motion, owing to the vibration of the undulating membrane and flagellum and to a less extent to the action of the entire parasite The actual mutility rariee in BOme specimens, and while it is generally not great, it may be quite extensive. These variations arc difficult to explain, the more so since they occur in specimens prepared from the same animal but at differed times. For the study of structure, fixation and staining are necessary. The various methods which have been published for showing the motion of the living parasite in such a way as to reveal the structure are unsatisfactory.

Habitat: The habitat of this *Trypanosoma* has already been given, but we wish to add Manila rate to the list This fad merits special emphasis in the consideration of measures for the control of ihe incurable malady caused by the parasite.

Pathogenesis: It is pathogenic for nearly all animals, as will be seen when the discussion of susceptible animals is reached.

Trypanotoma hruvci Plimmer ami Bradford, 1889.—Laveran and Uesni] describe it as a *Trypanosoma,* El to 27 microns long by 1 to H microns broad. In horses ml asses it may reach 2(i to 30 microns in length. The size, however, varies but little. It is a motile, worm-like organism, with an undulating membnane extending into a long Hagelhim at the anterior end The posterior end is variable—round, tapering, or conoshiipod. The motility is not great. The structure is not well market! in fresh specimens, but in stained ones it closely resembles that of 7V. *l>riaii.* It contains large, deeply staining granules, especially in the anterior end. The nucleus Dear the middle of the body is elongated and contains deeply staining granules. The centrosome is nev the posterior end, and is a round corpuscle staining more intensely than the nucleus and often surrounded by a clear zone in stained specimens. The flagellum, free in the anterior end, continues along the undulating membrane and stops near the eentrosome, appearing, however, to be separated from it by the clear zone above mentioned. In involution forms flagella often appear to have direct connection.

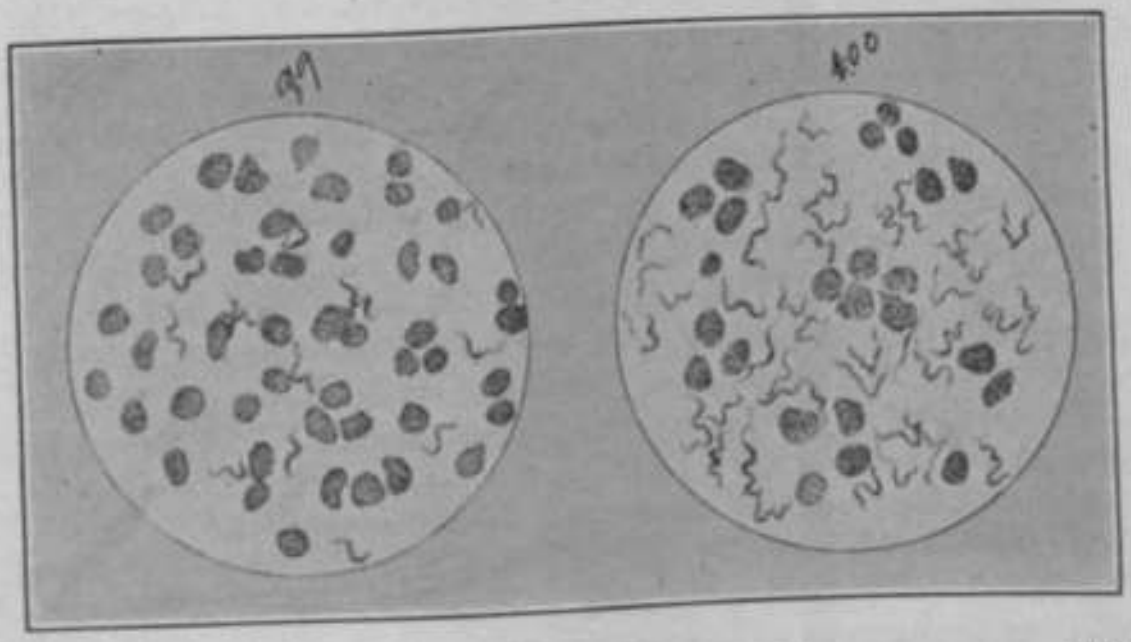
Bruce says that this parasite as found in the dog is thicker, shorter, and the posterior end more rounded than in other animals. In the horse the dimensions are nearly double, with the posterior end tapering.

Plimmer and Bradford consider the parasite to vary in size and length with the period of the disease and the species of the animal, being the largest in the rat at the time of death.

Salmon and Stiles give as the specific diagnosis of this *Trypanvnovta:*

Two *wiy* B« to 30 microns long, 1.5 to 2.5 micron* broad. &• rompared with 7V. *lcK%*ii* Ik«* (»•-•erior extremity of IV. *hrvcci* in not so sharp, the unduUUng

membrane is broader more plicate protoplasm colors more easily and nior, deeply, «d t h o » - - - ; / : ; ^ tcrior half, some of winch grand-, Wfcid. a,ci.m« ate ,MH •"• arc as large as tlie centrosomc, «na unq ocntroBome divides before tUe nueleu».



Fios. ';»-l(».-5 , , , i rtf « rat four HH%> »ft,r inoeiitdtion; 100. B U M eight days after ino

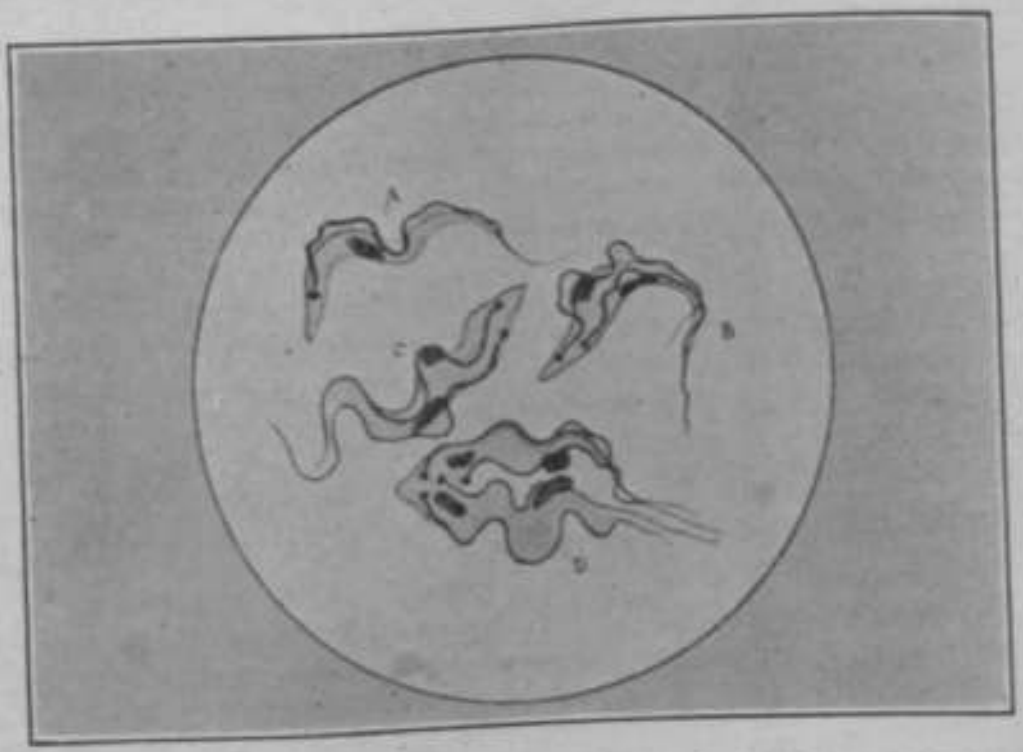


Fig. m - Trypanosoma of dourine in the process of evolution, clear} showing th- centrosomes. (After Ligniores, 190M

Habitat- It ii fmmd in &e blood of several species of domestic as well aa wild animal*. Th|S P ◦ mx , is more a chapter >levoted to this subject.

Ps&hogeneszs: It is infectious upon inoculation for nearly all animals.

Trypanosoma rowj>lii Laveran and MesnU, 1902; Trypanosoma equiperdum Dofiein, 1901.—Rouget describes this parasite as a motile, worm-like *Trypanosoma,* 18 to 86 microns long and *2* to 8.5 microns l>m;i<l, with KD u ml n hit ing membrane and a long anterior najMhun. The posterior end is tapering or blunt and contains a small, shining globule which does not stain. The protoplasm is granular. lie considers it identical with other *Trypanosoma* of domestic animals.

N"ocard, who worked with this parasite, considers it and the disease produced by it identical with other *Tri/jinnosoma* and Trypanosomatie infections.

Buffard and Schneider maintain a close relationship between this parasite and the others, but they are not sure of their identity.

Habitat: Blood and lesions of horses and assos suffering from dourine.

Pathogenesis: Naturally infected animals are horses and asses. Infection may be transferred by inoculation to dogs, rabbits, white mice, and several other animals.

Trypanosoma nepveui.—Whether or not this is a distinct species is hardly determinate from the descriptions thus far given, but the work of those baying cases of Trypanosomiasis in man under observation will probably aettle this point. All *Trgpanoioma* described as occurring in cases of human Trypanosomiasis are included tentatively in this Bpe ies for convenient e.

Nepveu first described a *Trypanosoma* in human blood a? fulln ws:

This Trypanosoma presents ail the characteristics of the genus. It has a homogeneous colorless membrane, one border of **which ifl** thinner than the other, and hyaline, with t'hHrnctt>ri*tie **undulating** movements. This **membrane** U>urs a nucleus and a fine flagcllum, situated **Ulteriorly, the** tuuluhitions of which follow in rapid succession. • • •

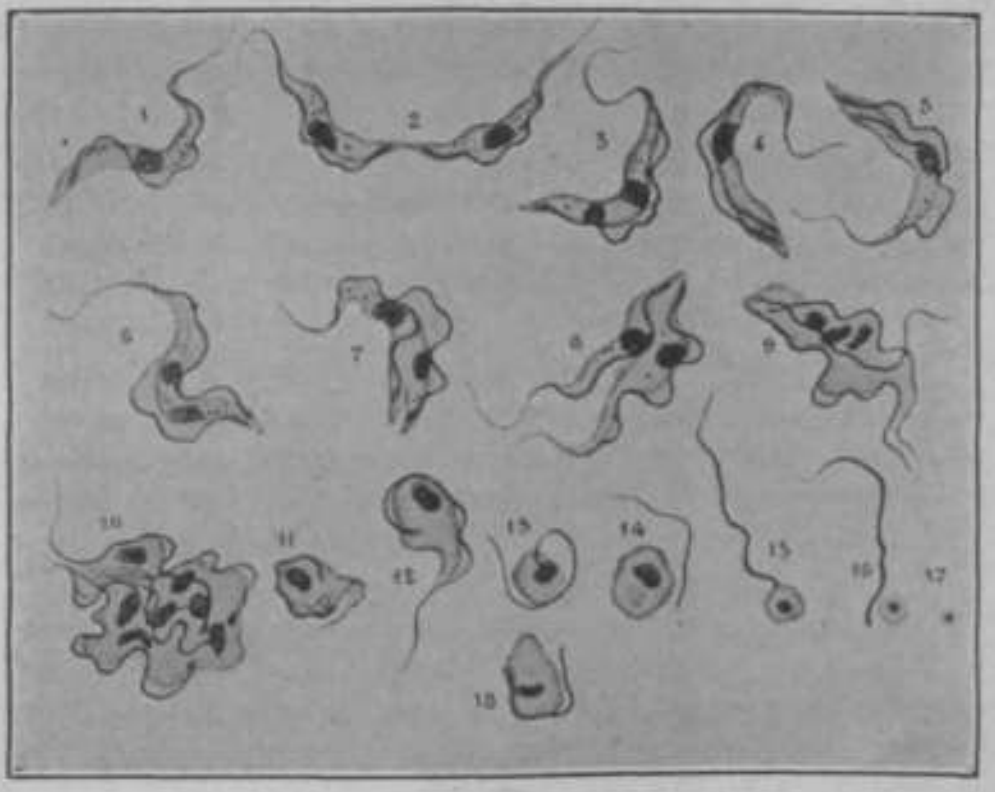
In conclusion, Trypanosoma must be classed among the parasites of human blood. I am **unaMs** at **pitaent** to give a more **complete fescriptiOD** of **this** vari-ty, and therefore refrain from giving it a special **nine.** It will therefore be best first to establish the **similarities** and differences between thi* **parasite and** the congeneric parasites of animals and also to complete the observations on its morphology and life history.

Dutton, who has found a *Trypanosoma* in Forde's case in South Africa. describes the parasite as follows:

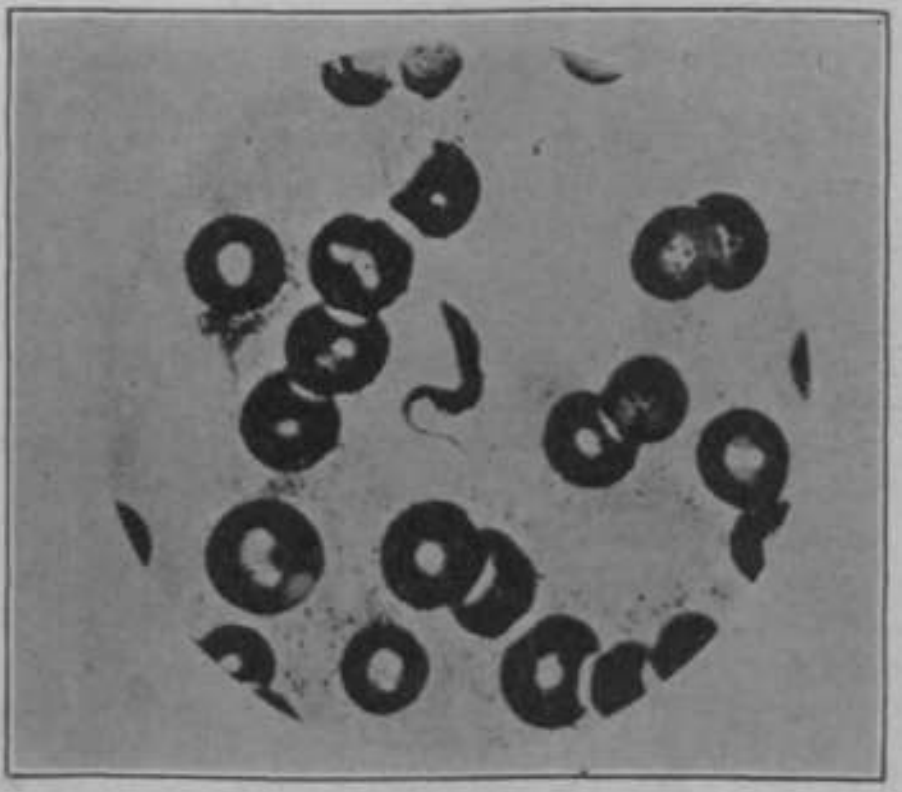
In contrasting the parasite with similar parasites in animals it approaches most nearly in its morphology *Tr. brucci.* It is the smallest of all described niitniinaliaii *TnjpanosomQ.*; its average **length bl** -2 microns. **Including** the fiagel-**lum;** its breadth is srnitpr in |jrcijKution to its length than in **other** parasites. The posterior part as measured from the micromiclcua to the **wctrwne** tip is short and characteristic for this para-ite.

The micronucl(Mis and ita associated vacuoles nrt* **abreya large** ami well marked. The "set" in fixed sp*-imens / liffers from that of other spe<ies, as has already been pointed **m**t.

Dr. Laveran, wi has very kindly examined some blood films **taken** from the



Fm. **tOL—** *Tntpiimxtitiui* of **maJ de cadL-ms wilbinu** (.'enirtw.iiits iiiiKutshuhU- by staining according **ing [.'I**avenan or **Roman-**sky. (After Ligtieres, 19**08.)**



Fi;. 103.—Showing *Trypaatmma* **found by Dm ton in the Wood of a European, i** After Fo**nde, in Jour. Trop. M**d., sept. **1. IWii**

patient, informs DM iliat if the morphological characters are alone con>i'i, he would **regard** my specimen as a new ; it differs from *Tr. bruoci* in the length of the nagellum and in the small number of cliruniatin **granule*** in **the** protopln>tn.

Having as yet not had the opportunity of transferring the parasite in the blood from man to other animal* a a has been HO **completely doM** In **BflgfTfil** by Bruce in Africa; Kanthaek. Durham ami Wandford, and Plinmier and Bradford in England; l^averan and Mesiiil in Fran.*[1], and to a **latt extdtt** in surra by Eva; , Steel, Lingard. Van **Dyke Carter;** and in dourine by Ron.et, Noeard, and others; 1 am quite unable to contra si the pathogenicity ami the morphological appearance of ihe huniiiii parasite in lower animals with the other species. It is to **ha** remembered that no *case* lia* **mr bees** reeordetl in man in the district* in which animal inftviion i- M common, although man i- exposed to the same riak in infection; for instance, **the** *t*tt>,6* fly *(Qlossina mortitans* Westwood), which was proved by Bruce to oarry the infection of nagana from animal to animal. **Intel travelers,** natives, and others, as well as aninials, ,

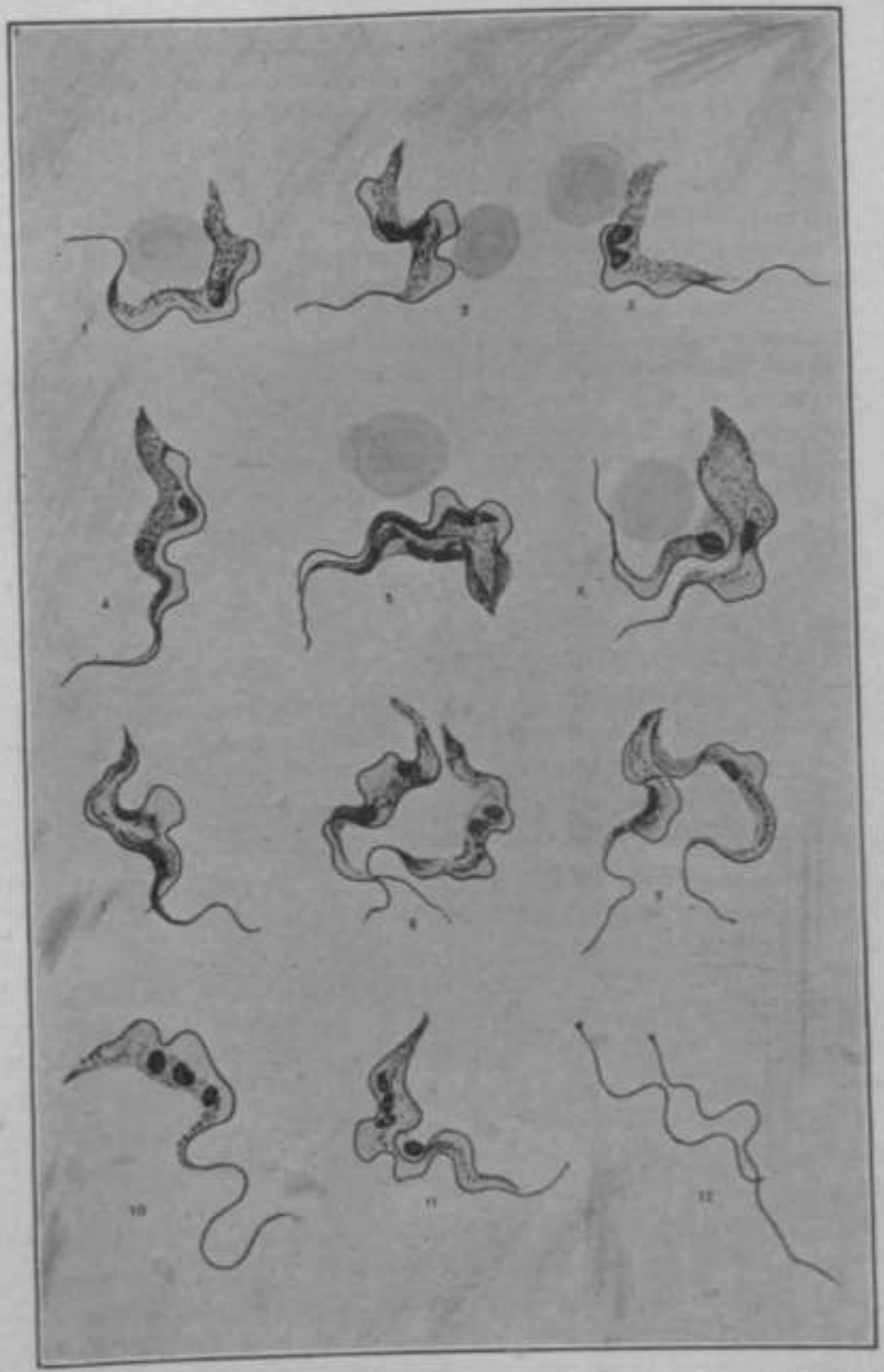
The consideration of these facts and the discovery of a parasite—evidently of the genus *Trypunosuma*—in the blood of a patient presenting symptoms markedly similar in very many points to those of the two or more dJseases of lower animal* which have been definitely proved to be **caused** by the presence of different ipecies of the genus **lYyjKMMMM** forces one to the conclusion that the parasite found in this patient is a new specie*, and is also the cause of the **iHtWMt** from which the patient is suffering. I would therefore BUggesi the name *Trypnnmoma pambiense.*

Until more wof^has been done, it is advisable to use **caution in classifying** tliis ***Trtfpmotoma*** as a **aeparati s.** h **- done in thu report** t. ntativt-1 v. **but** the chanc* ~ **reful** work will decidr it **to** Inidentical with son^e of the others. There are several reasons for **this** assumption. The easee BO far reported are from areas where the di> case is prevalent in animals, and these cases are few in number and somewhat **scattered.** There arc probably many cases **which** have not **been** d etected, hut **we** c;in not believe them **sufficiently numerous to pcrpetuati** the species without u host in some of the lower animals. It **Mem** much more **likely** that tit'ere are changB in the patients which -omehiw interfere with **the** natural **resistance** for **the** well-known para sites.

Trypanosomu equinum Voges. 1901; Trypanosoma Wmassinit, *1902.* The lenpth of this parasite, acconlin<: **to Vbgea, u** two or three time* and *its* width one-third to one-half the **diameter** of a red blood i cell. The anterior end is provided **with** a fiagrUum about as long as the body of the parasite and extends **backwa** rd about two-thirds the **length** of the body as a somewhat thiek»iu-d **margin** of a distinct undulatini: nu'inbrane. The ptBterior end of the pant-ite is about one-third **the** h-ngth of the flag-ellum and is contractile **and** somewhat **beak-ehap** ed.

IU motion resembles that of an **eel,** but **the actual** motility is not ^-rcat. the whole body taking part in an «xcessively active **rrigglii** ng motion and the flagflhim and In-ak ends moving in 0] posite dire<-tions. The nn otion is dm- to **the** undulations of the **membrane,** which run in **both directions.** The **rtagvllimi treanty, but the parasite mi** y move in the

direction. The* ii « «*!••• *>™* *" "^ «*j ;l "f
— - Qew the posterior end, -*MU*\ the ptotopUunn U granular, 'n
young parasite 8 (raidy found) a larg. k I -m-l,u>) ii Been near^e
anteri i and a wnallei dutmiatin ma« MHT the posterior end. I ho



l-« Fonu« i>(muUiiitiiitiion tn the blood of • horse; 7-9, Same in the blood of a guinea pig; 10-11, polynuclear forms in the blood of a guinea pi- :a «tcte of gestation; 12, Flagella and centrosomes free in .1 prvp^r ation made from the b"""11 *rf m »»"»•• pig In • »l of gestation. (After Sivori and Leder, 1902, PI. IV.)

chromatin mass in **stained specimens i- Bometimoa surrounded** by a bright area, which in turn is surrounded by a nomtaining border.

Habitat: Similar to that of *Tr. **brttcei*** and *Tr. evanm,* excepi for **tie,** which .! tu **be** i in mane.

Pathogenesifi: **Pathogenic** for **domestic** and certain wild animal!?. Voges **considers** the cattle of South **America** immune.

Tryi>.nosom>i ilwila'ii (lir uce, 1902).—**Bruce** has published a note regarding a new ***Trypanosovna*** **discovered by Theiler** in the cattle of South Africa. **The** mw **parasite is** to be distinguished by its size, being **aim**st twice JI large as **any** of the others. It i- pathogenic **only** for cattle.

Lftveras and **tfe&nil have studied** this ***TrypanoBotna*** in specimens furnished by Theiler^ and they **agree** that it is a new species. They give its length n- 30 to f>0 microns and its breadth as 2 to 4 microns. In its

Fin. 105.— ***Try****a* of null di- CHdenu Mnin-<l nci-ordtng tu Lavvrnn. (After **Llgnlerm,** Kwwil Vet., 1902, Pl. II.)

general **structure** and modes of **division** H does **not** differ materially from other *Trypanosoma.* **Thi**y consider one of its diagnostic points-the presence of blood cells with basophilk- **granules** in **the** infected blood.

Habitat: Blood of **cattle**

Pathogenesis: Horses, dogs, goats, sheep, deer, rabbits, guinea pigs, rats, and mice are said to be immune to this parasite. but Theiler was able to infect calves by inoculation.

*Trypanosoma tratisvualiense (Laveran **and** IferatZ, 190S).*—This *Trypanosoma* was discovered by Theiler in the cows of the Transvaal. Its dimensions are variable, the average being 30 microns in length by 4 to 5 microns in breadth. Its characteristic diagnosis *is,* according to Laveran and Mesnil, who have studied specimens submitted by Theiler, is the presence of the centrosome near **the** center of the parasite and near and

urtimes united to the nucleus. The altred <orpusclea seen in blood infected with *Tr. theihrii* have not been seen with tins parasite,

bitat: Blood of Transvaal cati

Tnjpnnosoma of mammals.—Regarding the ditfVrnUK.I i ne of the *Trypanosoma* which are of the greatest importance in the disease of domestic animals, th« o be considerable difference of opinion; and the work will probabaly not be satisfaetorilv completed until aU the supposed varieties are studied in one country in similar environments.

cording to *U* aad Mesnil the distinction between *Tr. brucei*

!. *Tr.* ia thinner and more tapering, and mdulating membrane is smaller and less folded. Its protoplasm color Its chromatin granules are not so large and numerous. .,itv is always thin and tapering and never has the appearance of a truncated cone. It lives longer on ice than does *Tr.* individuals showing no material differences are found

I n *ivih* blood without Hie presence of dividing forms , are differentiated with great difficulty. In *Tr. brucei* the centro- ahravs divides first, following which the flagellum. nucleus, and protoplasm separate in the order named. In Tr. *lewisii* division may gin in the nucleus, and before it takes place the parasite Bometimes lies 5 microns or more in breadth.

Tr. equip.nlum, according to the same authors, closely resembles *Tr. brucei,* but the morphologic differences between the two are apprecial.

brucei has much greater dimensions; its protoplasm colors more deeply and nearly always contains large chromatin granules, which are absent in *Tr. equiperdum,* which is never more than 20 micron, in length However, we have, in the blood of animals, seen *Tr. equxperdum* whic^ so closely resembled *Tr. bnuei* that methods of differential diagnosis we unsatisfactory.

Tr id *Tr. eqmmim,* according to Laveran and Mesnil, have almost the M ngth and form. The protoplasm, the nu< the undulating membrane, and the flagellum have the grea: -ambiance in (he two *l* '<*. but this is not true of the centrosomes. trosome of *Tr. brucei* colors easily and deeply and measures about ,at of *Tr. equiwjm* does not measure more

rule. Large divisions into three or four parts, which are Bomewhat more common in *Tr. equinum* than in *Tr. brucei,* are sonntijncs observed.

Martini considers the posterior end of *Tr. brucm* more blunt than that of *Tr.* fevtm, *Tr. equinum,* or *Tr. evan tii.*

Buffard and Schneider and several others believe *Tr. rougetii* to be identiu.il with other *Tri/panosoma* \nodx\cing Trypanoeomiasifl in domi-tic animals.

-cheube, Bruce, Kost, Koch, and many others consider *Tr. evatuni. Tr. brucei,* and some of the other parasites probably identical.

Ligneres has recently written elaborately regarding the distinctions between the various *Trfpanosomu* of mammals. In the main hi* results agree with those of Laveran and Jlesnil already given.

A consideration of this subject resolves itself into two headings: :*t. a differentiation based upon microscopic observations of the para-siteB, and. secondly, that based upon their pathogenic action. A* might be expected, the more two parasites differ when compared by one of these methods the greater will be the difference between the two as determined by the other.

Tr. huisii differs morphologically from the parasite of nagann. surra, etc., had these differences are confirmed by their pathogenic action. Con-currence of opinion on the individuality of *Tr. tewlsii* as found in dif-ferent countries is so m iversa 1 that further attention need not be paid to it.

When we come to consider the identity or nonidentitv of *Tt. ewuu ii Tr. briuei, Tr. equipcrdum (roug>ii<).* and *Tr. etmatsicum (equinum),* we are compelled to obtain our data for all of these parasites except *Tr. evansi i* from the work of other autho]

Taking up first the study of morphologic differences, we fail to see any justification for the extremely careful and guarded conclusions of Laveran and Mesnil or the ?ery sweeping ones of several more recent authors. They have disregarded the fact of the variability of i hese organisms in the same species of animal in the same country, th<ir greater variability and different species of animals in the same and in dif-ferent countries, and other conditions requisite to identity of environment and to a conclusive comparative study- It must be remembered that we are dealing with organized animal life and that environment lias an important influence on its physical condition.

The most important differences which con-ervati\e writers generally point out between these organisms are variations in the shape of the posterior extremity. the centrosome and the undulating- membrane and the gr;nular condition of the parasite itsolf.

From careful observations we are confident that the postirior end of *Tr. -vansii* is contractile, a condition which a few writers ha\e noted in other parji sites. This results in a variation of the shape of this

extremity in *Tr. evansii,* and doubtlessly **in** other parasites, as great as that given for any two members of the group.

The same statement applies to some of the other **difference!, such** as variations in **the** undulating membrane **and the** general **morphok** gy - of the parasit".

Another important factor which has not been given due consideration is the age of **the** parasite, as ia also **the** condition **with** rei erence to life, of the media from which the **preparatione** are taken for study. In *Tr. evansii* and probably in some of the other parasites the number and •sze and to a certain **extent** the location of the granules depend **upon** the **conditions mentioned.** The difference in the staining of the eentrosome in *Tr. Itnuei* and *Tr. **eimaniami*** **(agtnfttim),** first emphasized **by Laveran** and Mesnil, we are not in a position to comment upon.

Laveran and -Mesnil have written very **carefully** regarding the differ"iitiation of these parasites, and are most conservative in considering differences in **pathogenic action,** regarding the latter as secondary in importance to the morphologic dil'erences of the organisms. More **effusive and** less careful writers have drawn emphatic conclusions from pathogenic manifestations alone. There is undoubtedly a greA similarity in the pathogenic action of **the** vari-ms ***Trtfpanosoma,*** in general the same animals being susceptible aml showing similar symptoms and 'post-mortem lesions. The chief differences are those of degree, and **they** vary almost as nnieh in different animals of **the** same **species** when **inoculated with the** same ***Trgpemosoma*** as with different ***Trypanosot*** na. *Civ*tle, f**: example,** !>a- e been used to show **differences** in the **pa** rasites, wh<>*n* as **a** matter of fact in Manila these animals, when inoculated **with** *Tr, evansii,* show variations as great those noted in literal ure for an\ **two** disease s. We have seen a cow die in twenty-four days fro in surra **(see fig.** 1*2?). and all **degrees** of resistance above this to an almost **complete** natural immunity have been observed.

After carefully **reviewing** literature and **taking** onr own observations **into** a>count, we do not feel justified in forming a p>>itive conc lusion; but it seems to us that proof sufficient to establish the individuality of **the** *Trypanosoma* causing Trypanosoi niasis in domestic animals has not vet been advanced.

V. MODES OF TRANSMISSION AND INFECTION.

Be)ieving, as we do, tha i **the** transmission of *Trypanosoma* by biting and si inging insects is the **only method** deserving consideration fr*om* a **practi** al standpoint, we are in **harmony with tin** best thought of modern lit.rature on the subject. To demonstr**be that** this is the <*m*ly practical **method** requirea (1) <videnc^ of a host constantly |present in infected zones, (2) direct evidence of **trai on** from this host to the **healthy animal,** ami (3) evidence **that** in tl absence **of** >ither **the** host or the insects the disease 18 not cominunieat'd.

With reference to the presence of the host, we have ample evidence that it is constantly present in the different countries afflicted with *Trypanosoma,* It has been shown that in Africa elephants, camels, cattle, and other animals live for months and sometimes years with this disease, certainly long enough to carry the source of infection from njie rainy season to another. Poa, Bruce, and others in this same country have shown conclusively that a curia in percentage of the wild animals are infected and that they harbor the parasites, with little or no inconvenience to themselves. They have further shown that when these animals are driven from a community the biting (lies to a large extent follow them, and in this inanner the epidemic which may be raging at the time i? almost completely suppresed. In India camels, cattle, and other animals live long enough with this infection to carry the disease from one season to another; in fact, the camel may live for more than time years. Rogers and others believe that in India the cattle, whit}) live for months with *Trypanosoma* in the blood and often completely recover, principally act as the hosts. In South America wild animals and certain species of cattle when infected live for a considerable time and act as hosts in the propagation of the disease. Some of the rec* writers in that country have concluded that horses are infected in sufficient numbers to act as hoe

In the Philippine Islands with an epidemic of two years' duration it has not been found necessary to go outside of the horse family to find a host constantly present. In Manila infected horses are found during the entire year, during the dry season, of course, in small numb The wild animals of this country have not been examined, and cattle, while susceptible to the infection, are rarely found to be naturally so.

In literature there is an abundance of incontrovertible evidence to prove the disease to be transmitted from sick to healthy animals by Kiting insects, and this has been fully confirmed by our work, as will be showu. There is also sufficient evidence to show that, in the absence of either the host or the biting insects, the disease does not spread.

BY CONTAGIOX.

There is nothing in the nature of the disease or in the manner of its spread that in the slightest degree indicates transmission by contagion. The same may lie -aid also of *congenital* transmission. Observ. are unanimous in the opinion thai tin- fetus in utero is not infected. *We* have performed a number of experiments in this line on dogs, monkeys, rabbits, guinea pigs, ami rats. In one dog infected with *TrypOk* by inoculai >out two weeks before delivery, mi scar: lage followed on the eighth day. In none of our other animals was gestation intcrf* with and the young « rer found to h infected. although ! to infection, h E our experiments two puppies were allowed t>' nu

from an **infected mother** in an insect-proof stable, and at **the** time of the death of their *taoi*;i:ht **days after thai birth,** they «**ree** from infection.

BY COITION*.

Almost all writers, **referring** to dourine, state that it is transmitted by coition, and a considerable **number** believe this to be the only method of **transmission** for this ch**ense,** while others believe it to be the exception, **even** in this form of Trypanosomiaeis. This method of transmission lias **been** given little consideration in relation to **the** other form;*.

Recently some writers **up**on this subject have **offered** at least **Suggestive explanations. Schilling** believes that transmission **by** coition occurs in **those** regions free from the usual infecting insects and from other **conditions favorable** to the propagation of the disease; and the geographic distribution of dourine tends to support Schilling's conclusions. In infected countries, if the infection takes place by coition it is lust **sight** of in the more frequent methods and could be determined only by **careful** experimentation.

\\>- **bave performed** a **number** of experiments looking to the elucidation of this point in the epidemic now raging in this country. Considerable difficulty has been experienced in obtaining direct evidence. Horses are not available for the work, and with the native ponies it has been almost impossible to find at the same time infected animals and those desiring intercourse. In several instances infected blood has been introduced into the vagina of female dogs by the use of a catheter. All these experiments except one have given negative results, and in **the** positive one infection is attributed to a lesion of the vagina. In tiose eases in which the mucous membrane of the vagina was injured purposely, infection following the introduction of virulent blood occu; red in every case, with an incubation period equal to that following infection through the injured niucosa of the mouth.

We have not observed an absolutely conclusive result following coition. One male dog **contracted** the disease after intercourse with an infected female; but a small number of biting and Binging insects were present upon anot :casion at the same time, so that it was probably transmitted by them. \ **her** !»» ;in infected male goat was seen to copulate with a **healthy female,** but no infection followed. This was hardly the **n** •**able** kind of an experiment, since at **in** question rarely sh<> >ites by **microscopic** examination, though his blood was infectious **by** animal experiment. **Again,** the manner in which goats effect - ulation would be much less likely **to** result in **infection than** in the case of the horse, provided, as has been suggest*.[1]*!, it depended upon *traumatism.* 1 um probable, however, that in many animals, **and ally** in the case of -rse, infection might oi .llow lal intercourse as the result of traumatic injury of the

li is not uncommon to see a few drops of blood aft*T sexual intercourse between these animals, and it would certainly require no stretch of the imagination to suggest the possible presence of small injuries in the mueosa of the genitals of both animals. It does not appear, however, that much importance should be given to this as a practical means of transmission of ti disease. Any disease of hones transmitted only by coition could, of course, be eradicated with the greatest eat e.

RATS IS CARRIMBS OF THE H FECTI OS.

In referring to tin[1] part played bj rats, we coroe to a much more important subject To bring out its full significance necessitati s a brief consideration of the natural infection of rats with *Tr. evansii,* a point which will be thoroughly discussed under "Trypanosomiasia of rats/' and a consideration of the bearing such infection has upon the transmission of surra in animals of economic importance.

Rats tn an indefinite way have been blamed for the trsnsn ission of *(he* disease. Lin pud has made elaborate ezperinu nts to show that grain soiled with the excremeni of these little pests and eaten by horn s played an important part in the spread of the infection. He demonstrated that rat surra was transferable to horses by inoculation; but, owing to his failure properly to protect his animals from insects, fa is •work lias received hut little consideration. MusgraYO and Williamson have shown conclusively that a certain percentage of ratfi in Manila harbor *Tr. evansii.*

In a preliminary report they say:

> A per raying of rats are known to harbor a *Trt/fKittosoma* somewhat resemblinjj Hit' one farad in UM horse, uod it has been eonehtaively shown thai a certftin aanibw of rut- in Manila harbor the WM *Trfpamomma wbHh mam* s the <li*ea«> in other animal*. These parasite have been determined both MQrphoto^eaUj «nd in their psthogcaie action to IM> iil.-nti.nl with UM parasites causing TrypaaoflOBdiasii la ben es.

With this information wo are prepared to consider the part i hey play in transmitting the die ase to domestic animnls and in perpetuating the epidemic. Mats frequently fight, and it 1 s been shown that the infection pa^es from one to another in this way. In addition, the wotmdi *to* caused attract biting insects, particularly fleas, which ai e known to transmit *Tfjfpanoaoma* from rat to rat, and, as will be seen later, from rats to other animals. In Manila the number of rats infecte'l with *Tr. li'insii* makes it necessary seriously to consider them in discussing means of controlling the i isease in thB city.

IS FECTION OF PASTURES, FOOD, AND WATER.

Infection throu jli the sound mucoea and through the injured nun ous nienibrauiv presupposes to I large extent as its source infected food and drink, liingnrd. the groat champion of this method of transmission.

considers the ingeetion of stagnant water and of grass from land .subject to inundation a source of infection, the latter being a favorable breeding place for Low forma of animal life and possibly of *Trtfp*anosoma.

Salmon and StOea believe that there is nothing at present known in connection with the liiV history of any *Trypanomma* to Lead us to look srriou.lv upon grass as a source of infection. We know that *TrvvaMioma* die very rapidly under all usual eondit.mis outside of ,|». In -dv. If they are to be found in either food or (tank, th, ing be I]IIM |,, in gome phi the Life cycle with which we an- unacquainted If food and water should bo infected, a, Lingard maintains, they would ;i be harmless in the presence of the demonstrated fact Oat I he sti a we know it is not tranamittsble through the sound „ mucosa disease a of the alimentary canal.

ln a prdimmarj report tft and Williamson mata the following statement regarding this subject:

TIl, exis ce of an extraeorponal stage >f *TW*™*.....*> lhi»" « « rass *JTc* * * £ in »-«hy H - - i- ** •*•• '-ikin ml,,th; r iiiiiui; * of sus- an ceptible iinimilN tttfeg ana linking in these looal.t.o, and from Ofe orj or otl« part Of the animal , o « , v , - i " , Wo B » H . . . I *• *• *« *» - recogli7l. is without s,tm,i.,!t - wmnteoi tio» •" Ota l!(,,,(. l(,vin, ,hi. -ulgcct, how, er, fo: a fuller. a ta - it u pwp« t«t *Trypancsoma* qu.ckly die un-l,r aH :,,,!, uf the body of «ome living creature, and no evidence of existen it a;,,. ,,, „;... „ otfcer ***** 5*«» «« be advance,!. Both t L L«]i;lv, be« toocuUted with lar., n.nnh.-r, of *Tr*$_{VP}*a*$_{n}$*o*$_{m}$*a and wm\mt* HU f,i» wwks or months., when fed to tailed to wmvy th* dfeeue, •«« **3 msecvtiblc aatiwdi when injected und.i m. M^n.is.imHarto'., *»»*?**+'' pwraknt in low-lying, marshy land* and during these marshes, i it was for age* attributed to the air. the water, etc., of conditions are h.rn.l took years to nmko tho public underhand thai in „t;»lu. in- it. proridrf the pati-nt (a pv . M ^ i l , -Uthcti, an)i for some time ;lft,rw,r,ls. it n. ccnflned to the city. Ik, g h « the bor*« wn. OH same which had been fed for md no result •d. . ..

The disease started from a foc M of infection and spread direcUj with exposure „, iniected animals, and attacked alike animals fed exduaively on ha; ate an(1 thOttC fed on grass. The dUense i> pwralMit in Manila ai .me and has l«*n so continuously since its introductfc havjij|: the disease, uM,l,.r oar oWrva60B for the pa«t four months had been fiM previously ent [rely on hay and oats.

In one lvrg.- stable, with hoih Anarkaa and sativc 1 horses ill1'i B, 1 entirely on dry feed] and *two* of I died o{ tl, u,l one of the two ponies was the only horse of this clan in the stable vhich received dry feed o>y

The statement is .nade that certain district- in India are avoided by caval os th< march because of the danger in these dii from food and drink through which animals may contract the di;,ase. Similar condition*m* ire found

in South America, but in addition it lias been shown that **Infected** ilMricts on **this** continent are just as dangerous to horses **provided** with dry food and pure water **while** [Kissing through them as they are to animals onting forage grown on the spot.

It has been shown hy a number of observers* that an infected animal taken to a new place becomes a focus for the spread of the disease, **provided** biting flies are present, no matter whether the territory U **marsh;** or dry.

Since that **time the** work has **been** continued, but **no evidence** lias **been obtained** to show that food, water, or pastures arc over factors in **the spread of the** dis« iise.

Attempts artificially to infect water and grass *mw* **always** tailed. It is **true** that **when** these substances are used us culture media parasites may live for a short time un<:**tain** conditions, but multiplication to an **appreciable extent** does not occur. It is of course possible that **Infection may occasionally** take place in **Localities** where sick and healthy **hones** graze on **the** same ground or drink water from the **Baffle place,** provided both **of** animals **have** lesions of **the mucous** membranes or cutaneous wounds on those parts of the legs which come in contact with the grass or the water. It is absolutely certain, however, that if food and water are ever infected to an; it **must be** with some form of the parasite not yet known. Even if such places served as culture **media** for *Trypanosoma,* as we know them, they would still be comparatively **hail** **to** those animals having sound mucous membranes and free from cutaneous wounds.

INFECTION THROUGH THE SOUND Ml* COS A.

There is some difference of opinion, especially **among** recent wr, in regard to **infection by** food and drink through **the** sound mucosa of the alimentary canal. Lingard affirms **emphatically** that the disease is so transmitted, but the great majority of recent **investigators** state with equal posit- that the disease can not be so produced.

Kanthuek. Durham, and Bland ford **attempted** to transmit *Trypano-•i* by feeding, performing a number of experiments- At times they w. i **e&ful,** but in most eases they failed. They concluded that the **lity** of infection depends upon accidental]. of the mucous me ml) ram's of the upper portion of the alimentary canal. Continuing, they say:

Of a number of rats fed on the orpans of iiaganp animals only H f. ired the disease, and those invariably showed superficial lesions of the snout and ears. due to lice. When fed upon infected material, **thty** buried their snouts in it and scratched tlnir wi with their blood-stained forcpaws. Furthermore, in rala which acquired tin through feeding, the cervical gland- \UT<? *n)* enlarged most, a fact which proves that hematozoal infection must h» place in the head, for, as we shall show, the primary infei **ivela** by the lymphatic*.

\ **eai** eatedly on **the** - of bodies of **infoeted dogs and** and subsequently on the bodies of **dead** rats, died at **a** time correspond it

Mhnl period m an Infection a1 the ftnl meal on »t* W« regard it M pwbaMe ihui mne aplinte* of bone i mperfidal i.-i..n*. through nfeicfa the ban* tozoa were enabled to *!.er.

\ mbbit, i tally by m„u>< ol • pip«tte with large quantities oi int. blood, did not show the alighted rig* ol Hw .1.- Kouget i tailed to infect auiiiml? by tht> mouth.

Evans and Steel believe that stum ran be transmitted eithea tion or by inoculation in do* illu! IIIIIK>s_ p *0 ^ ^ hnilt ft, in fected blood is used. With blond kept twenty-four hours or mote ti dill in it succeed in conveying the di-

Wriiin- in 1899, Ungard considered that natural infection wit] might occur in one of four wa I a^ and other v«|^ fcation grown upon land mbj anndai Irinking Mn1 water during certain n, tlu, llltf, , afc 8] . probably as earners of the vims; and (4) from ;;;' ra wiled w.th the excrement of rat, and \r,

Having determined thai ta 7>„• - in ln(lia cause ofTrypanosomiaa rtain percental nimals, sueh the horse, he experimented to whether th practical unportance in the spread of the disease. He mb .f rats withgrain, whici Fed tot ;tmi f> hom surra, with n. Witt similar experimente, howev, under favorable conditions of moisture and heat, he claims to have obtain,,! nea, With re* he writes as fnllr,

., later date, dun.* tbe hu,,,- half of the hot season and the mi hirthei wend in viewwer, carried ,l,o dimat, is f*vor«ble Emn it- humidity tnd U !iu1t^ tWin<1 P.ymg four mont»tK tat the inC«lK,Uon period of the *ih«*m* will prnV ably be fmini: to vary with the ;tlB()UIll of moBture m Q ~phorc and the amount of mat rbi ingested by the tll(1t » 11UI; in Bombay were contracted through the or bandko r«ta mixed with the w>m.

Salmon and Stilea doubt the aocn iy that T, r;i· ypanosoma have not been found in i rXl used the necessary precautions to in his experimenta, and that if rate iljvrUlVil a from them would have be ble u Vogea fed animals with several liters of infected b paste, without results, Lareran m Mesnil also failed to convey the disease through the .und mucosa. Rouget's feeding experiments were negative, but I ping infecte i blood into the conjunctiva. B m able to convey the disease through t) d muc sa, and says that in

those casea in *which* infection occurred by feeding then* were injuries' of the mucous membrai!es.

Rost writes that grass, grain infected by rafa excreta, and flies must be considered in the etiology. Salmon and Stiles consider tngeetion as a possible means of infection, hut state thai it can deserve no special consideration as u means of transferring the disease from hone to horse.

It appears to us thai our of the strongest arguments again*! the bunt - mission of the disease through food and drink is furnished by Lingard himself. He states that a -treet-c u company which had lost hnndredfl of fa -om surra finally provided their animals with boiled drinking water only and with grass brought from an elevation ol 6,000 fe t, pro- hihitvd the feeding of green vegetables, and also ordered the animals to be isolated, without success. It is to be noted thai these stables «ere situated on a street along which infected horses were traveling, so that the isolation of the nmipnnvV animals did ool protect the healthy ones from flies. The manner of feeding did exclude infection by this means, anil seems to u- s strong point in determining ilnit Pood and drink play abso- lutely no part in the trans nission of the di- as*.

The numerous citations of uu tance• in which dogs contracted Tryp- anosoniiasu by rating the carcasses of animals dead of the dii ease em to us to he no argument in favor of its transmission through the sound mucosa. Such animals are a I Mays fighting, and the infection might readlily take place through wounds, and in addition these animals are usually well provided with Siting insects. Curry states thai it is not known whether the d isense Q the Philippines can be transmitted by food and drink.

Our investigations have failed to produce the slightest evidence thai infection by food, drink, or otherwia ever occ on through the sound mucosa. Bfusj; rave ind Williamson, diaenssing this mode of transit is- gion, say:

> The prcat majority of wi iters agree thai infection *enn** not take place through the BOtrad nmeoaa of the alimont ary trac -t, and that the occasionul infection following the administration hy month of the virulent hlood and organs of animals recently dead of the disease are probably due to the fact that 1'hese animals had damaged mucooa membrane! of the mouth or upper part of the alimentary canal, which would, of course, resali in inf ection, just as would *o<* eur in any other part of the body Dy)>rii!: ing an injured -!irfa*-e into enntad with bafectiona material, or rice versa.
>
> In nearly nil feeding experiments larjn* •loses of the infective a^fnt have l«fn given i. and in li is sense they h ive not approac bed natural inf(ction, rhicb, I: om the nnturi[1] of tliinjis and *v,h*ether administered throng the nm cous me niltrane or the «kin. would t* in >tn:il! doses.
>
> Lingard attemptwl iirfwli on thro n«h tlic digestive caaal liy the administrate on <>f very Btnall *it* ses of infe •<•< blood gi ven free [Uently in Urge dil utions t" water. One of liU horses t iiat had reoeiTfd nwh treatment, and in addition one dose of l,'i r. *p.* of infected blood, develo ped tin[1] disease on the one hundred thirtieth day after th e beginning of the experiment. l!f ft d a second horse 210 minin s of

fresh virulent blood ti one dose, with an incubation period of seve aty are days. He «• es not itate thai these horses were protected from msects during th<- periods of the experiments, which were made in an infected country, and it is more than probable, eonsidering the incubation periods of one hundred thirty and seventy-tivc days, thai his animals were infected in some other wi y.

So far as we have beca abk to discover, then- is not in literature any absolute stool of infection through the sound Bnieoss by feedinj

1„ this preliminary report l>ut one of our many feeding exparinMnts wiU 1* given,

Monkey No. 126-*ealthy adult male monkey—«as isolated, temperature taken or a week. and blood examined daily I The temperature remained normal the blood negative for *Trypanovm**. After nv.lv,- hours' fating he was fed weekly for six weeks on cooked rice (the usual did with fre»h WK. virulent blood, rich in *Trppmmomm^* from different animals at different feedings. Ontw. occasions he was given to d d«k infected blood in weak potassium eft M.h.ti.n. in which fryiNMoaomd live longer than in any other known solution out-i.i.- of the body.

U the end of six weaka the animal was .pparently in good health, temperature had remained normal. an.l tbe blood free fro* >» « * • -Jy to exclude the existence of ini • drop of Wood was inj«t*d subcutantouMy into another monkey, which remained well and wai - proved suseepti DuriBg the feeding the Infected rice would often be stored in his ehops and remain then- for hour-.

Aft:,. proving the animal uoi infected at tl.* end of six wee ks, *B* small was mr IIIt· in ,,,,· 11!i; (IN month and he was again fed as before. The disease dev eloped on the fourth day, « evidenced by rise in temperature ;IIII the !« rf *rrwpmamm** in the blood. He ran the regular course the disease, ud .lied on the eighteenth day aft*r infectton.

XhU work hu ww Batmoed for more than a year, involving tbe use of hundi eds of anhnala, We b perimented with goats. rabbits, gnina piga, monl *** ««»i ve have fwl thf,,,, large and small doees of virulent blood and all kind, of prepamtt both blood a ml inf. All «pain»ciiia perfomed under rnvtl, nstanc... whirh tontai infection impossible. Particular attention to this part of the subject was deemed 1 1 • in order ini li. mmend m« results have given absolute^ oonvindng pro oc eur through I td mucous membranefi b .<i>i»s<>n,<,. no matter in wiiui form administered-

; v n n \ DHBOUGH Tin: lv.iriai' HUOOUS MEMBK-W es.

U stated bv Musgrave .1,1-1 Will iamson in. a preliminary report, su rrn is essentially a wound disease, and I tran- mission tl troogb tbe inju-ed mi cous membranes results wh ected material is brought in contact with it. When int BIB throug h the alimentary tract, it does so through a wounded mucoaa memlaam . Monkey No. 126 was one of the many an im; ·; ted upon to (ktennine this j^int a? wWl fts experiments ttl> possibility of transmission thro igh th. sound muco ». Of course it was easy to prove that infection could occ ir through an injur ed mucous

Burfece; but definitely to -li"\v of what importance this would l>r in the practical transmission <>f Trypanosomiasis required more work.

It wag HIT- vsin 11T-i to determine what percentage of a number of imimal.s in the natural course of events have sufficient injuries to make possible as infection in ;i given period of nine Naturally this was found to vary greatly. In dogs and nil* injuries ar<- so frequent that in order to obtain animals without lesions to be used in.determining the possibility of transmission through the pound mucosa, we were compelled to confine each animal by itself fox some tune. In horses, cattle, and other animals of economic importance natural Lesions u\' the mucous membranes an more rarely found. In (torses used for carriage and draft purposes, lesions i a the corner of the mouth caused by the bridle bit are ijiiite frequent In *On* ca-e of cattle and cai abao, lesions are Been in the nose around the ring which is placed through the septum and which usually has a rope fastened to it. Small wounds might occasiooajly be produced in the nmuth by eating rough dry food.

With injuries present in the mucous membranes, the next question to consider was the manner in which infectious material may be brought in contact with these wounds; and from a practical standpoint (excluding flies) then are not many possibilities. All Mich means are of course mechanical and readily suggest themselves; they are. changing bridle bits from sick animals to healthy ones, allowing healthy animals to lick sores on suk ones, placing <minmU to graxe upon the same ground, or allowing them to drink the same \vater, etc.

Merc may be introduced a strong argument against the theory that food and water play a serious par4 in the transmission of the disease. If such were the case, animals with wounds Mould contract the disease from eating and drinking food and water which hud been allowed to stand just as readily as they do when freshly infected material is fed to them; but this is not the case. We 1 lerimented on animals with fresh wounds, feeding them water and grass *h* from fortyn ight boors ti) three months previously and kept under all kinds of conditions, but have failed to eonv< y the disease in this manner.

PI ez.— Of the biting insects that play a purl in the transmission of the du ease, certain varieties of flies are of the greatest significance.

Of Hi s credited with playing an etiologic role in this disease, the tsétsé fly (*Glossina morsitans*) is among the most important.[1]

Schilling states that *Glossina longipalpit* is very prevalent in Togo, as waU as *Stomoxys calcitrans* and three species of *Tabani.* He regards all

[1] We had hoped to introduce here a short illustrated description of each species of fclw Ika wliifh I;ave beei onKiitP'J with pUjiag ;< tola In the transmission >>i *Tryponittutpa;* but the jirfssare of otlior work bfts prvrented the *ntomo). At s'line futu re time we hope to be able to A this, wInn «< *AaU* also lir;ish the discussion of some of the points left open in tl>i- paper.

these varieties as able to iraiwnit the in fection. He proved conclusively that at least two species ,,- tllr,e fii,. cu, transfer the mfectujr. in d

Martini found normal T$_W$.i..^»m twenty-three houn alter teed the *Stomoxys aOdtrans* on ini d, to iasect itseli bang kept ta « room ri a temperate *d "J «• ***** tea,. Onth >wing d*y the blood ww could not be observed. On doge biting experiment with these B» failed Healthy ho rses and asses standing next to sick horse^ aU covered with J y s *caldtra***, did not contract the d isease. Martini's work wa. performed in Berlin.

Working in Manila, Cnrrj considered th< i * *eakitams »J** princ ipa agent of transmission and found eno • aumbers of them feedingon sick animals. H *Trypanoxm**, in :111(rtomachs of these flies twenty-four houn upon infected bl....I. Be was unable to find *Trypa»o** flie a. Rost found r^poH«w»« in juk» squee^ hot. ^8 on • slirra animi11_)U i-inced that tli- • isniit the dii ,

,-pi.l. Indi. .« »'"'• «• « '>• ,,,,,,,,;;>. and no pi.....I. . . . .* o r dl*tr,,_v ,, f ,, l,,,,,,, ,,,r, ,x,v-Hv, aninmU ,li,,Un ,h, r,p.,, ,n n. Durta ,x ....'howev™. in the «...,

• Lfected nfa«U « ••'">,'.....'f H, ,,,n,,m,.nm,l that the bodj «ui. •'" «- « « • W.....«" ,,, ft,,- feeding on infected animal* and that the ..,.., of stTfluXi, Ptibleanfa * : nts ,,.....,, n t - i •• /'T' ,, Viir,,-"r; d 7 :K>1 fo ,,ml ,,, ,!,,• and .!,,• Ml p, in ,,,l,,l. «i,s which tad ted. . . . . .»»»'>• i.,rll•r ta 8outh Americ. p. •« •"- •"«•»"-• •«,,,». an,l th.- -'.>". l,, ,, l i_ reUti » f tranmnittini thai i traiwmitted onl ,ugh « wind in South An and the v.-ll as yariw.

•».• fa.-l..rs in tl, transmission of the «f ease.

Roger. pro^ r a 1# edanbnab. Infected flic kept from « a* by biting an. hannle«whe- fed to rats.

Bruce considers the tsétsé fly able to convey tin- disease forforl

hours after feeding on infected blood, lie placed five muzzled horses in areas containing flies, and notwithstanding the fact that they were all prevented from using the food and water found there, they eontracted the disease. Suspected flies transferred to a district free from nagana conveyed Trypanosomiasis by biting two dogs after four to seven hours. He found living *Trypanosoma* in the proboscides of these insects forty-six hours after they had fed on infected blood, and in their stomachs one hundred eighteen hours after feeding; but at the end of one hundred forty hours no parasites were present.

Schilling noticed that at a certain place in Africa on one side of a lagoon three kilometers in width, surra and tsetsé flies were prevalent, while on the other side neither could be found.

Without going into further detail, there is an abundance of incontrovertible evidence that the disease is transmitted by a number of species of biting flies, as was the opinion of the natives of India and Africa long before science demonstrated the fact. It has thus far been conclusively shown that the tsétsé fly *(Glossina morsiians),* at least one other variety of *Glossina, Stomoxys calcitrans, Musca brava* (?), *Taon,* and at least one variety of *Tabani* transmit the disease. All other biting insects have been looked upon with suspicion, but absolute proof of transmission by them has not been furnished.

Is it a mechanical action or is it one phase of the life cycle of the parasite which takes place in these insects ? The time limit of infection in all conclusive experiments has been too small to admit of any other construction than that the action is mechanical. .This is the conclusion of nearly all modern writers. Schat, whose work has been mentioned above, is the only exception, but his experiments do not confirm his theory that a phase of the life cycle of the parasite takes place in the fly. The time limit of infection for these insects is given by most authors at twenty-four hours, and a few place it as high as forty-eight. Agreeing with Salmon and Stiles, we must say that a phase of the life cycle in insects is certainly not inecessary to a definite continuation of the infection, and it is extremely doubtful that it exists.

We have transferred the infection to monkeys by biting flies in experiments so guarded as to make the results absolutely conclusive. We have also transmitted it by means of the common house fly from an infected dog having a wound to a healthy one in a similar condition. Monkeys are difficult to experiment with, for the reason that they take pleasure in destroying all flies coming near them; but we succeeded in performing our experiments bv placing one of the animal's legs in a test tube containing flies which had recently been fed on infected blood. These experiments have been repeated, and the transmission of the disease to the horse, dog, monkey, rat. and guinea pig by biting flies has been confirmed. Our work has been conducted with the greatest care and in all cases controlled by animal experiment. In short,

the transmission of the infection in this way has been so frequently shown that further demonstration hardly appears necessary.

With these facts before us, however, we have yet to discuss the very important part of the subject which refers to the role which these insects play in the *practical* dissemination of the disease. This of course is difficult to prove by direct experiment without great expense and trouble; but the evidence showing this to be the usual method of transmission is so conclusive as to render such experiments unnecessary.

Summarised, this evidence is as follows: It has been repeatedly shown that biting flies can transmit the infection. It has been proved that animals protected from insects do not contract the disease, but that when protected from every other source of infection but this one Trypanosomiasis occurs with the usual regularity. Finally, no other suspected method of transmission explains why they are found in zones where the disease is epidemic.

Fleas.—Plimmer and Bradford and Rabinowitch and Kempner have shown conclusively that fleas may transmit *Tr. lewisi* from rat to rat; and it has been suspected that they may play a similar role in the more important animals, although the suspicion had not at the time this work was taken up been demonstrated.

With reference to the transmission of the disease by fleas, our own work has been absolutely convincing. Surra has been transferred by these insects from dog to dog, from rat to rat, and from rat to dog. Horses have not been used for this work because of their cost and the apparent uselessness of wasting expensive animals without material gain in information.

Sources of error in this work were eliminated in the following manner: The dogs were placed in an area covered with sand and protected from flies by screens, yet but one of the dogs were then taken from the stable, and this one we proved to be free from *Trypanosoma* by animal experiment. A surra-infected dog was then placed near by, but separated from the other one by a screen to prevent them from touching each other but at the same time allowing free passage to the fleas. The healthy dog developed the disease on the sixth day, as evidenced by a rise of temperature and the presence of parasites in the blood. This experiment was repeated a number of times with positive results. The time intervening between the admission of a dog and the first [positive] evidence of disease [is] nearly as the incubation period could be estimated) varied from five and one-half to twelve days.

All animals were then removed from the infected area and only healthy ones introduced after periods of time varying from twenty-four hours to four weeks. Although the fleas in the sand remained quite plentiful, no infection occurred.

Rats, in screened cages placed in this flea-infected area in close prox-

imity to nn infected dog. contracted the disease. The dog waa then removed and a cage of healthy rats substituted, some of which contracted the disease.

These observations have removed Seas from the doubtful means of transmission and proved them to be a factor to be carefully considered in our efforts at prevention. Fleas axe very oumeroufl in Manila, especially so during the wet season, when Trypanoaomiaeifl is most prevalent.

MotquiPoes.—Beyond the bare mention of the possibility thai these insects may transmit Trypanosoma, we have been unable to find any records in literature; ami because of the lack of time our experiments in this direction have not been as thorough as we desired.

A number of experiments have been performed, nil of which have been negative iintl were curried out with young monkeys and guinea pige in the following manner: A young guinea pig with parasites in its blood and a healthy one were placed in a large mosquito-proof cage and separated from each other by a screen. MOBquitoes were then placed in the cage in targe numbers, ami more wen' added when necessary. The experiment was continued for a month without results.

Mosquitoes were allows! to feed upon infected blood and then placed in *n* large t'-»t tube, into which a monkey's arm was introduced and allowed to remain for three hours at a time. The experiment was repeated daily for a week, but no infection occurred.

Tin[1] mosquitoes used in these experiments were *A nof/hales, Btegonyia,* aiii! *Culex.* These varieties are all very prevalent in Manila, but do not appear to disturb domestic ^ninuils greatly; and for that reason, even if tiney sometimes carry the infection, a- is likely, they deserve onlv secondary consideration in discussing the spread of surra in ho;ses. It is morv than likely that the 1;rge gnats Found in swampy places and which attack large animals are important i;nsects in the transmission of *Trypanosomiasis.*

L«ce.—These little \»'<t< repeatedly are mentioned in literatim as possible agents in the transmission of the different forms of Trypar!oso-miaais; bnt so far as we have been able to determine, there is no direct evidence furnished that such is the case. It certainly appears possible that the disease may In- iransferred by lice, i special|y jn the case of animals, siuh as rats and other small animate, suffering from wounds; but as far as the larger ones are concerned, we can hardly consider these in.-ects as a practical means of dissemination for the disease. We have repeatedly pe!-fnmu-<l experiments on monkeys, dogs, and gui.-irji pi_s in order to determine this point. but eo far they have failed t<> give ptwitive results : nor 1ave we be n al>le to find *Trypenosoma* in lice cauglit on the bodies <f inf<ected aMimals.

It hafl -almldy been pointed on* that Uo are very numerous on rats

and **bdp to M. amall wound. on tna* «m,** -.lly around I, ears. **'T,,,, ,™ also exceedingly .....** «• **c^fcao* tat do not** appear to pr(|IUKI· iinv i j u v ln „„,,,,. ,l,Ht.kiuu,.l annuals. Tic(.,_\5iutb,;^,nfl,,, ticks have beer. .|·1,,,,,, writers as **agents in the tranamia of ft.** believe they p**ay an important rote, for the** -tat • **tick**.....,,,,,,- i,j s **th.'.** s kin **tha, it ataorta the blooa of *l** " M m s |**ta**» * "™n an,**l a.** ,...., **at .hi, U** accom (« ** **Uh to the ,-n,.n.l The** ;eec,,:,,fti,. tick are so far « « **tft-** ""-.'-,"".'".'niit',;M-v be carried by ther,, from on, animalto an..th.,-. **TOs logic** « « » **to** « to be very satisfac ,,,,,,·ani,,,,,·,,,,,,ai· **,it.,o,,t ..x,,nn,,n .** ,,,,,,l..r,nf,i,k, in-imwnt in .·.·««...-·«..·"-··* »»..- 11..1-

J£ Z a tby wae a, *~* ''' '''' disease *« '''''' m,nt **very careful conaidentioB.**

1XFWT1"X IHBODOH 0PEN SK1N **WOCSOia.**

lnim wU.it has **already** I.....n **«id in a** « »"««"" inju^d mm,,a. it will n^lilv h, ,- >!,,. -k- ,"rce -• **i«npr during the** *«h ,.: • " ,. m,.. **whbh can** nndonl,t,dly **infect woond. with grert "fttan they can uninjured .km «urt** W.th t ,,,,,,•,-,, **J** U,,,; ar, nmny a.i.li.io.u, possibilities to be consid. •-<• **whTch** . nay be disre **P«aed** in **dealing** with sound >"M,,aU. **Th«e** ,na. V ;,vh,t,i.l, ,nvironu,,n..l.«tinno I vary ,,v ,. Mu^rav and Willia.nson mention an,...,, **'.I** • ,,.,,,.!>..,, ***k an,n ,-j ,i inihir on bealthj** **W** a **fuller underlnding of rat** "• •. . . . » >",,,,•,,,,< I-,, ,,,, ,, rais,d h,T,. **Thiah,** • tat »lh 11> knowledge already possesse, **of tl»- tn.n«..-** *•« rtranitie. ,Rl b **thU** way **it would** » ^n im or,,», **,.rt** in tnin.n.i- ly **m** a country l,k **Jhifw C .ni'.or inj-iri,, to I** • •* «« " **numerous.**

——u

MISCELLANEOUS.

, m,,u,i has brougl t out the point **thai the itaeaae n»y** be transferred by birds' **picking** sores on inl ected a **u,m»l,** and **following** this R

i",«i,s and when ther h

the infection, since ,h,v ,,,ak. ,,,·· nals and also a gre,t,r d,- emination of flies. However, as a means of

tnin.<mi.-sinn **deserving consideration** from a **practical point** nf view **in** the **Philippines, the possibility ii** \TTV **remote.**

Theik'r **believes thai** in **Sooth** Africa **the propagation of the disease to** a **limited extent** is **influenced by the immunization of cattle against rinderpest with deflbrinated blood. In Manila we have had** a **striking example of** this **possibility. 1M\ Jobling, Director of the Serum Laboratory, received *horn* Java** a **number of cattle For serum** work. **One of** thi'sc **developed rinderpest and** was bled to **death, the** blood **obtai]** being used on four so rum animals, **three of** which **promptly develo]** surra and **of** nun-e beeune useleSB for scrum **purposes. The infection** in these eases **undoubtedly came from the Java eow** and **illustrates too well** what, as suggest**ed by Theiler, no doubt frequently happens.**

In following tin[1] disenssion of the modes of transmission and infection. it is **seen that** hut fow **of the headings whieh** have **been chosen really** have any **practical significance;** and **we may well close** this **part of the** sub**iject** with **the statement, already emphasised,** that ***Trypa**nosomias**It is** esse**ntidtly a wound** disease **and that infection takes place when n**ateries ***morbi** are browjht in ronfnrf. irifh nn injured **surface and in no other way.*** **The** most common **agents** in **bringing** this **condition about** are Iriting and **stinging** inserts, and **of** tin**se** certain **tin** ilio and t<i a **less extent fleas** arc tin.' **most important**

***The manner of perpetuation,*—The manner of perpetuation of** *a* **dia**ease of **thie** kind is **interesting,** since it **has** a practical **bearing upon** methods for its control. **The eradication of the disease** may with propriety he **disci• at this** point

Ifuagrave and **Williamson** in a **preliminary report referring to** this question **say:**

The manner of **perpetuation of** mi **epidemic of TrypUKMoniaais** in any country is a very **important** point in eoii;<i<U*rmg **the** j>r*-vi-iit ir>n **and eradicatiofl** "f the disease.

By **the** v<TJ tuitiire of ***pt** rasites **mi*** of **parasitic dfneaaea** in **general,** w> know that, unles* the **dtaoaaa i- eontiaaoaa,** the pnm^iic nm-i have a natural lm*t, or there ttitist Ix- **a BtSf^s** in ii^ life cycle **En** which it can exist for an indefinite period **outside the living body; otherwise** thp infection will Uisapjwar.

Many of the lnr». tsetsé-fly area **i** are absolu; **tatote oi** •ie a n i n als, timl probably some of them **bare** never had on*? **within** their hi orders, and yet the **dies** in *ih*>-< dt^ti:ts are exp**tble of infecting domestic** uniinuU. \- it him be**a** quite eoinln>i\Hy **ibowa that** the tiy **I** not ca**pable of** *i;iriving **the infection** at iim-4 Inn ii -lunt time it **oeeeaaarflj** means that **ihen !« JI Boorce** of infection from which the tii.- are s**tppiied,** ami the natnml **iafensee** would lie that **the** native s>urec of **Infection** i- the wild anininN in which the **eountiy tboaada.** It has ilready been shown tha**t** some of these .niinials ur*' **susceptible** \" **the** di*-ase am! that others harbor the parasite* with little or no **laconvenienee. It** is very **probable** that, were inoculation **netftods** iji-tiiid of niicrosk^pir hlood **exaaunati**ons used for (li«Kno.-iii ptu**poses,** i **mneh *target*** [KT.entage of these e.*UI* :(niinals would I* found Infected than has generally been auppowd.

Conditions in certain sections of South America are v**ei y much like** thn*e in

[illegible] came manner. [illegible] cow acts as a [illegible] parasites [illegible] enough cases in horses to con- [illegible] abilities are that a number of wild animals which [illegible] fection [illegible] continuation. [illegible] claimed [illegible] least ce[illegible] ts of [illegible] varieties of animals which that in certain [illegible] of the country there are [illegible] but live in [illegible] susceptible to rinder[illegible]t an [illegible] are [illegible] have "surra" [illegible] rested areas. At cert[illegible] se[illegible] lies are so numerous th[illegible] hese [illegible] by inocu- fro[illegible] It would be interesting [illegible] camels lation to see whether or not they are fr[illegible] season [illegible] may play an important part in carrying [illegible] years to the next, as it is stated that these animals [illegible] after infection.

From the foregoing, and if the disease continues to spread, [illegible] at the wild animals of this country must be considered in dealing with the epidemic. If a certain portion of them are not already infected, it is only a question of time until they will be, and another difficult point in the solution of the problem will thus be produced.

The part that rats play in perpetuating an epi[illegible] has not yet been fully determined, but the fact that at this time, [illegible] the [illegible] le of the dry season, a considerable [illegible] of these animals are [illegible] infected, and with the knowledge before us that [illegible] infection [illegible] itted from [illegible] rat to another by fleas, which are numerous on rats [illegible] all se[illegible] kes it probable that these animals play a very important [illegible] uating the infection in the Philippine Islands and in other countr[illegible]

However, so far as the city of Manila is concerned, it does not appear necessary to leave the horse [illegible] to discover how the infection is perpetuated. Now, even during the dry se[illegible] st daily, see a horse, sick with surra, driven along the streets, [illegible] although not by any means as numerous as during the wet season, are [illegible] gh to co[illegible]ti[illegible] the infection.

[illegible] the *Trypanosom*[illegible] living on p[illegible]ass [illegible] an [illegible] racorporeal stage [illegible] stage taken into the stomach of sus- [illegible] marshy pl[illegible] localities, [illegible] this organ cep[illegible] or other part of the animal economy passing in[illegible] the blood in the forms we recognize, is [illegible] paper. [illegible] subsequent

Before [illegible] aried [illegible] idence of their [illegible] outside the body [illegible] ed. Both existe[illegible] case, or other similar place[illegible] wat[illegible] ss have been inoculated with large num[illegible] and hav[illegible] convey the disease, after days, weeks, or months, when fed to susceptible animals, and also when injected [illegible]

Since [illegible] the above, [illegible] with regard to the part rats play in the spread of the d[illegible] evidence makes it important that these pests be taken into accou[illegible] discussing the perpetuation o[illegible] somiasis.

[illegible] is not believ[illegible] e rats of Manila were infected previously to the advent of surra, [illegible] is supported by the ev[illegible] d by an exan[illegible] from zones free [illegible] se. [illegible] at these

Surra [illegible]

animals soon become important Ictors **ba it.- perpetuatioD in certain zones. In tfantts the annual destruction of thousands of rats with the purpose of preventing the spread of plague will also have a beneficial effect in limiting one ageni in the transmission ami perpetuation of surra.**

VI. GENERAL PATHOLOGIC ANATOMY.

ii< **n.** r;i1\ **speaking, writers have been** *very* **brief** in their duapription of the anatomical !•sions **of the different forma of Trypanoeoniiasis, the majority agreeing** that th«y are not **constant or pathognomic Some, however, have held different neve** ami **bare given excellent descriptions of their poBt-mortem** findings, particular!) **Vogea** and Sivori and **Lecler.**

!-;i\i-ran and nfesnil aay that "nagana is **certainly one of the dis**ases in **which,** at **the autopsies of animals dead from the disease, there are slight** hsinn>. \r;irly all **authors agree in giving as a constani lesion hypertrophy of the spleen. At the autopsy of one horse Lesions of the internal o^aii:- vere insignificant*"**

Voges -tatc* that iii nml de cadei**us post-mortem examinations show edema** and **roughened hair, j>**st as **they** arc **present during life. The** .skin **is removed** with **difficulty,** and **when taken** otr **a vn-\ dry fie&h** similar to that **Been** in **cholera** is **observed. Cloudy » rous thuds are** visually **Found** in **the serous cavities**, especially **•', the chest, which may contain** sev**era!** liter*. There **are fibrous layers** on **the pleura and oi**her se**ous surfao**s, e**pecially** marked <m **the abdominal organs. The subplei**ural **lymphatic glande** are of**ten enlarged.** The spleen **is enormously enlarged, sometimes** hard **and firm** and in otln**r case- soft** and **friable. The** fol-lii-!-**;i increased in size until they resemble grains of ^i;:"-** The liver is e**nlarged.** The kidney? are pale and *on**etimes enlarged,** the **. lymphatics** are **Blightly** ±*o.* Fluids are often found in **the larger** socket **, joi**nts.

Schilling, writii raixa in **Africa that poet-mortem** exaniirm-**• tioaa show marked generaJ anemia,** and **numerous** discrete, **dark-red** Eub-**'pleural spots, enlarged soft spleen, enlarged Follicles,** and **slight swelling** 'and **softness** *of* the **lymphatks of the neck,** which **contains a** small **amount ,of yellowish, opaque fluid, No special changes are** observed in **the I**iver **land** ki>li)'ys.

9ivori and **Lecler, writing of "surra tmericain," state that the** adi pose tissue is r**eplaced by** a **gelatinous** mass. **The mulcles havi** a rose tinge, **but** are pale and in **parel**ic cases may atrophy. **Qit**ron-colored fhiid is pr**sent** in th- peritone**il cavity. Hie 1**iver shows so**ne increase in** consistenc**> and is darker** in **color. The spleen i* enlarged** and the Iglomerules are pntminent **and red;** in *thv* **paraplegic form il** is gre**atly 'im**reased in size and **the** lesions **intensii**ed, so**metimes producing acute splenic tumor.** There is enlargeme**ut of** ili<" raalpighian corpu»cles, which art' ijftf.ii *) increasetl in volui**ne as to stand** out in **relief** un tin-

face. [illegible] contains [illegible] show traces of [illegible] pigment. The pleural cavity [illegible] The [illegible] may be normal [illegible] some [illegible] The pericardial cavity contains [illegible] or edema [illegible] congested. The myocardium is pale [illegible] a yellowish [illegible] as [illegible] of the subcutaneous [illegible] cardiac fat shows the same gelatinous change [illegible] particularly the left, has subserous punctate hemorrhages. The endocardium, [illegible] The brain shows [illegible] of the spinal cord [illegible] an increased amount of subarachnoid fluid. Sections of the spinal cord usually show [illegible] but they [illegible] consider [illegible] hemorrhages in the gray matter. These authors [illegible] secondary infection. [illegible] butable to *Trypanosoma*, some of them being due [illegible] They do not believe *Trypanosoma* destroy the red blood-cells mechanically, but think they are destroyed by mononuclear macrophages. The mode [illegible] of the edema they say is unknown.

[illegible] anatomic [illegible]

[illegible] enlargement of the spleen [illegible] shows

Weber and Nocard, [illegible] of [illegible] cachexia and hemorrhagic softening of the spinal marrow. The parasites found in these areas and in the serous effusions resemble those of surra, nagana, etc.

Kanthack, Durham, and Blandford give as marked lesions enlarged lymph glands, especially around the inoculated wound, hypertrophy of the spleen and liver, and often fatty degeneration of the latter. Iron reaction is obtained with the liver, the spleen [illegible] kidneys.

Curry gives as [illegible] lesions [illegible] progressive anemia, general subserous edema, especially of the belly, sheath, and legs, moderate enlargement, [illegible] frequently broncho-pneumonia and bronchitis, [illegible] marked glandular enlargement, particularly of [illegible] sub-charges, [illegible] lary glands.

[illegible] our experience necropsies have revealed anatomic pictures rarely as characteristic as in the chronic diseases peculiar to man. The ante-mortem [illegible] necropsy is made shortly after death, are [illegible] lesions, provided the [illegible] the body is emaciated, and the bands of edema so prominent [illegible] present. The body is emaciated, and the bands of edema so prominent [illegible] seen. A small amount of yellowish-tinged, [illegible] substance is found in the inner canthi of the eyes [illegible] in the nostrils. The hair is roughened [illegible] often scant, leaving [illegible] The mucous membranes are pale and a scant [illegible] looking and often show a yellowish tinge. The hide, as pointed out by Voges, is removed only with great difficulty, except [illegible] of subcutaneous infiltration, and [illegible] removed exposes the dry, hard, pale subcutaneous tissues. In the regions corresponding to the [illegible] life are found yellowish-tinged, gelatinous [illegible] ations, [illegible] are of a

similar consistency. A like condition \> found throughout the body in tin- regions where adipose <T areolax tissues we located, and especially is thifl iruc of tin- *hi* around the heart and the subperitoneal tissues. The muscles are pak\ wasted, coarse, and granular looking. The serous membranes, particularly the peritoneum and the pleura, often show Bakes of plastic fibrous material. These are particularly numerous over the surface of tlit* liver and sometimes the spleen. All the tissues and orgains have a peculiar dry. pale appearance, which has been so aptly

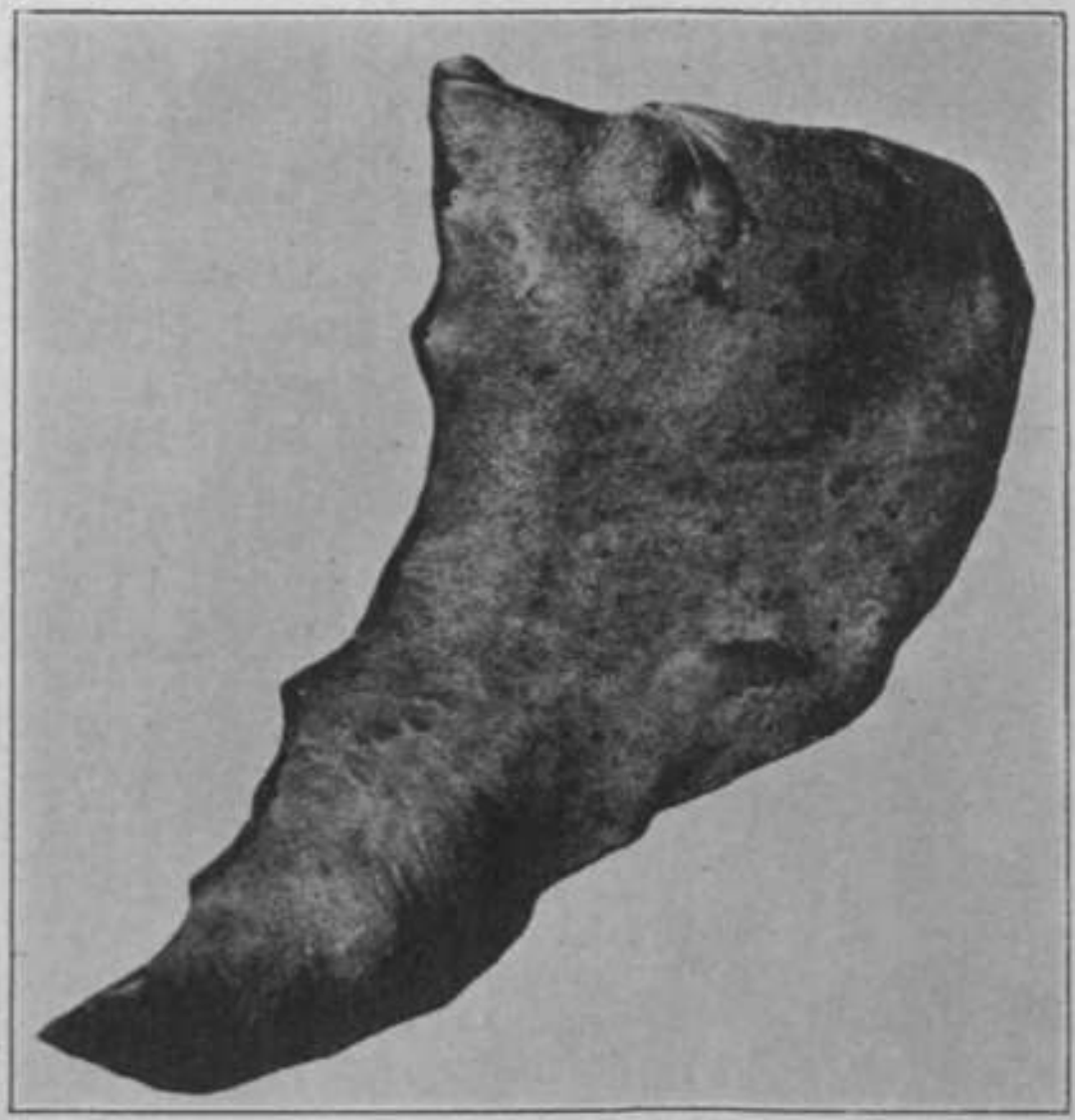


Fig. 1t - ~pleen of a horse dead of surra, showing enlarged follicles and hemorrhages.

compared by Voges to tln'ir condition in cholera. There aw anmei ous subserous hemorrhages, particularly on th*1 right -ide of the heart and over the lower port ions of the lungs. The lymp] atics are in general somewhat enli rged, ;in*l often markedly so; and in a certaii] percentage of cases areas of bronch D-pnemnonia are present The heart muscle shows parenchymatoud eha nges, depending somewhat on the duration of the (disease. It> ehfljnbew usually contain chicken-fat clots, which often

ext•ml for a foot or more into the aortit. The appearance of the spleen raxies Bomewhftt, but in the majority of cases it is considerably enlarged, friable, and somewhat soft. The surface is uneven, due to the enormously swollen corpuscles, which stand out prominently. On section a typical •-;iL'n" spleen is often seen, while in other cases a typical acute splenic tumor rach as is present ia infectious diseases of man. In a lew rases the spleen is but slightly swollen, but the dotted aj>[>earanee, due to the swelling of the corpuscles, \^ a constant lesion anil gives to this organ, regardless of its size, a most rharaeteristie picture.

Tlic liver is visually somewhat enlarged, pale, and cloudy. The intestine shov s lesio ns due to anemia with now and then small ulcerations in the upper portion and sometimes in the eeenm. The aqueous humor is often cloudy and contains *Tnjpatwsoma.* The urticaria! eruption observed during life is no longer evident. In some of the lower animals the scro nun and even tb testicle in the male and the vulva in the fern ale are gn atly s rotten, and in the male rnhbit the tension may be so great as to rupture the scrotum. Small prcpucial or Labial ulcers are not uncommon.

VII. GENERAL REMARKS ON SYMPTOMATOLOGY.

Before proceeding to the study of Trypano-.>jni;isN in the various animals, it might be well to make a few remarks on the symptomatology of the disease.

There is considerable variation in the clinical picture of surra in the same class of animals, even when the in fecting parasites are known to be the same, aiiel it i- there fore not surprising thai variations should exist in different species. In reviewing the literature relating to doctrine, nagana, surra, and mal de eaderas, one is struck with the great similarity in I he descriptions of the so-called intercut diseases. A •omparison of th- descri pt ions of any one of them as given by different \vriter£ shows as great a divergence as may be found with those of i he dis^ases acknowledged to be different. In all of them, howe ver, the re are a number of practically eoi stant characteristic symptome in the well-established infection such as to *make,* when taken tog ether, a clinical picture e sy to determine accur itely even without tin aid of tli« microscope.

After in incubation period, which varies in the same class of animal s and in those of 0 ifferent species as well as with the conditions o f infl ction, ami during which the animal remains p»rfectly well, th e firs.i s mpt to be *DO* ced IS a rise of temperature, and for some days a remittent <ir ii;termitt <>nt fever may be the only eridi nce of illness. Later on the animal becomes somewhat stupid; i ratery, catarrhal du charges from the nose and eyes aptx-nr; the hair 1 becomes somewhat roughened an• I fall.-; out in plai.s. Finnlly I he catarrhal

discharges become more profuse ;md the secretion more tenacious and oven purnlenti marked emaciation develops; edema of the genitals and dependent part.- appean ; a staggering g.iii. particularly of the hind parts, comes on, and i> followed by death.

Voges divides the symptoms of nuil de caderaa into two stages, a> follows: Mn the fourth or fifth di y afte r inoculation the temperature rises r ipidly, sometimes to 4.0[3] or 41° ('.. and then suddenly falls to normal or near] y so, usually on fchi ad day. Within five days the 'u is another rapid rise, reaching 40[a] C, followed by am ther widden fiill. These reactions may be repeated from two to eight times during the course of the disease. This is called by Voges the first stage. During this period the appetite is good ami there i.- no emaciation. The thirst is increased. The feces are normal, but in rare instances nun' Bhow a little dotted blood. Transient bemoglobinuria. The reflexes are normal. The cosi *a* smooth, and the hearing and sight nonnal. Toward the end of tin-- stage weakness becomes noticeabl&

In the second stage thi becomi intermittent, anil exaeerbations to 10 C. or over are coeptionaL Tin? remissions arc also less marked. The animal becomes inactive and sluggish and allows the head to drop carelessl *j.* Pn gressive emaciation takes p] nce; great thirst; progressive reakening. Edema, particularly of the hind ;egs, belly, and scrotum. The hair loses its gloss. I Increased sosibilii ies; digestion and re-pimtifm remain good. The gait b© omes staggering and I (mall y causes the animal to fall over. S me .vnimals die Bnddenily during the. Inter stages of the disease. Just before death the temperature variations usually become greater, vacillating between 34° and 39 I.; and death generally oeettrs when the temperature is low.

1

T: r is not continuous nr characteristic in anv of these d - he feve ieases. It may be intermittent, remittent, or. according to some writers, relapsing in eh: . varying from 39 » . It is nearly always higher in the afternooj

In describing the epidemic of Borra which visited Java in 1! - iat gives among the symptom* fte which are remarkable in thar they differ radically in many respects from those described truck by ti

i they form a very clear description of rinderpest in *He* found ; *Trjfpam* iul it woald appear to us thai he was work with i combination of the two dia

\ work 1 by various wr

, i he relation <f thi parasites in I

I cnlating blood, some maintaining that 'ortion that no relation \vhat« irhuck, Durham, and Blandford say that the para-

1 early in the -*[1] and continue I

until death. The counts vary and m[illegible]00,000 per cubic centim[illegible]. The parasites [illegible] to enter the lymphatic glands a[illegible] the point of [illegible] in the blood, a fact which they believe explains the short [illegible] period during which after inoculation [illegible] can not be [illegible] blood. Multiplication occurs also in the infec[illegible] area.

During the incubation period parasites [illegible] not found in the blood by microscopic examination. This has been explained in various ways. Voges considers this to be because of their rarity, while others maintain that a stage of multiplication goes on in the lymphatics. A few conclusive experiments by animal inoculation, however, have shown that the circulating blood is infectious for one, two, or even several days before parasites are found by microscopic examination to be present, which would seem to indicate, as has been suggested, that they exist in the blood in small numbers during at least a portion of the time.

The periodical disappearance of the parasites from the circulating blood for varying lengths of time during the course of the disease has not been satisfactorily explained. All kinds of conjectures have been offered with but little evidence to support them. Voges's idea regarding [illegible] parasites seems to us to be the most plausible. He states that the [illegible] are numerous during the first few days after the rise in temperature, following which they mysteriously disappear; and this appearance and disappearance may take place a number of times during the course of the disease. He considers this due to a certain amount of immunity, which is acquired by all animals in the early stages and which may be repeated a number of times before the animal becomes too weakened. This view is advanced in preference to the opinion that the temperature plays any part in this phenomenon. In the later stages of the disease parasites may be found in the blood in larger numbers and with a higher temperature than at any time previously.

Another symptom in this disease difficult of explanation is the anemia, which is progressive from the first. It has been explained that the parasites mechanically destroy the red blood cells and interfere with their manufacture in the bone marrow, and finally that on account of changes produced in the blood by the parasites the red blood cells are taken up by the large mononuclear macrophages. A number of less important explanations have been given. According to Voges, anemia is a constant and prominent symptom [illegible]; and 10,000,000, the normal number of red blood cells in the horse, may be reduced to 4,000,000, [illegible] 800,000 in some cases before death. The sedimen[illegible]ocytes is increased. [illegible] The hemoglobin is decreased in proportion to the diminution of red blood cells; from the normal [illegible] of 13.1 per cent it may fall to 3 or 4 per cent.

Several observers have spoken of the mechanical destruction of red blood t-clls by the parasiti.-. Yoges saw *Trypanosoma* hold erythrocytes against the body by their fixed ends until the cells disappeared. Crookshank, on the other hand, **was unable** to satisfy himself that they attack the red blood cells.

Laveran and **ICesnil** do not consider anemia sufficient to account for the death of animals. They say that the manner in which the parasites act is still unknown.

There is **certainly** something very curious about the **presence** *at* **anemia** in ill is disease and in the action of the parasites in producing it as well as bringing about death. **The** mechanical destruction of the red blood cells is not of the importance **many writers** attach to it. It seems to us **that there** is some factor in addition to mechanical action, **which cam goch** profound **changes,** and strong **evidence** in favor of this is found in the **peculiarity** of the gelatinous deposits. The parasites appear in some manner to **produce,** <r cause **some** part of **the** animal economy to liberate, this peculiar substance, which is not a **simple** infiltration of **fatty** tissue but is of different character. The **deposit undoubtedly** is formed gradually, as is inferred from **the** slow change in the secretions. The **discharges** from the nose and eyes, at first watery, gradually take on **the** same character, and before death become very tenacious and solidified in the nose and corners of the eyes.

Referring to the action of *Typanosoma* in the animal economy. Tjaveran and Mesnil state:

> Evidently in the presence of an infection so intense as that which is shown at the moment of death of rats, mice, and other animals, the mechanical action of sueti • **number** of parasites is to be considered. This alone, **however,** in our opinion, does not suffice to explain the cause of death. Rats infected with TV. **MSM** may have a great number of parasites and yet feel no inconvenience. In certain attempts at treatment, of which we shall speak later, a rat tin* lind for more than tiftom days as nmny parasites in thi? blood as red cells.
>
> One U led to think of a toxic action of the parasites and of the intervention of the soluble products excreted by them. The observations of the course of the disease in rabbits, guinea pigs, and cows, in which the parasites are not so large as in other animals, pven at the time of death, and the profound dejection of certain aninin U when infeoted. as the ass, plainly corroborate this viow.

Strong thought that it was perhaps chiefly through its mechanical destruction of the red blood corpuscles that the Trypnnosoma caused harm. Kxperim> nts were performed to show **whether** the parasite elaborate tod any **fcj** --tanee which acted injuriously upon its host

> Large amounts of blood taken from monkey- --.iilVring with experimentally l>rodueed Trypanosomiatsis of severe type were passed through a BorkeMl **Ufa** and the filtnit.- (injected into other monkey*. No symptoms of Trypanosomiasis were produced, *large* ceHoidin capsules containing blood with many parasites

£e plaeed in the abdominal cavities of sheep, but the results were also negative.

Vll ir tempts to isolate a toxin have proved futile. **It does not seem**

to us that a toxin can enter into consideration; but, as has already been said, the character of the **action** which results in the formation of tin.- peculiar gelatinous deposits will probably lead to a solution of the problem.

Voges believes that in mal de caderas death usually results from a gradually progressive heart failure, and in some cases occurs suddenly fro•u the **Bame** cause- He says that death usually comes on with a fall of the **temperature,** rarely at its height.

This statement is true, but does not go far enough; an explanation ol the cause of heart failure is what is desired. The condition described above may offer some solution, in that the gelatinous deposits are often abundant around the heart; and a microscopic examination of the tissues shows that a similar condition is present in the myocardium.

The incubation period of the disease in different animals has an important bearing upon tin.' application of methods for the control of epidemics. It will be discussed in detail as the study of the disease in different animals is taken up. The evidence of previous workers and **out owfl** observations show that it varies with the manner of inoculation as well as with other conditions.

In all the forms of Trypanosomiasis the infection seems to involve particularly the genitalia, the skin, and the organs of special sense. The skin symptoms consist in a roughening of the hair, **which** also falls out in places; a thickening of the epidermis, often with exfoliation, and in some stages of the disease various skin eruptions. These may be simple erythema, and more rarely they may assume the severer forms, as urt icaria, **or** in extreme cases a **distinct** localized ulceration may occur. The **crotnm** and penis in the male and the vulva in the female are often swollen, and. ulcerations of the penis or vulva are frequent symptoms, especially in dourine.

VIII. TRYPANOSOMIASIS OF VARIOUS SPECIES.

TRY1WNOSUMUSIS OF IIOBt-ES.

UV shall begin the **discuteion** of trypanosomiasis in the different sj >f animals with'that of the horse, which from an economic standpoint is the most important animal naturally susceptible to the disease in the **Philippine** I shinds.

Host of tin writings relating to Trypanosomiasis deal particularly with the infection in equides, and as a consequence literature is rich in descriptions which in many **points** can not **be** improved upon. 11 is our intention brir'ih to review **the** most important writings on surra, nagana, dourinc and mai de caderas in each species of animal, following this with our own observations, and finally, when through with the species discussed, to devote a chapter **to the diseoflftion** of the **individus**lity of these diseases.

Sumi, according to Lingard, manifests itself, after a period of incubation, in fever, a stumbling gait, and general or localized eruptions with the presence of *Trypanosoma* in the blood. A period of apyrexia may here supervene lasting for a day or so, during which the animal appears better. These apyrexial periods may occur a number of times during the course of the disease.

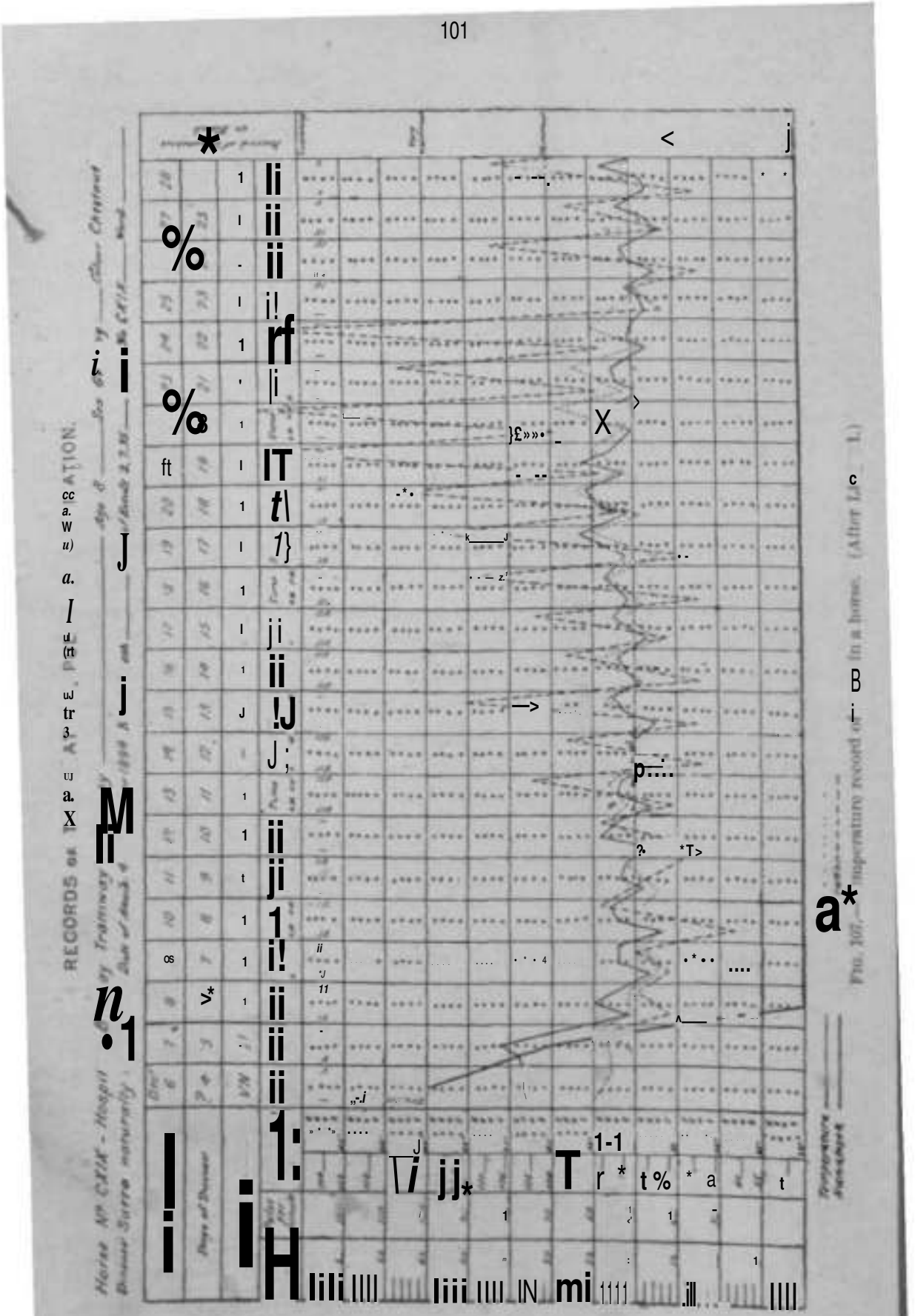
In every instance, however, they are followed by a fever usually from 38.7° to 40° C.; thirst, slight loss of appetite, ecchymoses of the conjunctivæ, with increased lachrymation and mucous discharge from the nostrils. The submaxillary glands may be enlarged, and edema beginning on the legs or sheath may develop. Emaciation is rapid and progressive. With each exacerbation of fever the other symptoms become intensified, and the animal is made weaker. The edema spreads, the mucous surfaces become very pale and tinged with yellow, and the respiration is quickened. The appetite remains good. Toward the end paresis of the hind quarters becomes noticeable. Paralysis of the sphincter ani is frequent. Shortly before the end the heart's action in many cases becomes violent, and death may result suddenly from heart failure. When this does not occur, the animal finally falls to the ground and dies from exhaustion.

Nagana is carefully described by Bruce, who gives as the principal symptoms: Fever of a remittent or intermittent type; catarrhal secretions from the nose and eyes; staring of the coat; and edema of the abdominal region, the prepuce and the posterior extremities. The animal becomes markedly emaciated and has a dejected appearance, the head hangs, the hair becomes very rough and in places falls out, the mucous membranes of the eyes and genitals become very pale, and there is generally a slight opacity of the cornea. Just before death the animal falls to the ground and dies apparently without suffering.

Kanthack, Durham, and Blandford inoculated two horses, one of which, a well-fed Russian cart horse, lived seven weeks, and the other eight days; wasting was very conspicuous. The period of incubation was followed by a smart rise in temperature and by the appearance of parasites in the circulating blood. A sudden rise of temperature immediately followed each increase in the number of parasites in the blood. At the time of death there was marked fever.

Laveran and Mesnil report two cases as follows: The first symptoms were the appearance of parasites in the blood and fever. One of the horses, which was not in a good condition at the time of inoculation, died in sixteen days; the other in forty-three days. With one or two exceptions parasites were always found in the blood by microscopic examination. The red blood cells gradually diminished and at death were reduced to half their original number, or even less. Parasites appeared in ... their ... appearance was coincident ... first rise in temperature ... ys reached 41.4°. This ... 38° C.

the blood in less than four days after subcutaneous inoculation, and ... was followed by a ... which ... a



RECORDS OF TEMPERATURE.

Fig. 107.—Temperature record of a case of typhoid fever. (After Liebermeister.)

RECORDS OP TEMPERATURE, PULSE AND RESPIRATION.

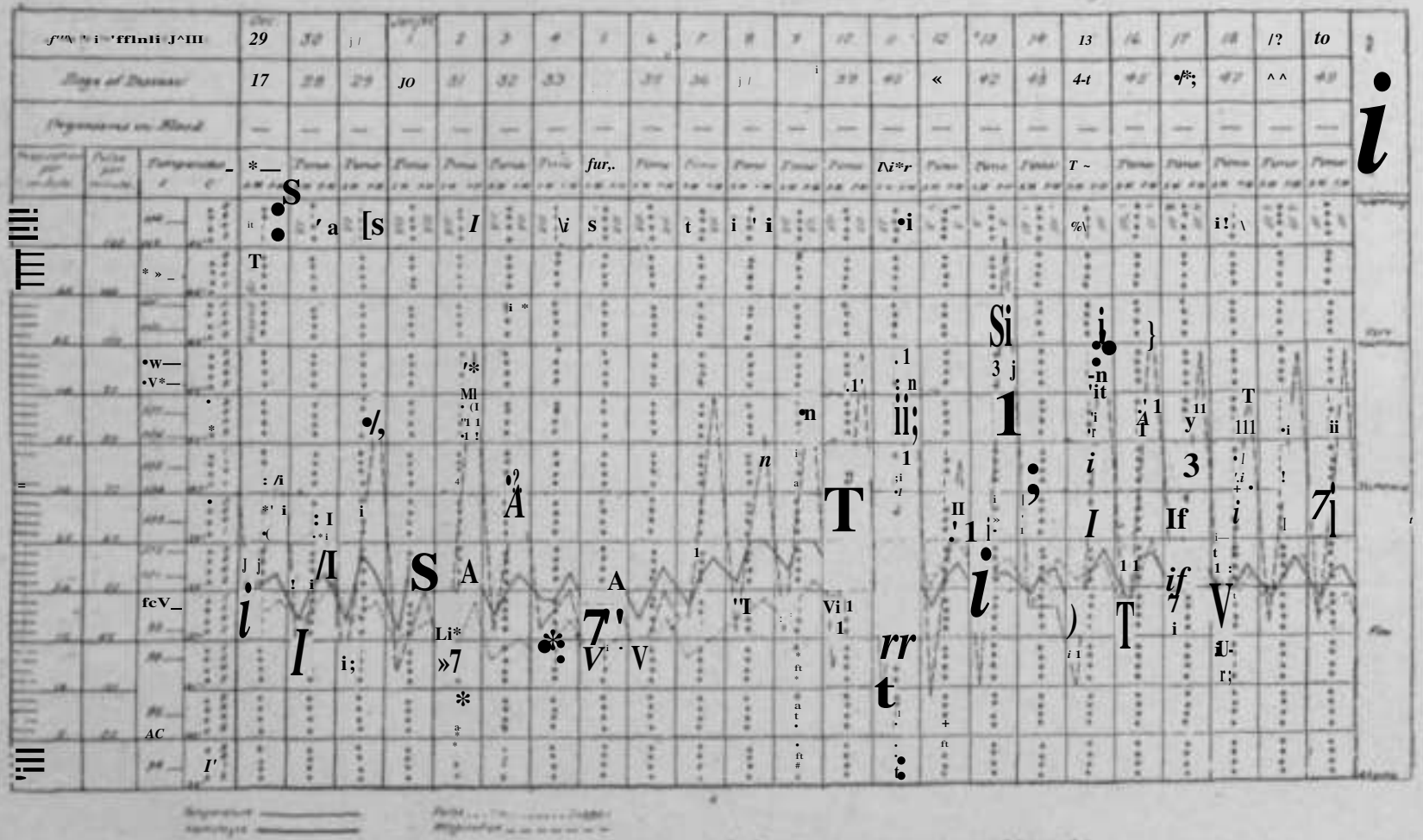


Fig. 107 (continued) —T«ap«mtUl e record of ;rnt lu u h«nw. (AfU-r Lingard.)

RECORDS or TEMPERATURE, PULSE AND RESPIRATION.

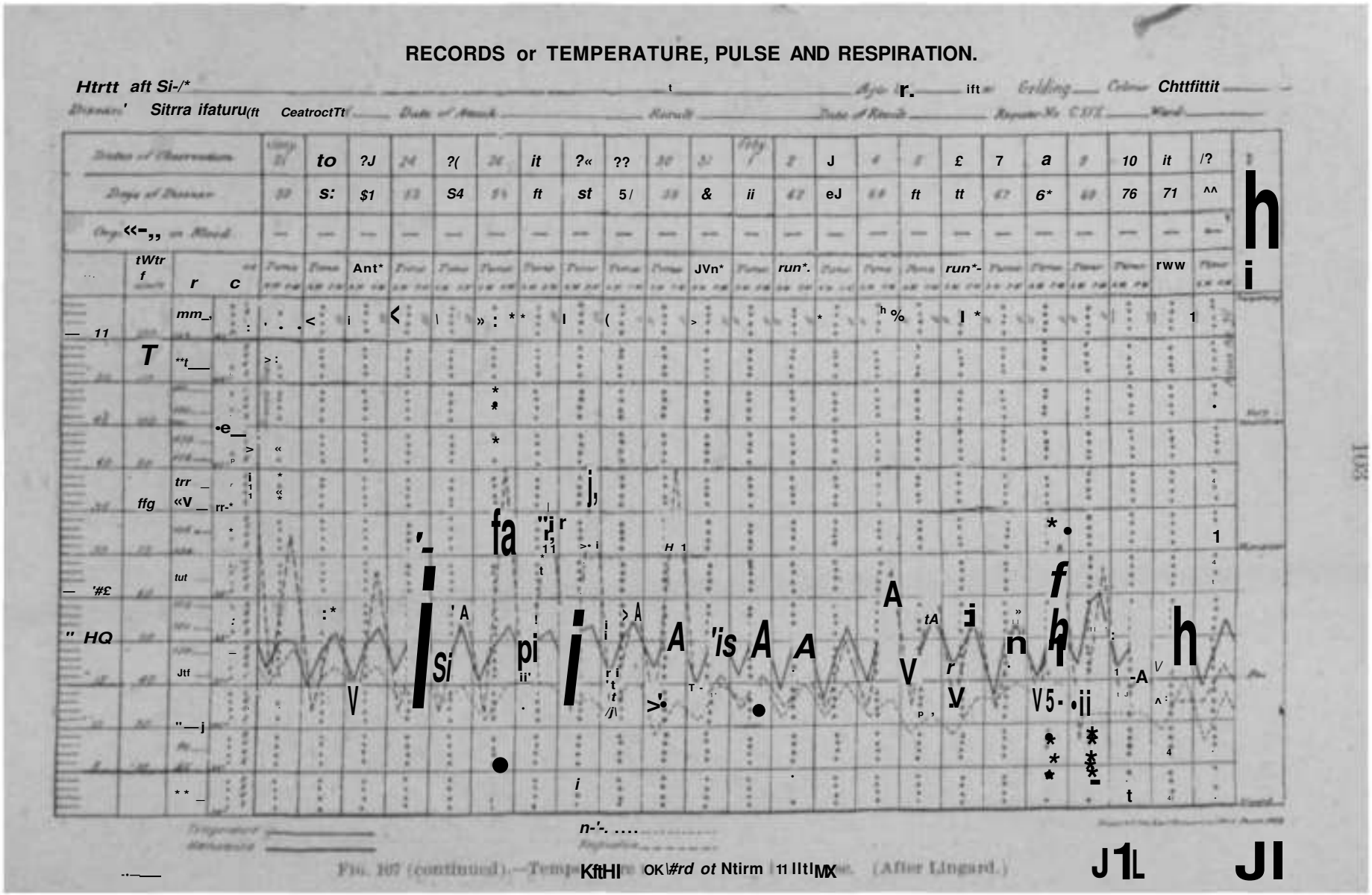


Fig. 107 (continued).—Temperature Chart. (After Lingard.)

RECORDS *ar* TEMPERATURE, PULSE AND RESPIRATION.

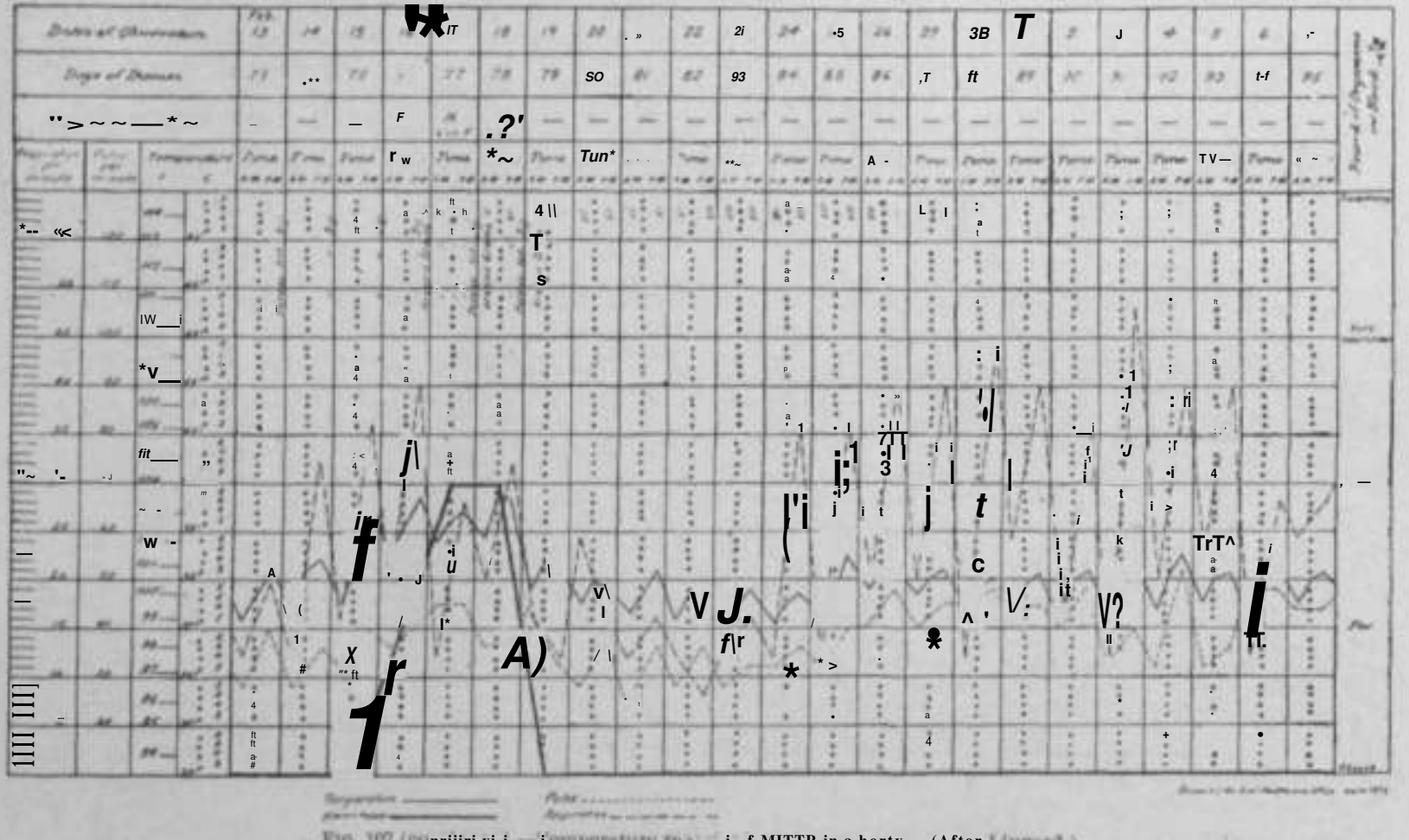


Fig. 107 (co nriiiri.vi i —i emperatur re , ,,.i ..f MITTR in a hortv. (Aftor Lingard.)

RECORDS OF TEMPERATURF. PULSE *»D RESPIRATION.

Fit*. 107 i<'4mtinu«il).~Temper»tUFC n**f»rr) of snmi in u In>t><-. (After UIIK'UI-'I,

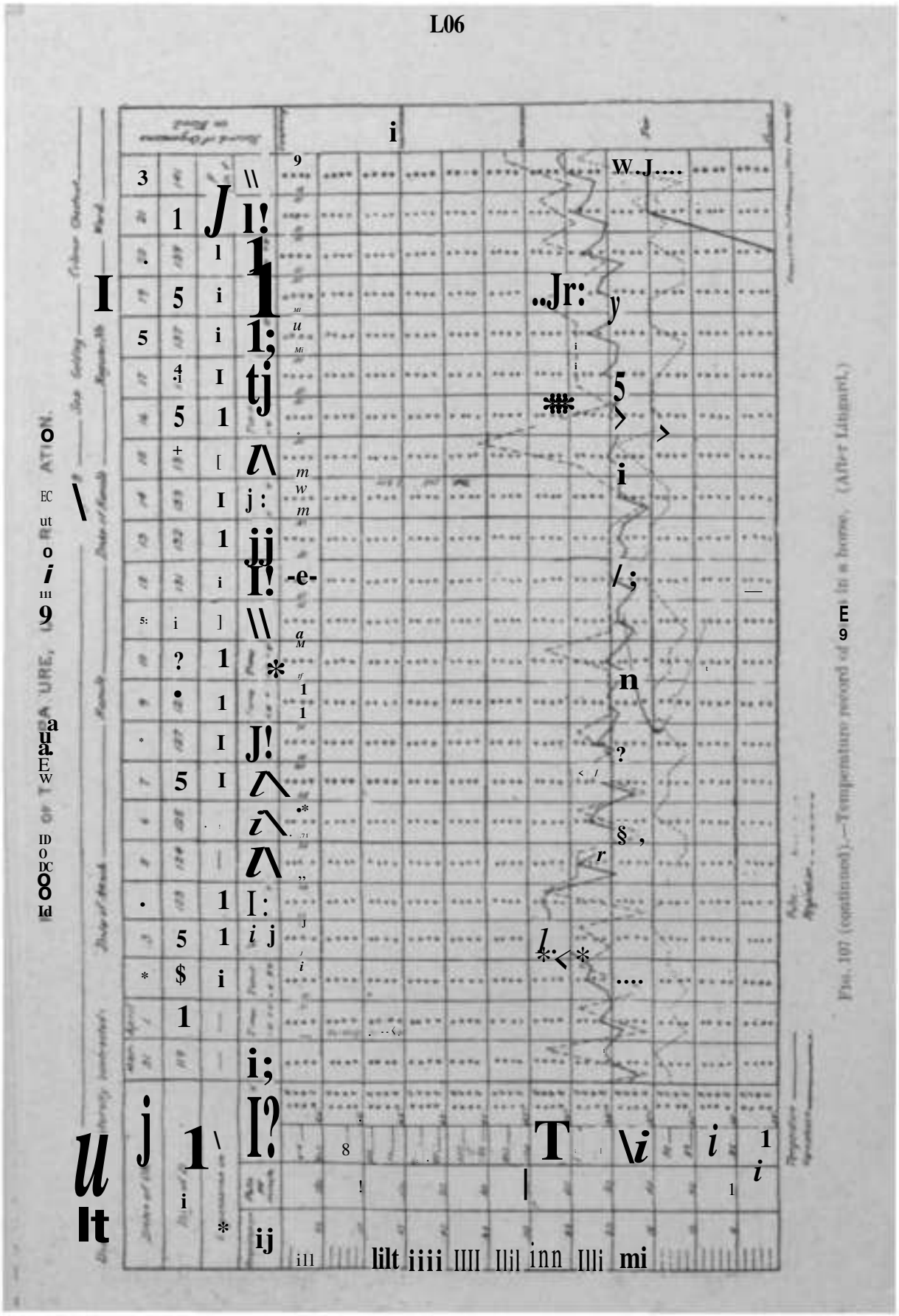
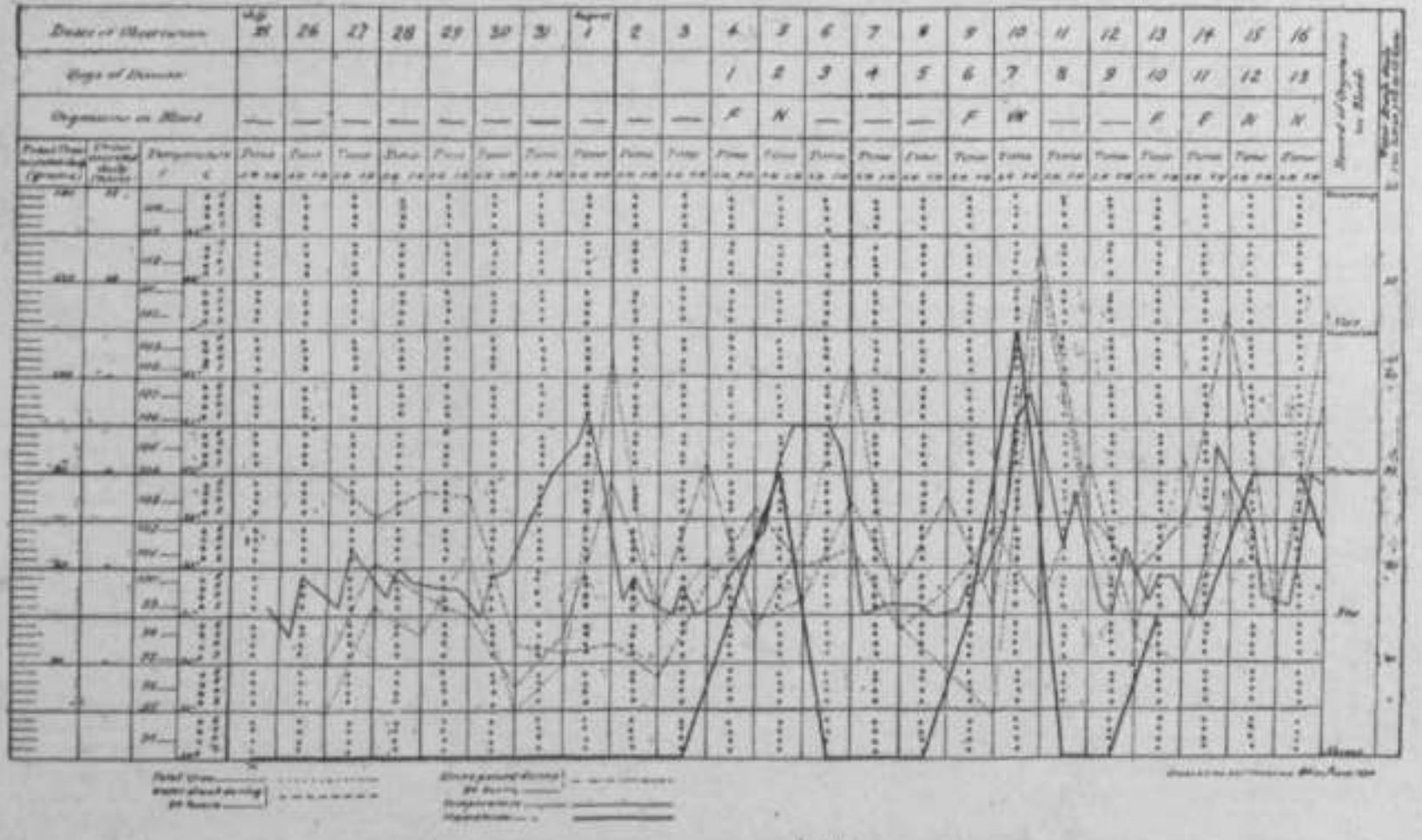


Fig. 107 (continued).—Temperature record of a fever in a horse. (After Liburn.)

RECORDS or TEMPERATURE, PULSE AND RESPIRATION.

Fig. 107 (continued).—Temperature record of Mirnt iti a i. (\ftiT Lingnnl. i

RECORDS OF TEMPtftATURE.WATER TAKEN,URIHE PASSED AND TOTAI **UREA EXCRETEO.**



Fi«. 1W— Ti'tnperftture record »(«irm in *n* home. [Afltff Lin«anl,i

RECORDS Of TEMPERATURE. WATER TAKEN. URINE PASSED AND TOTAL UREA EXCRETED

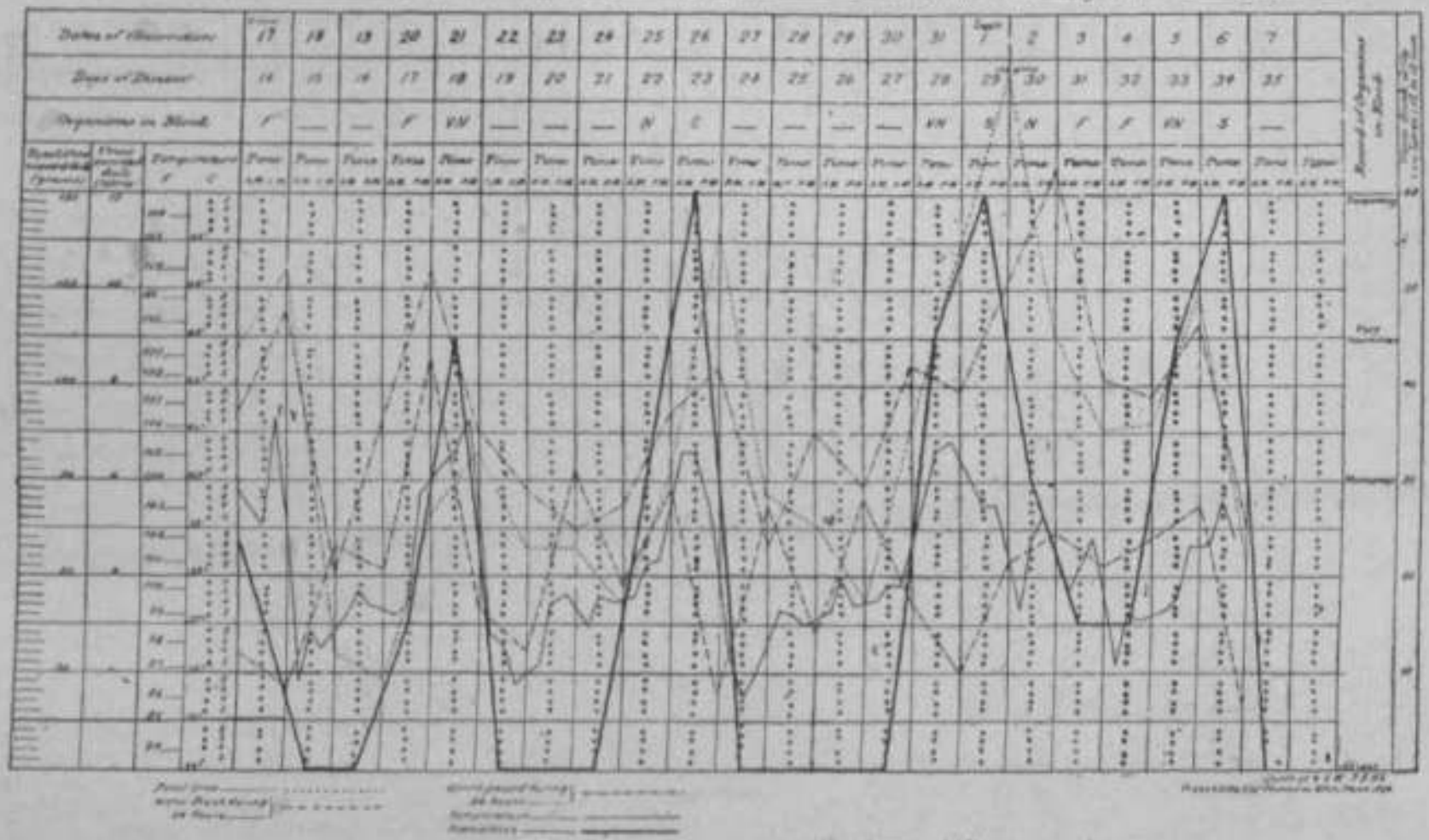
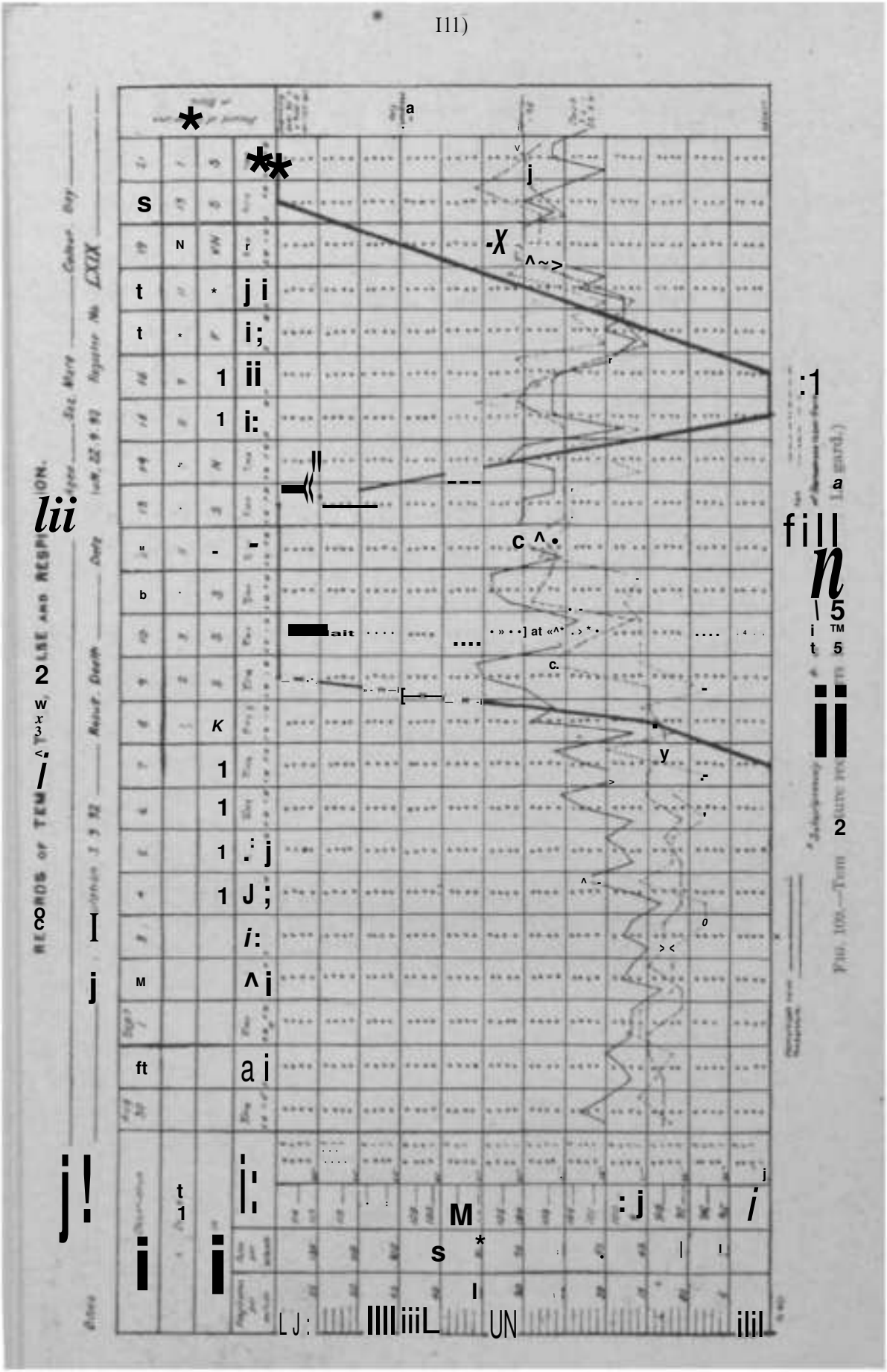


Fig. Lfil (continiwd).—TeropcMturu rcoon) "I nira in i home. (After Llngwd)


RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.
Fig. 105.—Temperature Chart.

corre•spending **reduction** of the number of parasites in the **circulation. With** the second **rise** of **temperature** to 40° C, where it remained oscillating **between** 30° and 40° until the day of death, the parasites again bec**one numerous** and remained so throughout the disease. Beginning about the **fifteenth** day after inoculation, there was edema of the pen is, *h** .gradually involving the belly but not the posterior **extremities.** Lesions of the nose and **eyes were** not noticed. The **appetite,** except at the height **of the** fever, was good. There was no apparent emaciation and no serious loss of weight.

During the incubation period of mal de caderas, according to Voges, no **symptoms** are noticed; but as the disease progresses, the animal becomes inactive **and** heedless of what is going on about it. It allows the head te drop car elessly tnd the whole body loses its firmness and becomes more and more sluggish. On being ordered it respond- very **lazily,** and **"even** the wildest and meanest horses no longer balk and bite." At this period of the **disease the animal may** fall to the ground and **die sud-denly.** *)n the other hand, if assisted to rise, it may live for as BUK-II as two weeks.

Following **the** incubation period, which **varies** in **duration, the temperature** rises rapidly, often to 40° and 41° C.f and on the **following day** falls to normal or **nearly** so. It then goes up again, and within five **days** reaches 40° C. or more. The period of apyrexia between these **elevations** is of uncertain length. This Voges calls the first stage of the disease, the important symptoms being **the** intermittent fever.

In the second stage ihe fever is prominent, **but the** intermissions **become** less marked **as** the disease advances, the temperature varying from 38.5° to 39.8° C.

Before death great variations, sometimes fro m 34° to 39° C. from morning until evening, mav occur, the curve being as irregular as a sept ic one.

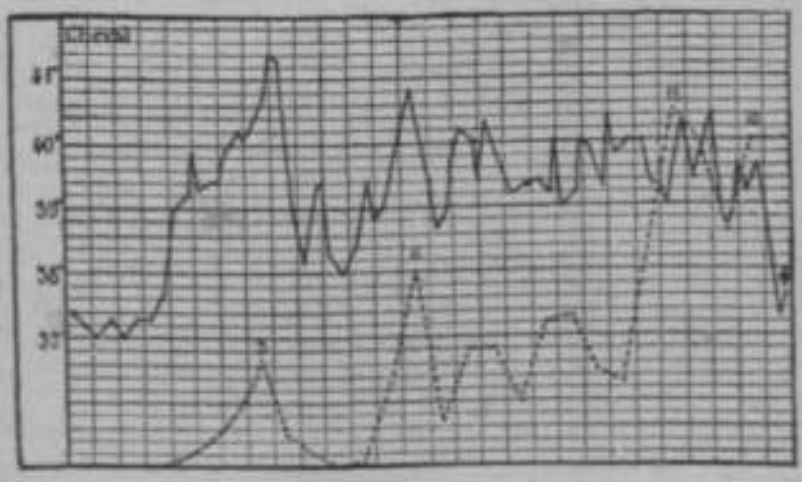


Fig. 110.—Xa;-*n* in « horse. (——> temperature, (——) *Trypanomma.* (Alter Lav.-ran und Mesnil, 1902, fig. 4.)

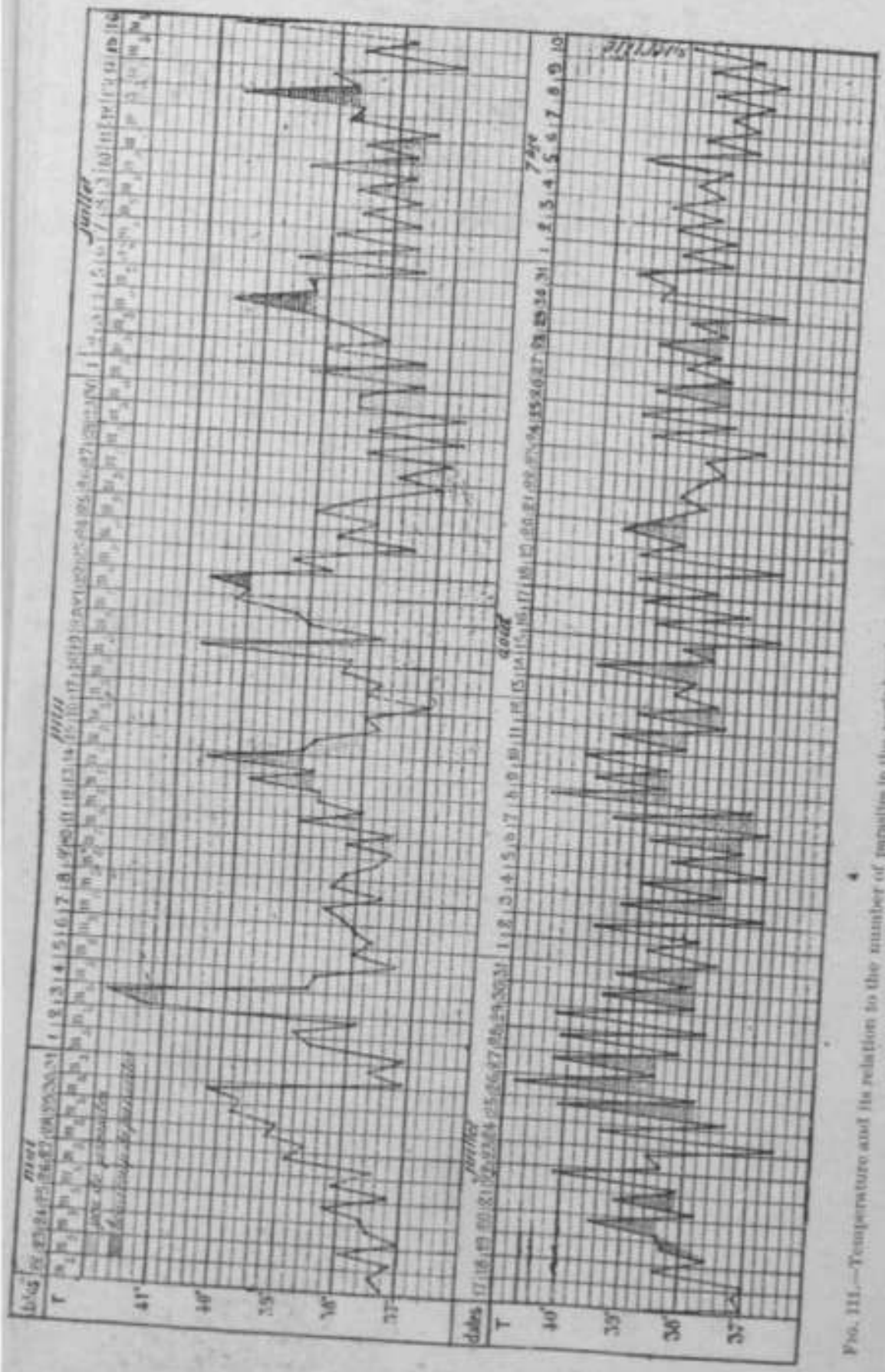
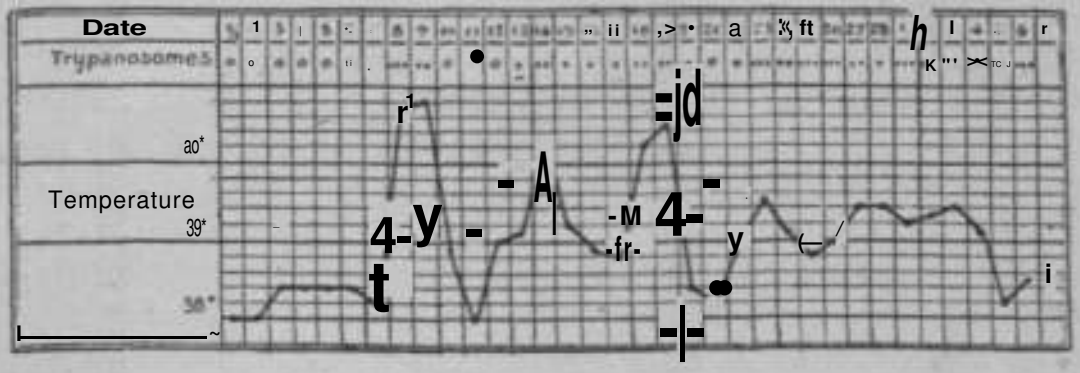
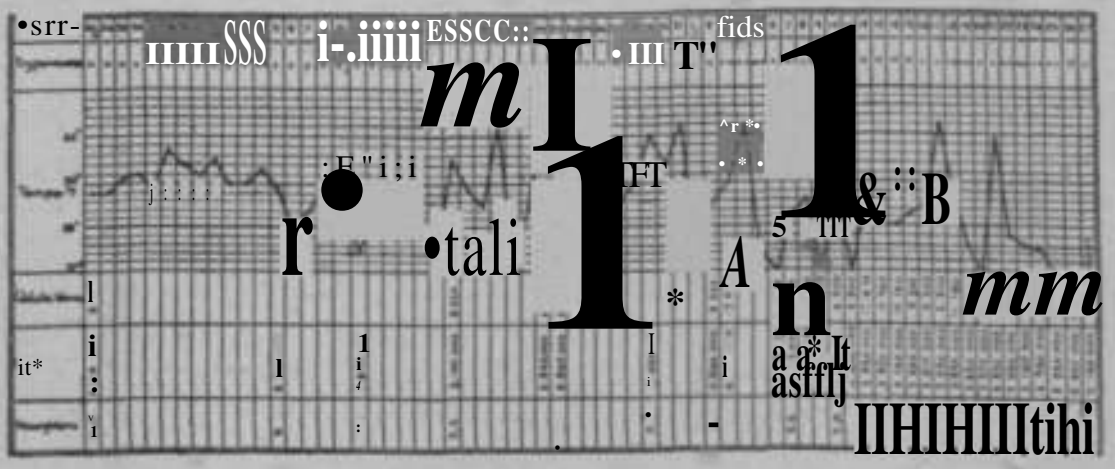


FIG. III.—Temperature and its relation to the number of parasites in the peripheral circulation in "aura americain." (After Lignières, 1908, fig. 10.)

Hemoglobin u na may occur temporarily in the first stage of the disease. Red blood cells are usually present in the stools, which as a rule are normal in consistency and number, hut in rare instances may be covered with a mixture of coagulated blood. Tliirst increases and becomes marked as the disease progresses. The pulse is at first normal, but the heart grows weaker **with** the course of the illness, finally allowing the edema dch is seen in later stages. Sudden death from heart failure sometimes occurs.



Fro. 112.-TeiniH.'nit»re chart of a hon** followinft intrsvenoii* fmj< .fl *v.* c. of Wood obtained from **u** liuree which showwi no txirasitcs in the tilood. Dt-ad in thirty-fnur d« LigniiTi-* in **Kecnefl d.** Med. Vet. vol. **10,** **b.** 28. 1903. |*. 117.



Flo. 113.—Tenipcnitiire rtvord of a hor**in(n>ultUe<l irnni<ir.l)rally «i[h Trypanosoroa **from** ft **de*d reu** (A -. 1W8)

An i mals with mal CIQ caderas show no evidence of pain. During the first stage the ret lexes are normal, but even as early as this there may be a diminished sensibility, which later on becomes marked, so much so that animals pay no attention to swarms of fties. Incoordinate on affec ling particularly the hind parts becomes so severe that the animal reela as if drunken.

The hair **remains** smooth and glossy during the first stage, and shedding, if present, is normal. In the second stage it losea its gloss and lies

less **smooth.** Knuieiatinn is not **noticeable daring the** early part of the disease, and with good **bod** animals often gain **in weight, but** during the later **periods this symptom is marked** ami **the** loss **ma]** reach 100 kilos or **move before death. The appetite** as **a** rule is not disturbed, but continues good to the **end,** and in 1 ome cases it is noticeably increased.

Dourine is a **recognised Cora of Tryponosomiasu in horses, but clinical** descri[>tions are nor so complete as for **the other** types. It is usually referred to as re-i!il)liii_ one of the **other forms. The emphasized symp* toms. in addition to the** ones already giwn. **consist in phlegmonons aken of** the **genitaiui and to a** less extent of the various part* of the skiu. **The** tempt raturt? a.- *A* nil' does **ran** so **high** in this **fora** of the • lisease as in the <>th>-r-. **and ps**rasites **are modi** less numerous in the •eriphcral circulation. On the **whole** the **com**se is considerc'd more **chronic** than that **of** surra *AIM]* the variety **of** -uscept**ible** animals is smaller.

Afl to the ireneral **dec**cription of the **symptomatology of the** disease as observed in **the** Philippines, **we have nothing to** add to the classical ones "f **the various wrii**ers in India. **South America,** and Afr ica.

With the ultimati* **object of d**iscover**ing methods of prevention** and cure, toward which all **of** our work *it* direct**ed,** one of I he mo-! important **question!** to de**eide and** one **which so** far has not **been definitely** di**ter**mined is tin- **incubation period** in naturally **contracted** 'ases. Authors writing of the disease under the same and different names **give** for i[t] various]enj»'th> <f **time,** and not a I few say that it is unknown.

Evans fed **two** hi rses 20 ounces **each "f surra-infected blood,** obtaining positive result- **ad** an **incubation** period of six **days.** lie did not **pro**ve his animals **free** from **infection** at the time of feeding, **does** not state that biting **insects** uvrc excluded, and of course can not say that there were no i esions i ti the mouth.

[ingard fed a **h<»rs<**[j] **frequently** with email **qn**antities **of infected bl**ood wel**! diluted** in •ater, with an **incubation** peri-od of c**me** hundred and thirty days or less, **depending** upon which f eding produced **tht** inf-ectio a. To another hors*- **he fed 800** minim* of **infected** blood at **o**ne dose, **the** incubation jn-riod lwin^r. **according** to the authoi, seventy-five days. These experiments are open to the same criticism; as **(hose** of Evans.

*Subcutaneous injectio*u—**In** twelve horsi[1]* inocula**l**ed subcutaneously **by Ungard.** the **ivei**uge inc ulration)H*ii>*l was **five** ami two-thirds days, **the** lonpt'st *ing eight days f **Mowing** the ii jectio**i of** 1 c. c. of bl<od containin! **but** f<^w *Try panoso*r«a, and the shortes t four da s, which occurred in four **of** r e horses after the inoculation of 1 I o 3 c. c. of blood containin *J. Trtji*i panoma* in larjje numhors. In threo horses inj ected s!ihcutaneously with blood **taken daring the intermissions of the disease and** micro*opically free from ;arasites, the aver iijre in**cubation** peri>d **was** six and two-thirds days, the longest be nji ten days and I he shortest fo **or.**

lu ;welve horses inoculated with blood bk n one and on e-
IuUf to sixteen, h(m, s post-mortem, the average incubation period was
nine and c •no-half days, tb longest being thirteen d ays fo:i$_{ow}$i$_{n}$., the
^i^*101 of 2 c. c. taken one HI.! one-half hours ; rtem, and the
shor!- st six days in a case of inoculation iritis 6 c. c. -f bloo- taken one
and one-half hor, rs post-morte >(l >ne

In tu o cases of rabcntaneonfi injection nf 1 an.I *I* c. c. ,f serum taken
forty-five minutes and two hour., respectively,]• ost-mortem from a honse
dead of []w d'' ease, th'J incubation per iods were eight and aim days. A

BUREAU OF GOVERNMENT LABORATORIES,
BIOLOGICAL ULBORATOST.

ANIMAL RECORD.

Horse No 147.
January 7 1903

Weight 700 lbs. *Age* 8 yrs. *Sex* Male *Color* Bay *Inoculation* Received with surra.
History

Bay native pony in good condition.

TEMPERATURE	34	35	36	37	38	39	40	41	42	Date.	RESULTS
										Jan. 7	Tryp. pos.
										8	Tryp. pos.
										9	
										10	Tryp. pos.
										11	
										12	Tryp. neg.
										13	Tryp. neg.
										14	
										15	Tryp. pos.
										16	Tryp. pos.
										17	
										18	
										19	
										20	Tryp. pos.
										21	Dead.

Flo. 11V—T<tut**mttm' **n^ord o f n m in • hone,**

horse injected subcutaneously with 1 c. c. o •f blood from the tunica **van-**
nalis of a goat suffr ring from the dieca^. !«>ped an incubation period
of five days, and a horse i ;iocutated with 1 **c** c. of **the** blood of the same
-oat ha- one »f thirteen da ys.

There are mi; nerous observ ation* to show **that** the incubation period **in**
na **homily** contracted cases does not vary more t!i$_{an}$ [$_{u}$. experi nental cases.

It is usually from four seven days, although in exceptional cases it may be more. In one of our animals, in which the evidence was complete, it was eleven days.

The incubation infected by us varied somewhat with the character of the infecting material and with other causes; but from

BIREAl OV (iu\ -KKXMENT LABORATORY
BIOMMilCAI. t-ABORATORT.

ANIMAL RECORD.

Ror« *Jfo* S
September 16, %

height *5° lbs. *dge* 3 J«. AJ;

History. Native pony, emaciated, hair ruffled, enormous edematous distention of penis, from which lymph is exuding. Numerous parasites in the blood.

Inoculation Received with curra.

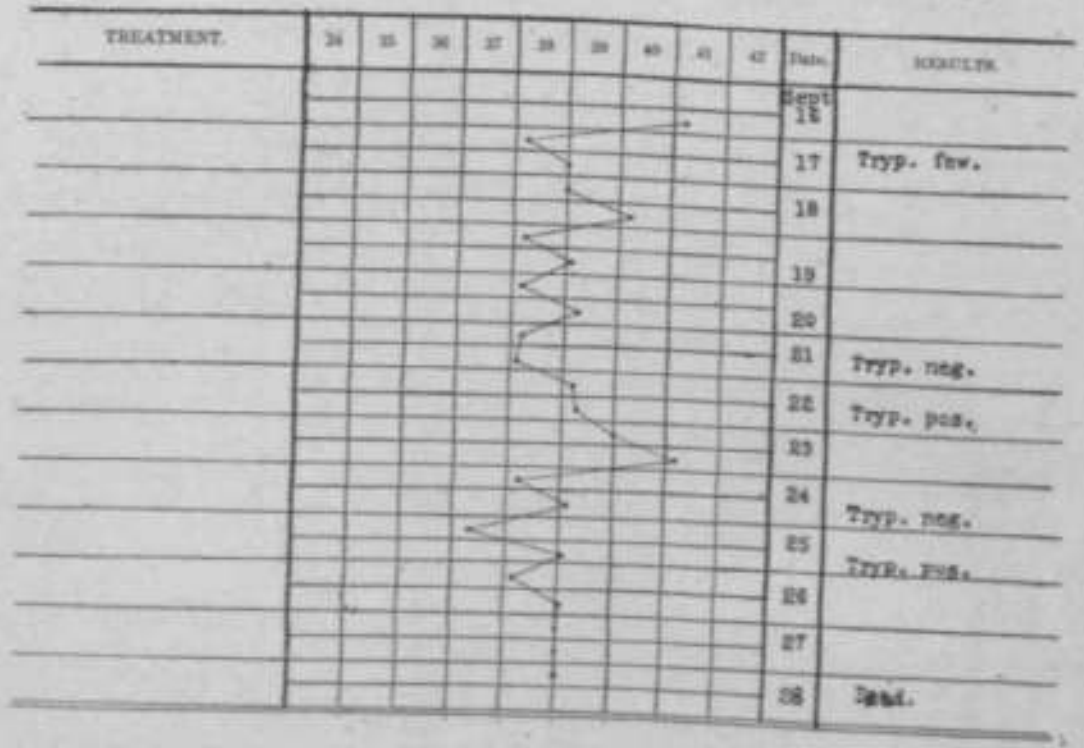


Fig. 116. — TYmf*ntuw nwoid of *rum.* ID **A boar**

rtain that variations in naturally »o grater and that thev oc,ur within oompanuiv cas« m tnosts c s « from four : ,ne of our ZJ. b. .on penod of ,leven d..«. and anmh.r, whi,•: malignant growth and a temperature of 39. «n d following . ^bcutanc-us in* Jlu f in ? th of its intubation period i toms, or «ny other n

*** one of the most iraporUnt symptoms and is the fimt**

BUREAU OF G(>VERNMEN1' LABORATORIES.
MOBOOICAL LADO11ATOBT.

ANIM[AL RE:CORDU

Horw -Yo MO

April 9, 190 »

Weight *Age* *Sex* *Col* *ulation.* .T^*'"*

History. ,_ Lars* *•j AwexLotn ha on aocount of ly

TREATMENT	34	35	36	37	38	*	40	41	42	p.	HMUK
100 o.c. virulent rln*srp«at blood suh- taneously.										Apr »	
										10	
										n	
										12	Serua rs&ction rtth surra blood negative
										13	
										14	Tiyp. nay.
										IS	try p. «%.
£ o.c. curra blood su- TUWWUHy;———										It	
										17	
										IB	
										19	
										to.	rryp. «,g.
										a	tryp. TWJ.
										zz	
										43	
										24	
										25	
										»	fryp* Surra pet,
										£T	
										es	
										29	Tryp. poa.
										»	
										1	Tiyp. poa.
										•	
										a	
										4	tTyp. poj.
										3	
										<	
										T	
										f	
										t	
										10	tryp. neg.
										11	

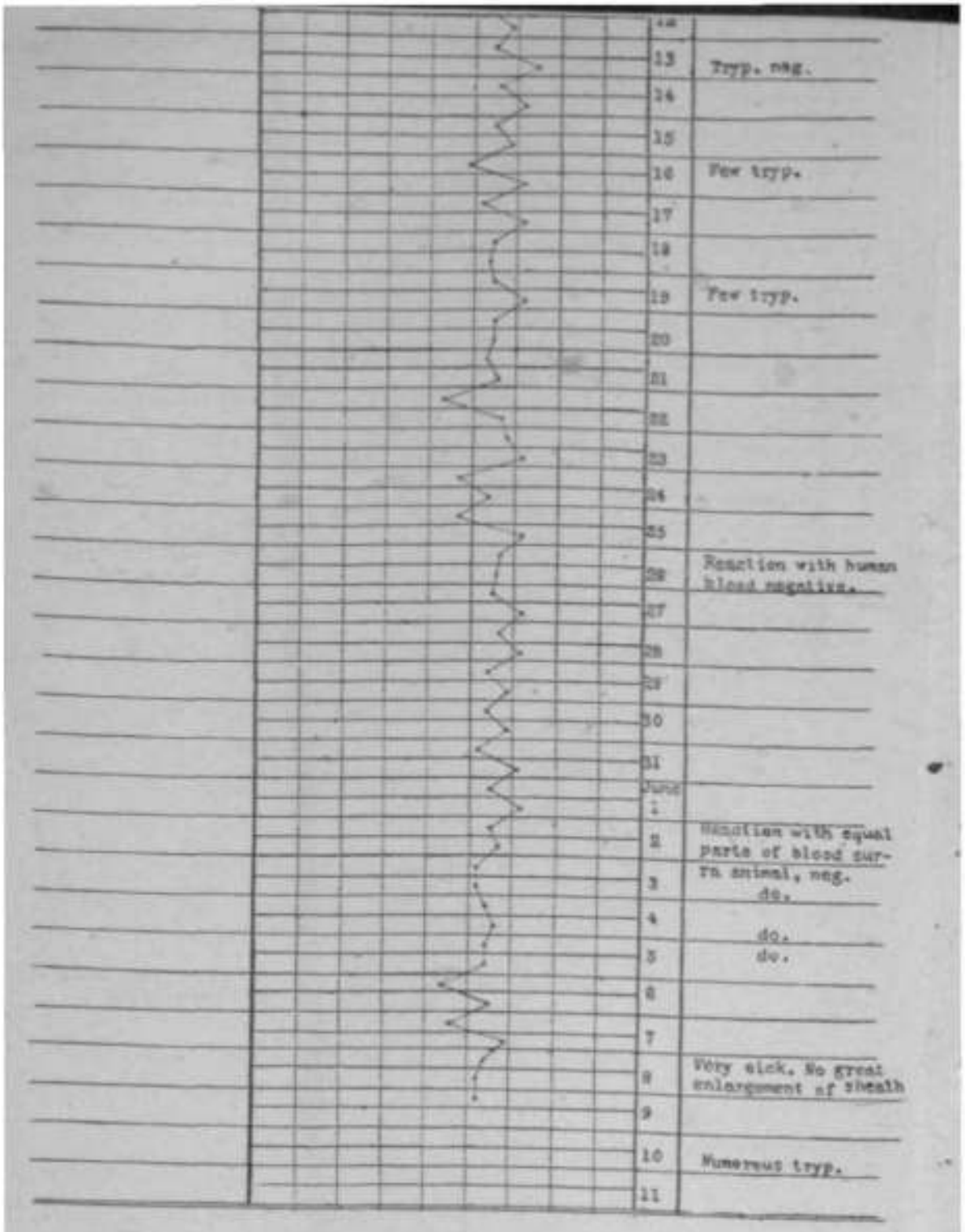


FIG. 118.—Temperature record of surra in an American horse.

nntEAi OF OOVEINMENT LABOKAtOBnS.

noume U r.,%ii'» IATOKY

ANIMA L RE;CORD.

ttors« *xo* HO

StC»b.T IT,, *190 t*

Wmght *4ft* *Sex* *Col* *illation* RBC*1V-«« with

istory •urn.

*tt4« POBJ UTljr in 411MU.

TREATMENT	u	=	*•	y	&	•	•	II	O	•Mi	HEM ITS
											Tryp. pos.
										-W-	Tryp. neg.
										1B	
										3D	Tryp. «.g.
										81	^t* ^lyp^
										22	
										£3	Trjrp. poi.
										24	^WP. pat.
										25	
										M	FfVP- pa*. v»ry nit-
										tT	
										•	
										29	
										.10	i*yp. po«.
										SI	ftryp. PM.
										1	
										8	
										S	Tryp. pos. very no-
										4	•»lmi«.
										3	Tryp. po». »trr n«*-
										I	MMUl.
										7	Ttyp. pM. Very IM-
										8	Ttyp. pot. Vnj MW
										9	Tryp. pos. very no-
										10	»•••
										ii	
										11	
										11	
										.4	Ttjp. Ht.
										15	Aw. Kjp. li«»d »•
										1G	'in nt in *tmm* —
										IT	
										H	
										H	
										so	
										13	Killed

Lenions of Temperature.

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1

BUREAU *ity* **GOVERNMENT** LABORATORIES.
HI- LOGICAL L I MORATORY.

ANIMAL RECORD.

Bom No 94
December 7, *190* *

Weight 600 lbs *Color* Gray *Inoculation* Received with trypanosomiasis
History Gray nativa pony tWi^g symptoms «f iwn.

TREATMENT.	24	25	26	8	>	29	m	41	u	Date Dec.	HEBILTS
										7	
										*	Try p. po».
										9	Tryp. pos.
						}				t«	fTTP- P«f.
										u	Tiyp- pot.
										te	Tryp- pw.
										13	
					>					U	
										15	Tryp. pas.
						•				16	Tryp. neg.
										IT	Try p* pos *
										18	Tryp. pot.
										19	Try p. po«.
										BO	Tryp. net.
										ft	tryp. n«««.
										It	tryp. i»c
											•sta——
											Tryp. pos.
										3	
										*	Tryp. pos.
										T	
										»	
										0	
										L	Tryp. neg.
										f	
——									"—i		Dead

FIG. 117.—Temp• rut; re record of a miiml ease.

Fig. 120.—showing urticarial eruption and edema.

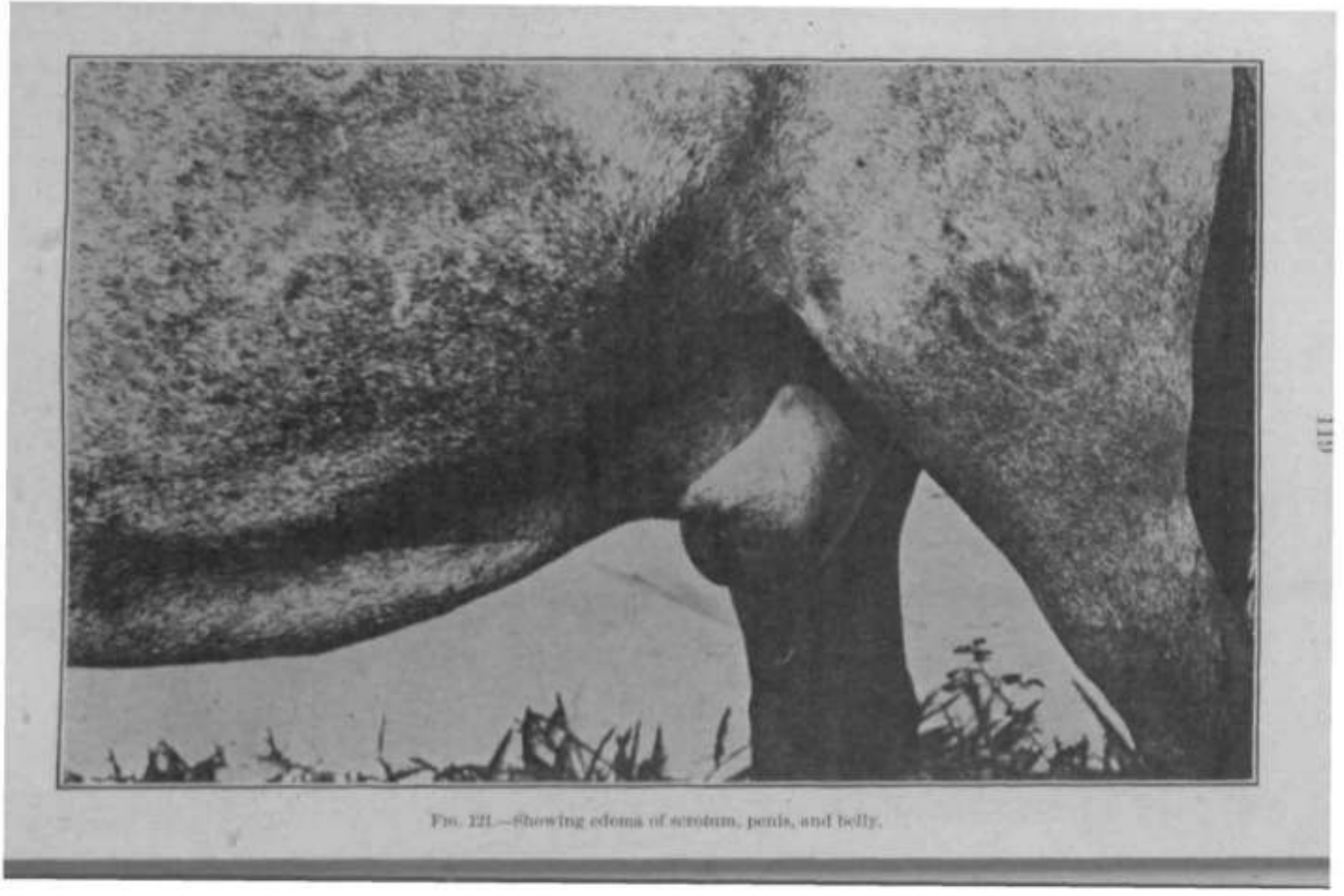


FIG. 121.—Showing edema of scrotum, penis, and belly.

tion **period** in **exposed animals. The temperature** as a rule rises very rapidly and during the first few days *a* ay reach 40° to 4i° C_M after which it **becomes** irregularly **intermittent, remittent, or,** in rare **instant**es, re**lapsing in** type always being higher in **the** afternoon.

Thf **especial value of the b**emperitnre **in diagm**osis is its mere presence in **connection wi**(h other sy**mptonw, Th**<re is at any time **ry littli**e in its **ranatione which** is char acteristic e'nough to **be very** uj nificant; but tak'n over a lonj: period, ita **course,** while not **coastant,** makes & euggec tiw **picture,**

The illustration- (see figs. 115-118) give m idea of the course of the fever in horses in Manila.

Simple **observatiom** of a horse suffering with this disease do not affon **sufficiently** exact data during the very early stages, but as **the** di> ease progresse- they become of I**stic** value.

The hair. at first **normal,** s<»on **becomes** rough and **shov**s a tende**Bfty** to fall out in places, especially the long hair around the nose and eyes, though this **never** pan**-** to the **same** extent a- it is seei to do in some of the smaller animals. The skin becomes dry **an**d scravvnv and sometimes shows e**rnptiona in pi**aces, w**hich 1**hay be **erythemat**ous, macular, or urticarial. We have occasionally noted in well-advai ced cases biiuehes of maeules, somewhat i concentric in form, which became pustular and finally vere1 with a scaly imid:ite caused by the dr.ing of the purulent-looking discharge from the pn stules.

Ca**tarrhal sympl**oms, of the eyes particularly and less **n**oticeably also of **the** nose. mai.ifest themselves rather **early** in **I**he disease, a'though they may come on hite and in -ome c;ises are almost wholly ah sent throughoui its course. At first the discharge is small in amo-nt and watery, but as the disea-' prog-esses becomes mo r*? abundant and mu cus-like, and finally takes on a **yelli**:o, become- tenac>*ma* and <• ften coagulates in the inner car:thi of **the** eyes.

Subcutaneous edema, more or less marked, *k* a constant sy**mptom,** but at1 v in the time of its **appearai**ce. In some cases it is seen e**aiiy** in the di&ase, becon!iing a very prominent symptom, while in **othc**s it come**I** on late and is very insignificant. Its intensity doe- not appear t bear any relation to the duration of the disease. In nearly every instance it is first noticed around the genitalia (fig. 120), **which** remain in the majority of cases the most severely inve,]ved **p**art; from the -heath it ~preads fo**rward along** the belly on both sides of the line.i alba in two well-define<! bands (fig. 121), which may extend Mffwn the for-legs, where they then unite and pass on to the chest as a large pod. ti illustrated in fig. 122. **Wh**en the swelling becomes mai ked, the two bands under the **bell**y may unite. The edema extends also down the hind legs, being most marke1 l>olow t]e hock; the fore-legs may also be involved, but to a less extent. Ot>ier place* which

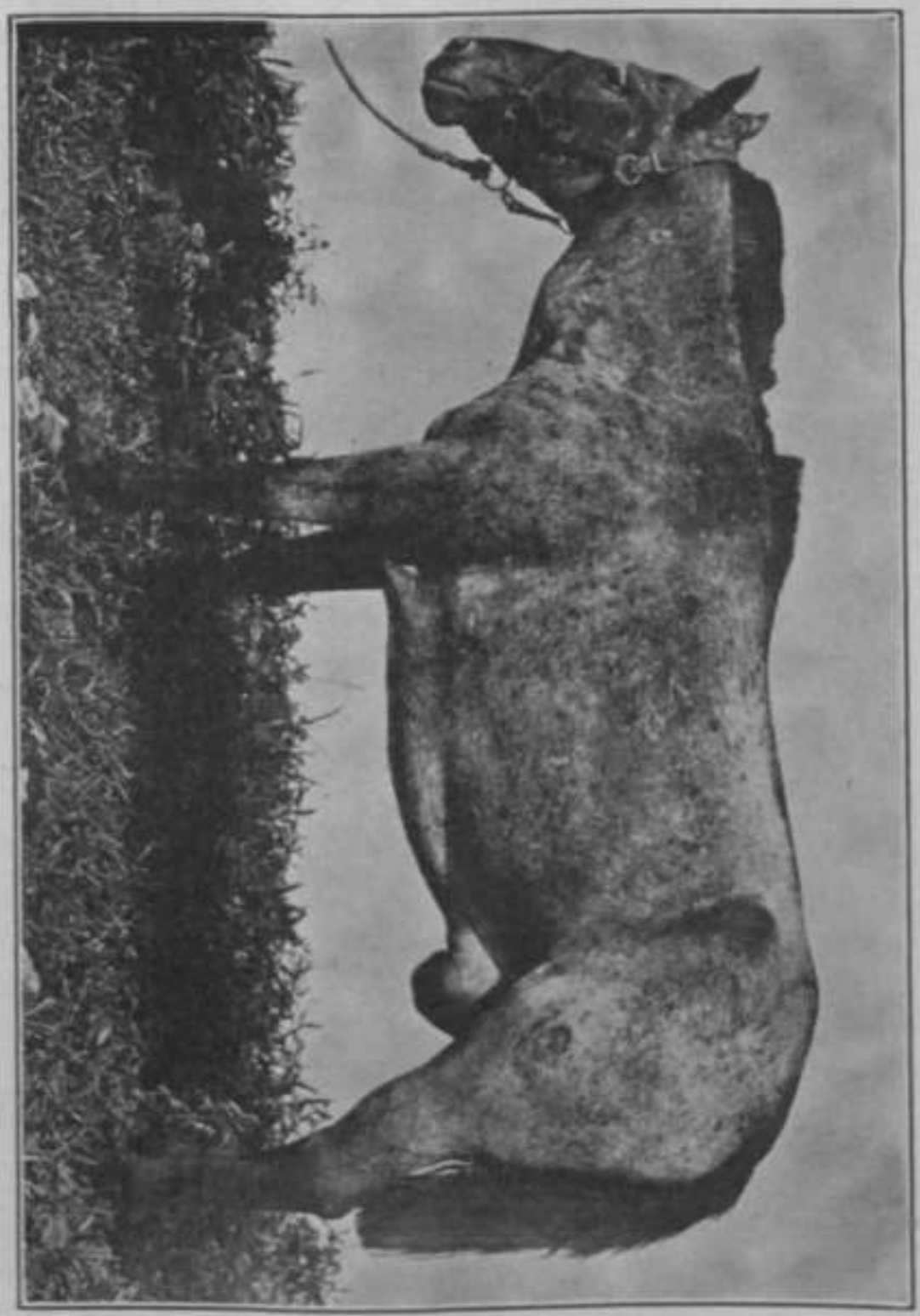


FIG. 122.—Native pony with sarra, showing edema and condition of hair.

occasionally show this swelling are the nose and the loose tissues around the ryes, the base of the jaw, the throat, and the base of the ears; but it is rare to see these parts involved to any considerable extent.

One of the earliest symptoms following a rise in temperature is the pallor of the mucous membranes, which (irsi become pearly white and then take on a decided yellowish tinge. In u well-marked case this symptom alone is ahnoaJ sufficient to make a diagnosis. The *mm*osa of the mouth, tongue, eyes. and nose assume I ghastly whiteness, which is out of all proportion to the pleural anemia. Before death these membranes become somewhat yellowish, a chan^r which gives a jaundice-like appearance but is of the same ehaxacb er as that seen in some of the otiier tissues of the body and described as a gelatinous infiltration.

Symptoms of the organs of special sense are important. Tn mum cases vision is impaired and total blindness may be brought about, usually by the clouding of the aqueous humor, which in such Cases as a rule contains parasites. Tiie senK o]' hearing is also invohed. but generally to a much lea extetit.

Enlargement of the sub maxillary and to a less degree of the other subcutaneous gLai nds is a frequent symptom. En some instances the submaxillary glands may lie greatly sivollt'ii and very sensitive to the touch; and again we have seen animals without at y apparent enl;urge-ment or tenderness of these organs during the entire course of the disease. When Tn panosomiasis is once w.-ll .stablished, respiiM tion is usually quickened and in ninny instances more or less labored, as is evidenced by the bellows-like movement of the abdominal walls. These symptoms are intensified whenever broneho-pneunionia compli-cates the disease.

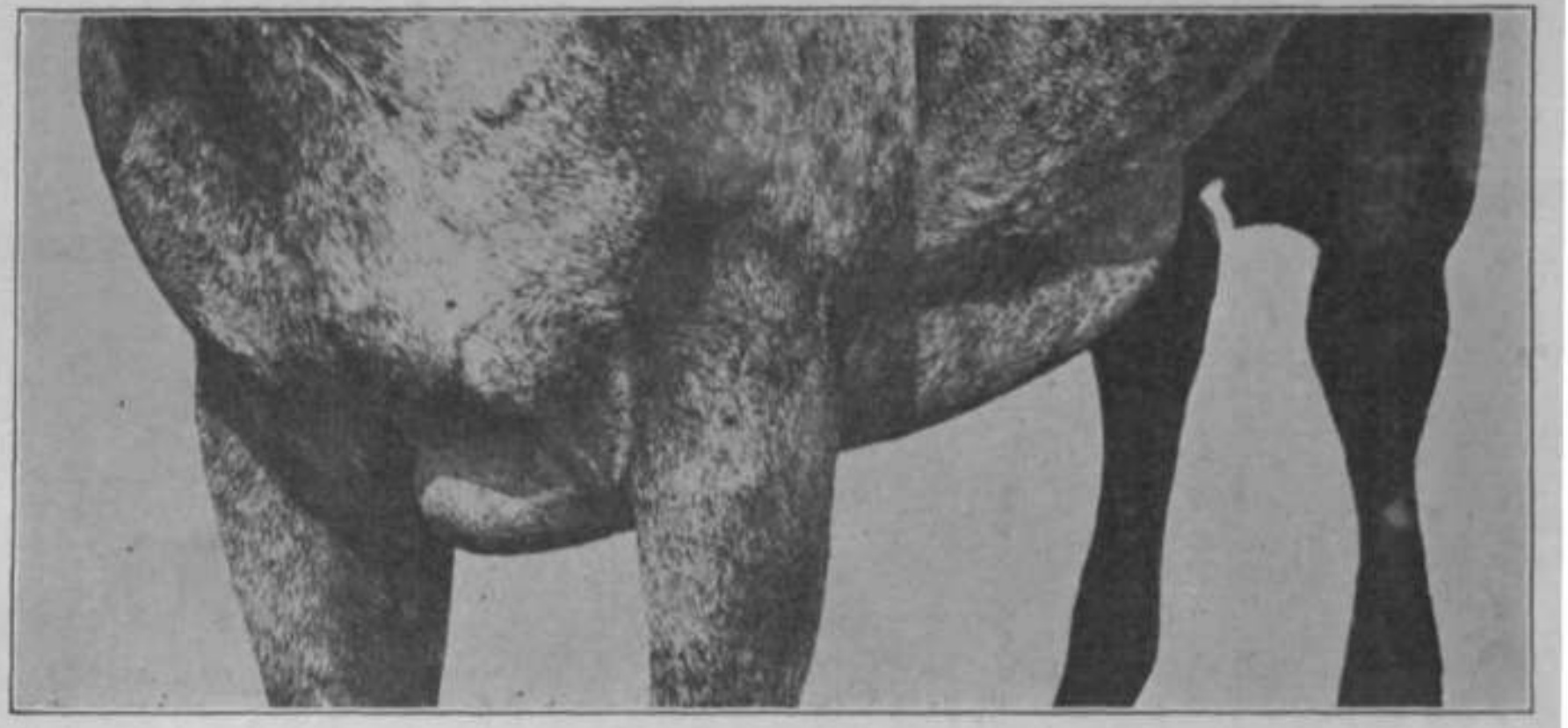
There are usually no gastrointestinal symptoms of importance, but in many eas«-s a res y sever•• diarrhea develops during the later stages, generally ten or twelve days before death.

The nervous symptoms vary considerably in the horse. In the larger number of cases tin lescribed *a*coord.nation of movement and the sis of s are present partial parah the hind quarter ese symptom to a certain extent, while cases are met with in which t[1] B do not at any tini>-manifest themsel ves. ter

The morbid anatomy has already been considered in the chap a general discus devoted to . -ion of this subject.

Tin r ANOSOMIASIS IP MILES.

Very little in regard to Trypan.osomiasis •'< mules is found in literatm excepting the bare statement that these animals are susceptible and have a long period of illness. *Xof* es say- Ihat the dunit ion of the disease may ▷• a year or more but that often the p»rasites are not found by microscopic examination for days or wei ks at a time, and that he would not IM[1] surprist*d at some future time to iind an immune animal.



Fin. I&.—Showing ctdema covering Ua- abdomen tod extending well upbetween ttn- *ir><u* legs; al » « *irur* [i*i<l*iti n to right breast.

The disease in these animals in the Philippine I si a ink ia of longer duration, just as is true in other infected zones. This fact might be taken advantage of in bettering conditions in countries when surra is prevalent and where means of eradication and prevention are not applicable, because these animals may be. used for a long time without becoming useless a through exhaustion incident to the disease. Mul.s are largely used as draft animals by the Military and Civil Governments of *the* Philippine Islands and axe being introduced to an increasing extent in private enterprises.

By inoculation they are just a- susceptible to Trypanosomatic infection as horses, but they appear to be less frequently attacked by natural infection; this is no doubt partly owing to the fact that flies disturb them Lesa

The symptoms in general are similar to those described for the horse, but there are certain slight differences. Tin- temperature is less remittent and more rarely intermittent, and we have*not seen a single case in which the fever was of a relapsing type Edema, weakness, and anemia arc

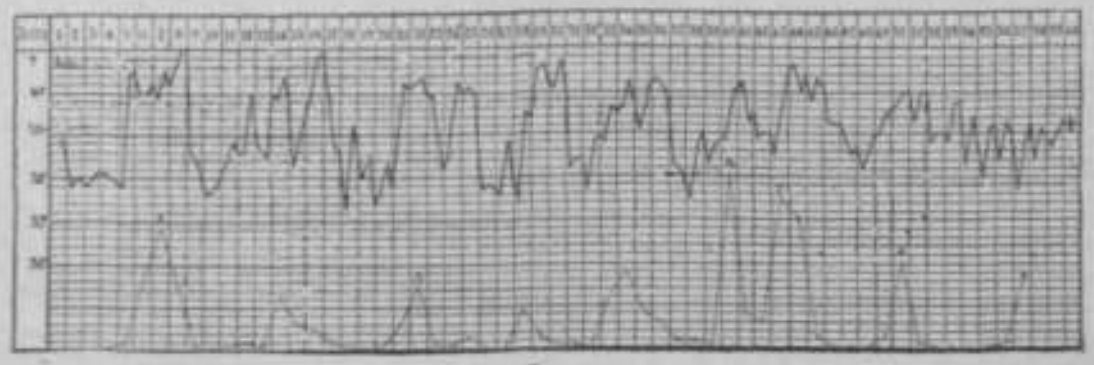


FIG. 1.*i* -NHKHIIU in Hit- ass. (——I Tempers ture. (·····) Trypanosoma. (After Laveran, urfrt Mesnil, 1902, flK. 3.)

slower in their appearance, but when once well established show no suggestive differencea (See figures in preliminary report)

The parasite% as determined by microscopic examination, as a rule are not so numerous in the peripheral circulation a? they ire in that of the horse, and the periods during which they are not found at all are more frequent and of longer duration. However, just as in horses, the blood is consantly infectious by inoculation throughout the course of the disease. The incubation period is the same as in the horse, the duration from four to twelve weeks or even longer, and the mortality 100 per cent

A- a general rule, skin lesions are more constant and decided than in the case of the horse, although of the same general character. The localization of Byuptons in the skin ami genitals is more noticeable in nnimals showing some resistance to the infection than in others, so that in some of the lower animals, such as the rabbit, we bcro a very satisfactory picture of dourine.

The morbid **anatomy** in mules is very similar to that of the horse, which has already been discussed.

TCYIANOSHMIASIS OF ASSES.

According to Lave ran and Mi-snil, migana shows the same general character of **infection** in **these** animals as it **does** in the horse. The course of the temperature is more **irregular** and the relation of the number of parasites in the peripheral circulation to the temperature is more constant At a rule, they are less numerous in the blood and may be entirely absent for longer periods of time. The local symptons, particularly edern;i. are said to be scarcely noticeable in these animals. The average duration of the disease is given by these authors as fifteen days.

Yoges states that asses are invariably susceptible to mal de caderas, and that the symptoms of the disease in them do not differ from those **described** for **mules,** Koch found the asses of **Bfassai immune** to the infection. He does not appear, however, to have demonstrated the immunity of these animals by inoculation; and as all **other** writers, referring to the susceptibility of the various species of asses, have always found them to be capable of contracting the disease, we can not but feel sceptical about **Koch's** conclusion:?. Lingard mentions particularly the **chronic** course of surra in the donk. \. There are no asses in the Philippines, so that we have **been** unable to perform any work on these animals.

TRYPANOSOHIASIS OF OTHKIt 8QUI1ES.

Nearly all **other eifuidea,** including hybrids, have been shown to be susceptible by various writers, although very little on the course of the disease in these animals is given in detail. As they are not of any economic **importance** in these Islands, no consideration will be g;ven them here.

TRYPAX0S0M1ASIS OP CATTLE.

'The gTeat variations in results **obtained** in **the** study of this family of animals and their undoubted great importance in perpetuating epidemics. make it one of the most important to be **considered.** In nearly all countries where[1] the infection is prevalent, cattle have been found to be susceptible.

With reference **to the** course of Trypanosomiasis in cattle and the **mortality of** these animals. \here is wide difference of opinion in the same country as well as in diffor«at ones. So far as we know, Voges in South America is the only writer who states positively **that** some cattle are not susceptible. ll« is **certain the** cattle of that country do not contract the **disease** after being inoculated.

Certain writers in Africa maintain that cattle are very susceptible to nagana, with a high mortality Others, as Schilling, have shown the infection not to be invariably **virulent** for these animals. the course of

nCCOHOB **or** TCMPCRATUNC. PULjt **MB** RESPIRATION.

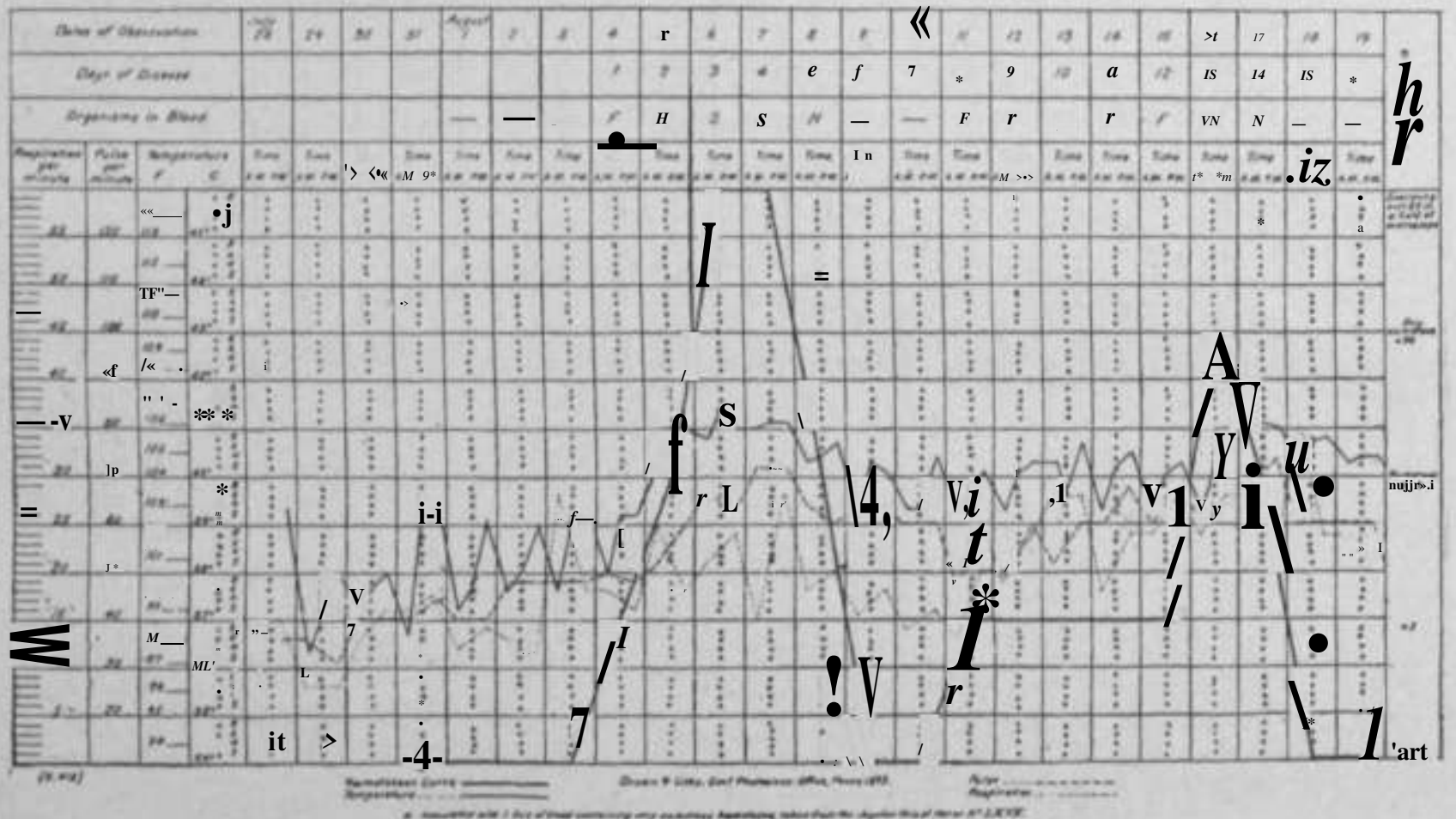
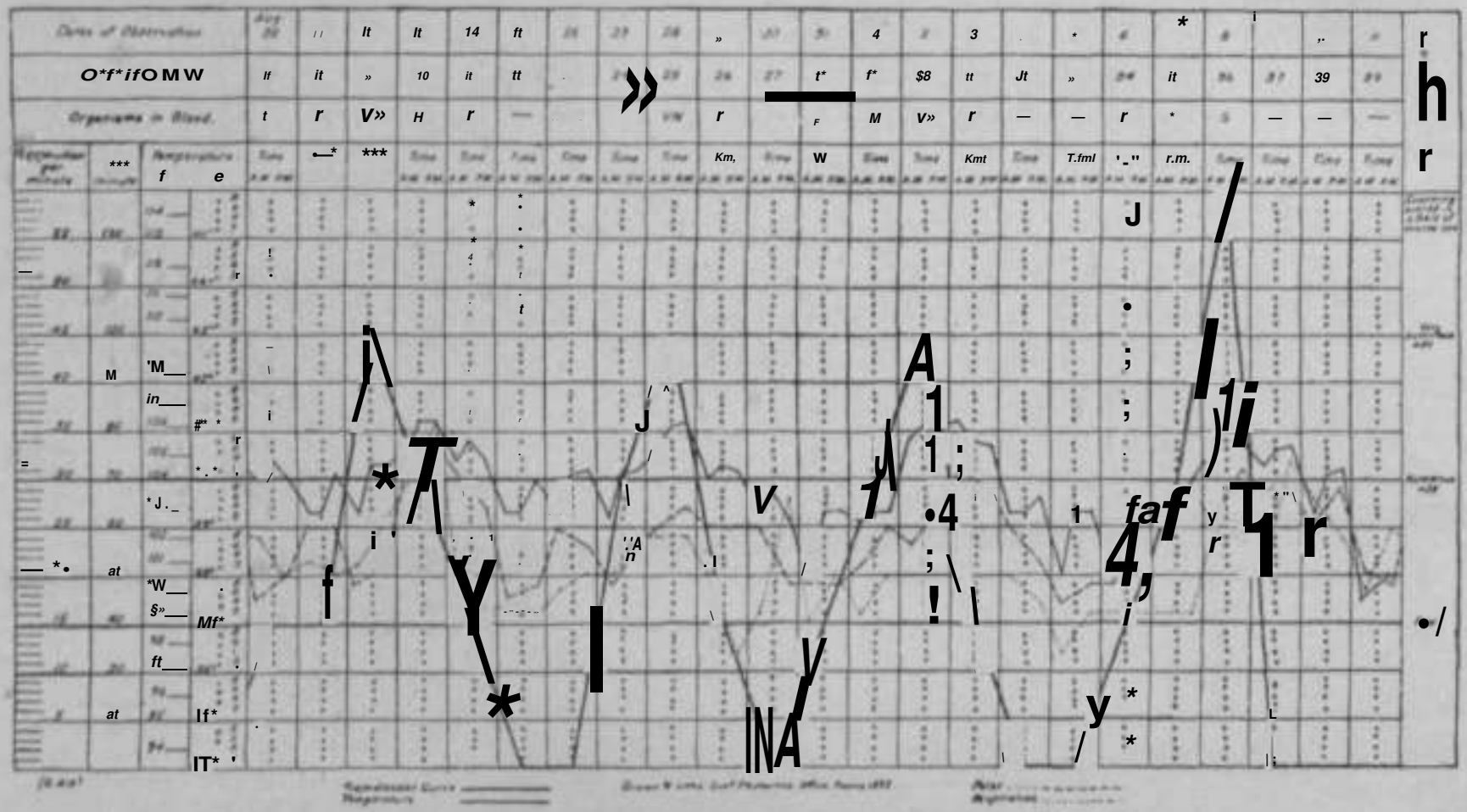


FIG. 125.—Temperature, respiration, and pulse curves of a donkey. (After Ungar.)

• tCOHOJ or TCMPCtlATuRt, f»UL«C *M0 PtfiPi RATION

Ott <S . Oett W fiuv*.- —*rfh»r f* B_



Ktii, ISA (MlpUiHXfl),-Xeni|HT«turc nwoMlof nirrn Inndonkoy. (Afitr Lingard.)

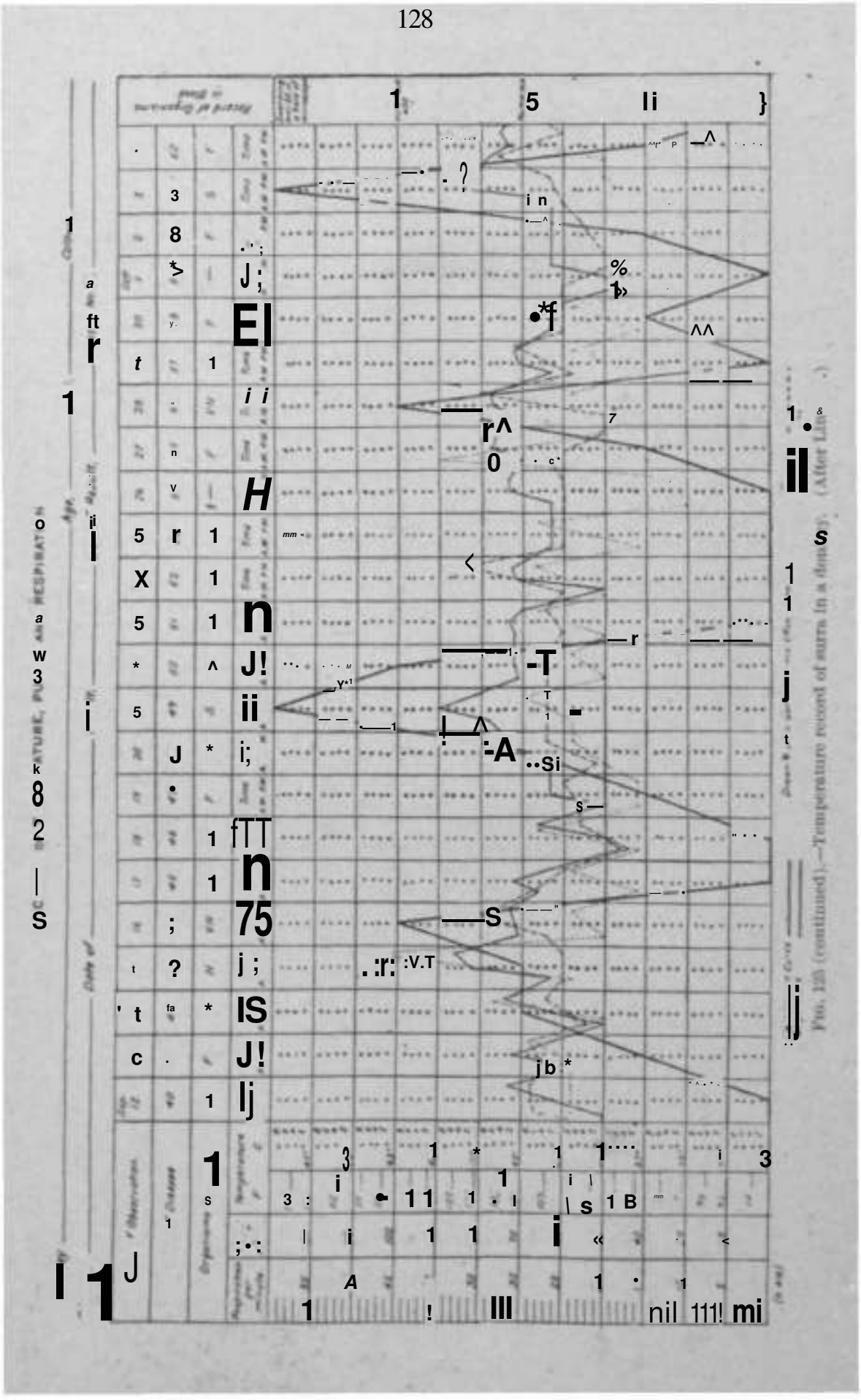


Fig. 125 (continued).—Temperature record of same in a dog (After Lin

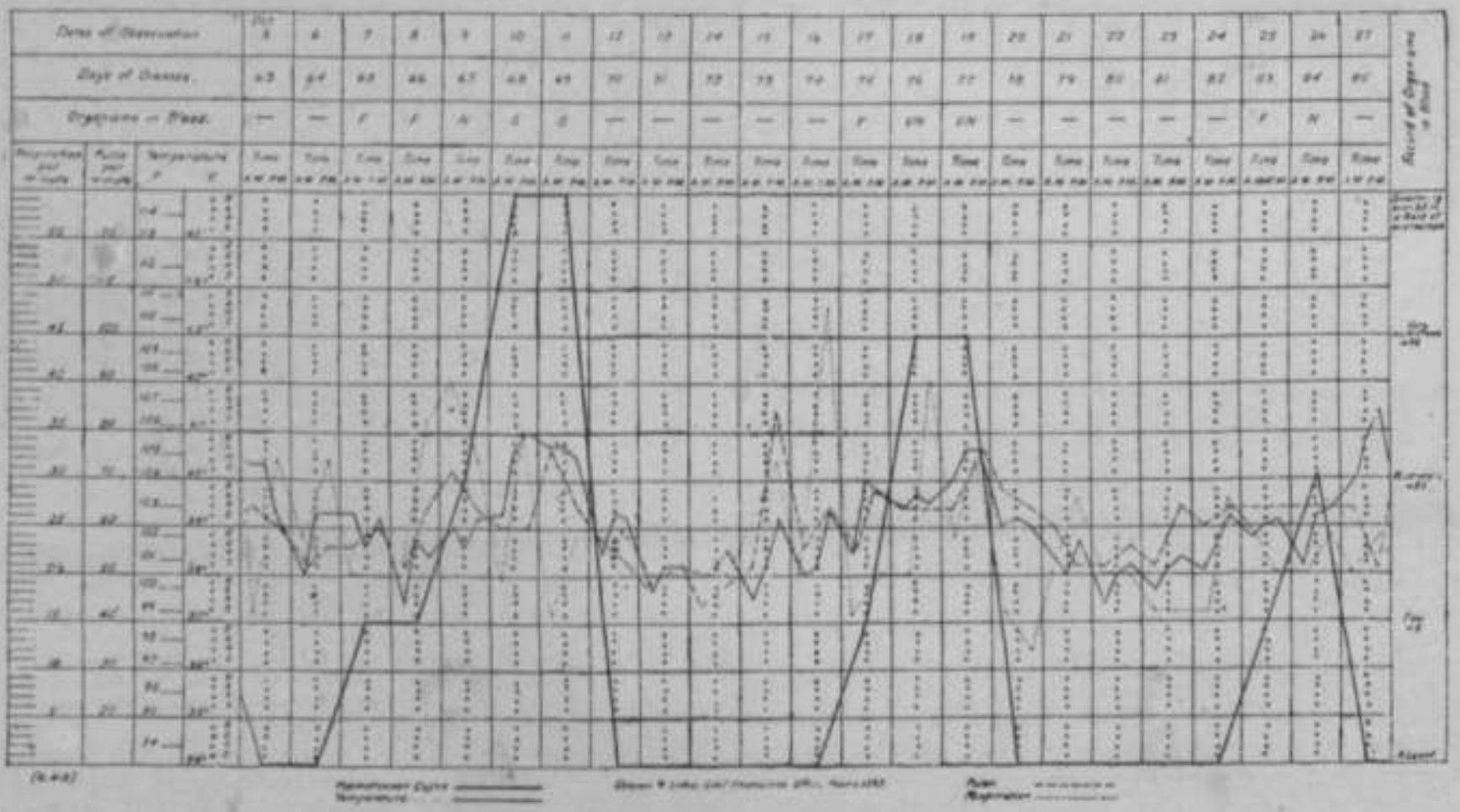


FIG. 125 (continued).—Temperature record of surra in a donkey. (After Lingard.)

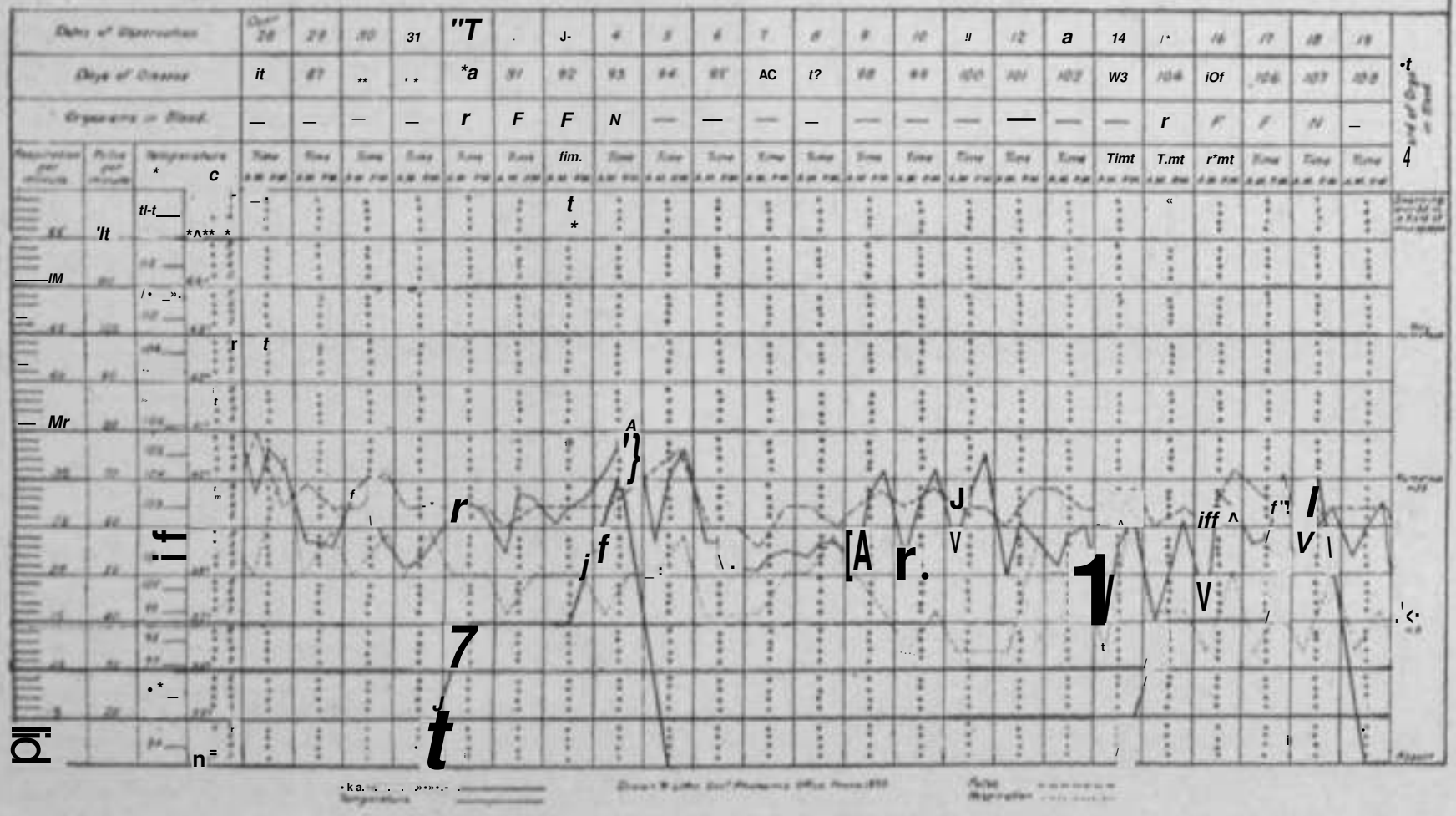


Fig. 125 (continued).—Temperature record of mmlnadonley. (After Lingard.)

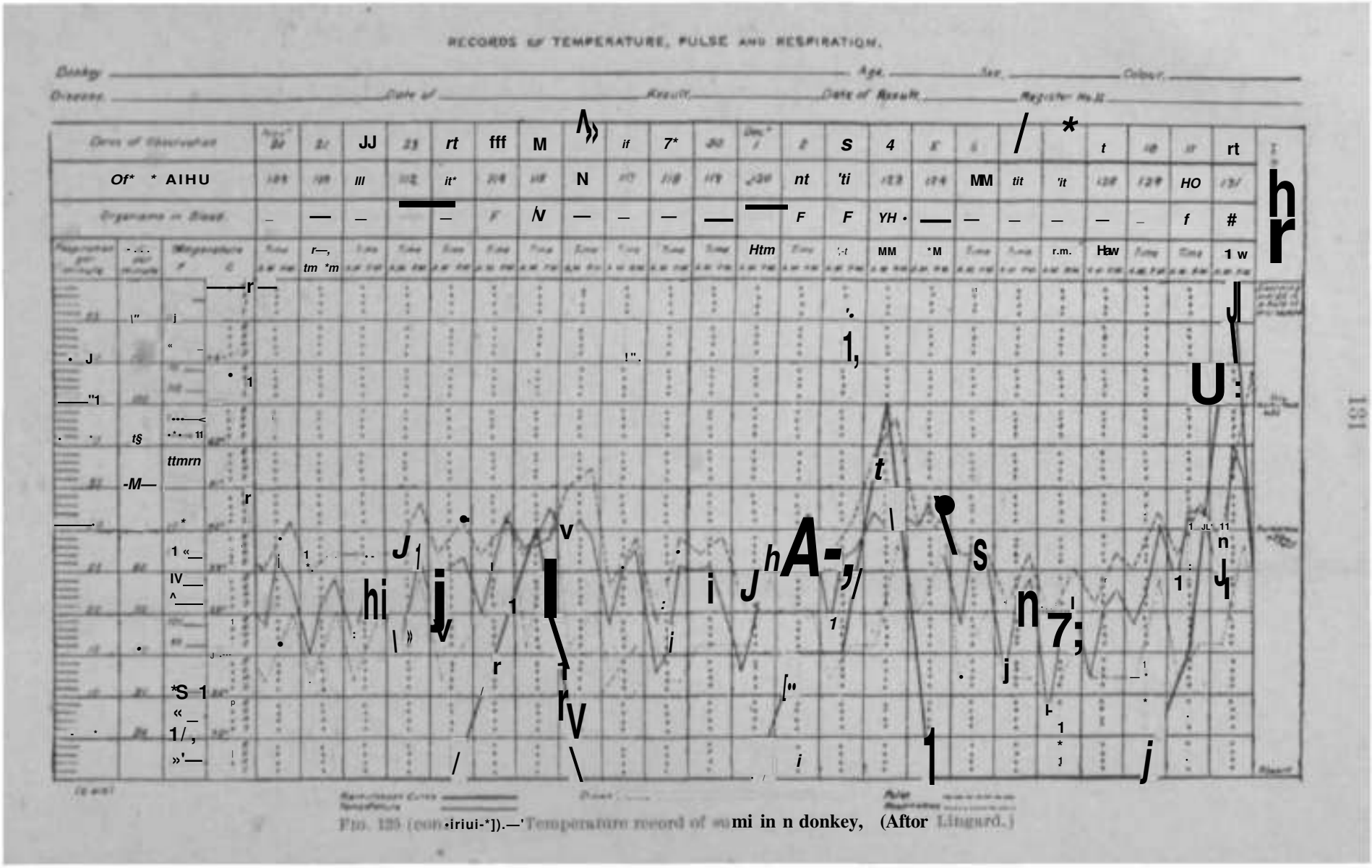


Fig. 125 (continued).—Temperature record of summi in n donkey, (After Lingard.)

RECONDS or TEMPCUfcTUfIt, P-UL5E *MD RESPIRATION

ACCORDS Or TCMPtftATuftC, PUUC *«0 »CSPI»ATtO*

Colour .

Om tt

Result.

^OfttrT Pttulf.

n*§itttr m

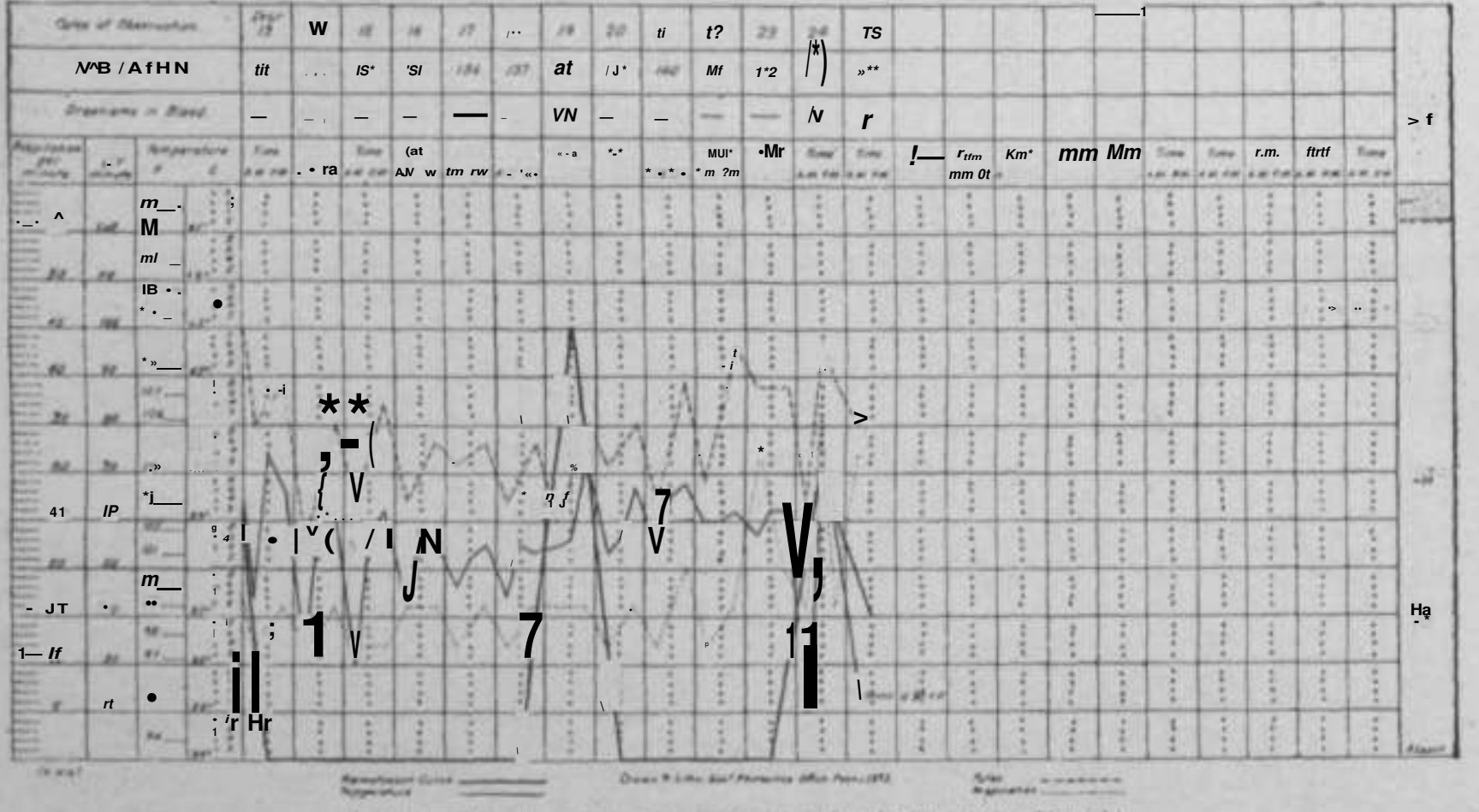


Fig. 125 (continued).—Temperature record of sores in a donkey. (After Lingard.)

long and the mortality tew, some cases of com) reported. Uveran and ifesnU worlrii lagana in Prance obtained a long con the disease in in animals, and the mortality \\as fcainly much lower than tht reports usually received from Africa would indi that country. Writers In India practically all agree that cattle are ptible i disease, but mention its long course, lower mortality, an. some cases of complete rec'Very.

Bni ce states that tae duration of nagana varies from i week I0 six months or more. I nptoms are much less marked than in horses or dogs. Emaciation is rapid: the hair becomes rough and falls i ;id runs from the nose and eyes; and there is a tend. diarrhea. The dewlap matous, but the edema is not so prominent on the nor extremities BJ in the in Fei onstant, but not so high as in th. laioaaliy Parai

Sehat, working with the surra of -lava, maintains that the dp rulent in that country for these animals, stating ormous, the 13 timesbi ate and of short dura-

and at others chronic with a longer course. II already ntion of the diai e can not bul that t!, - some other element preaeni many of his cases. He urn ta bly worked with Tr acripfion of the symptomatology and mt of rinderpest It seems more than rJdng with a combination of the* rvedinthecati - th Africa an acut me-mia with ->nly elighi fever, which i eran and kfeanil *Tiypamm rti*

Bkfi particularly of recurrent transient urtiearial uiTcriiL variations I in the ;ation was usually marked. I

IK-ripheral circulation, lie gi usual ineuha-ith nn mortality in uncemp tease in e- Tn our «

REGOHDt *r TCMPIRATUHt, PULSK AND RESPIRATION.

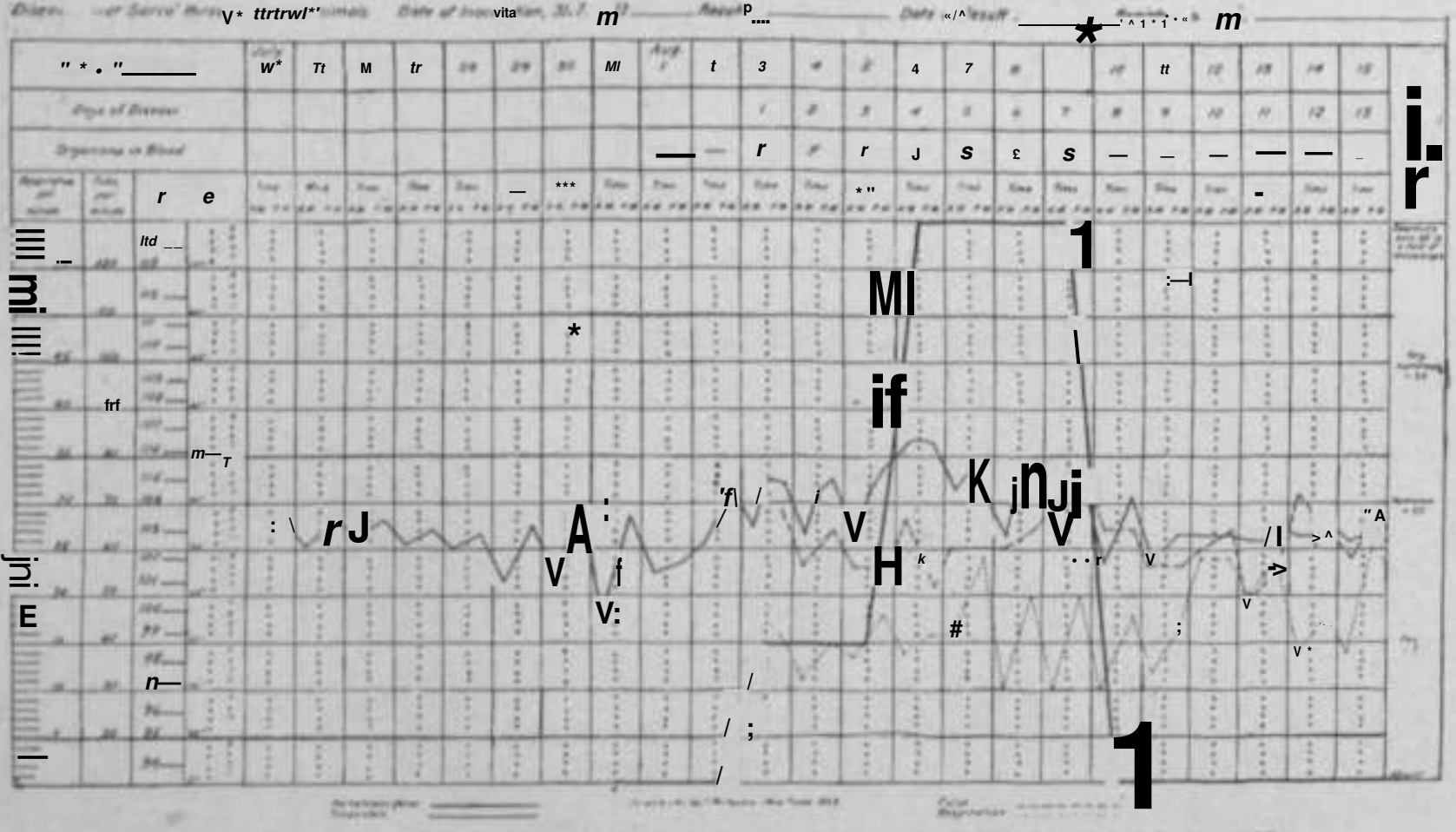


Fig. 126.—Temperature Record of Pneumonia in a Child. (After Ingard.)

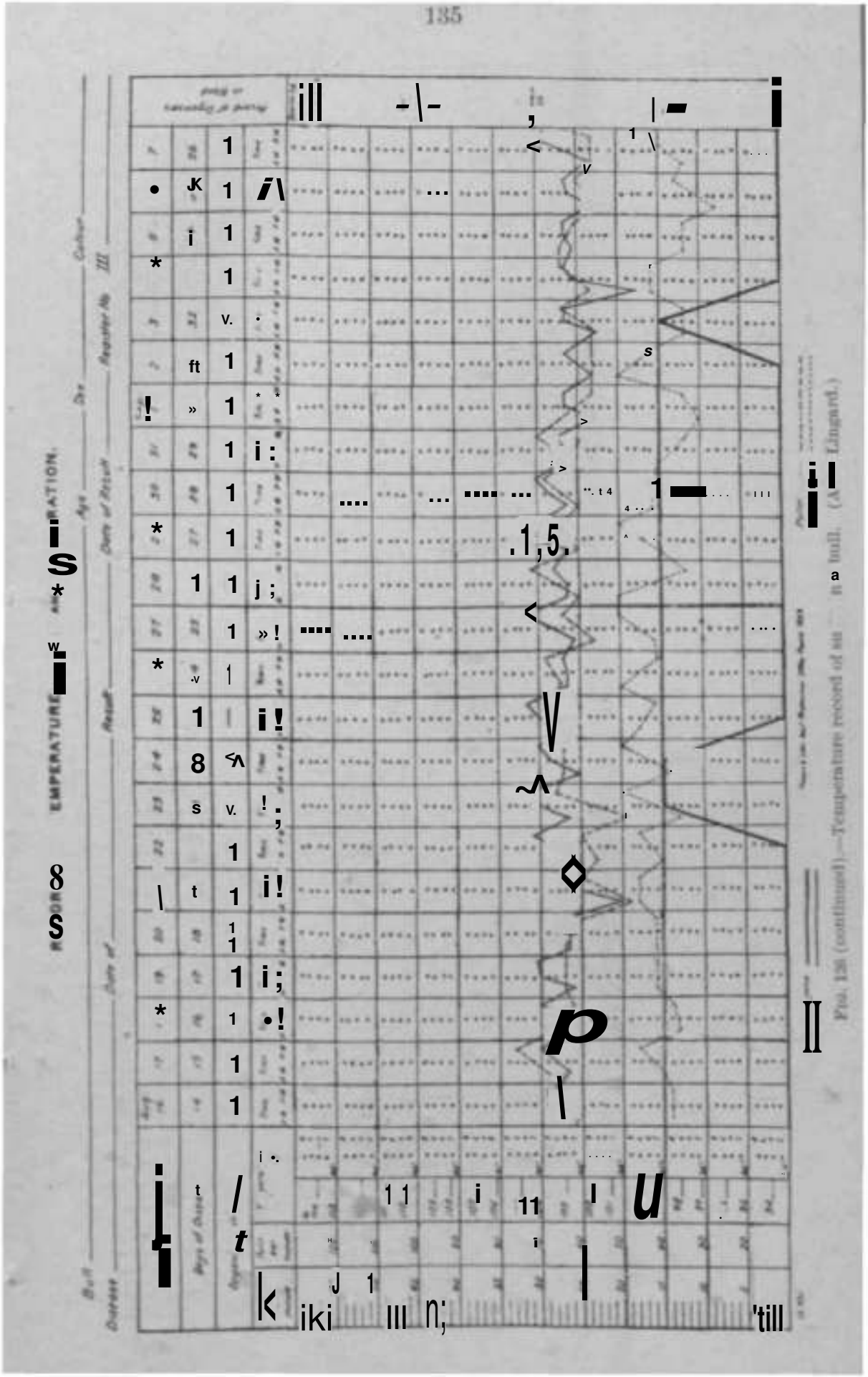
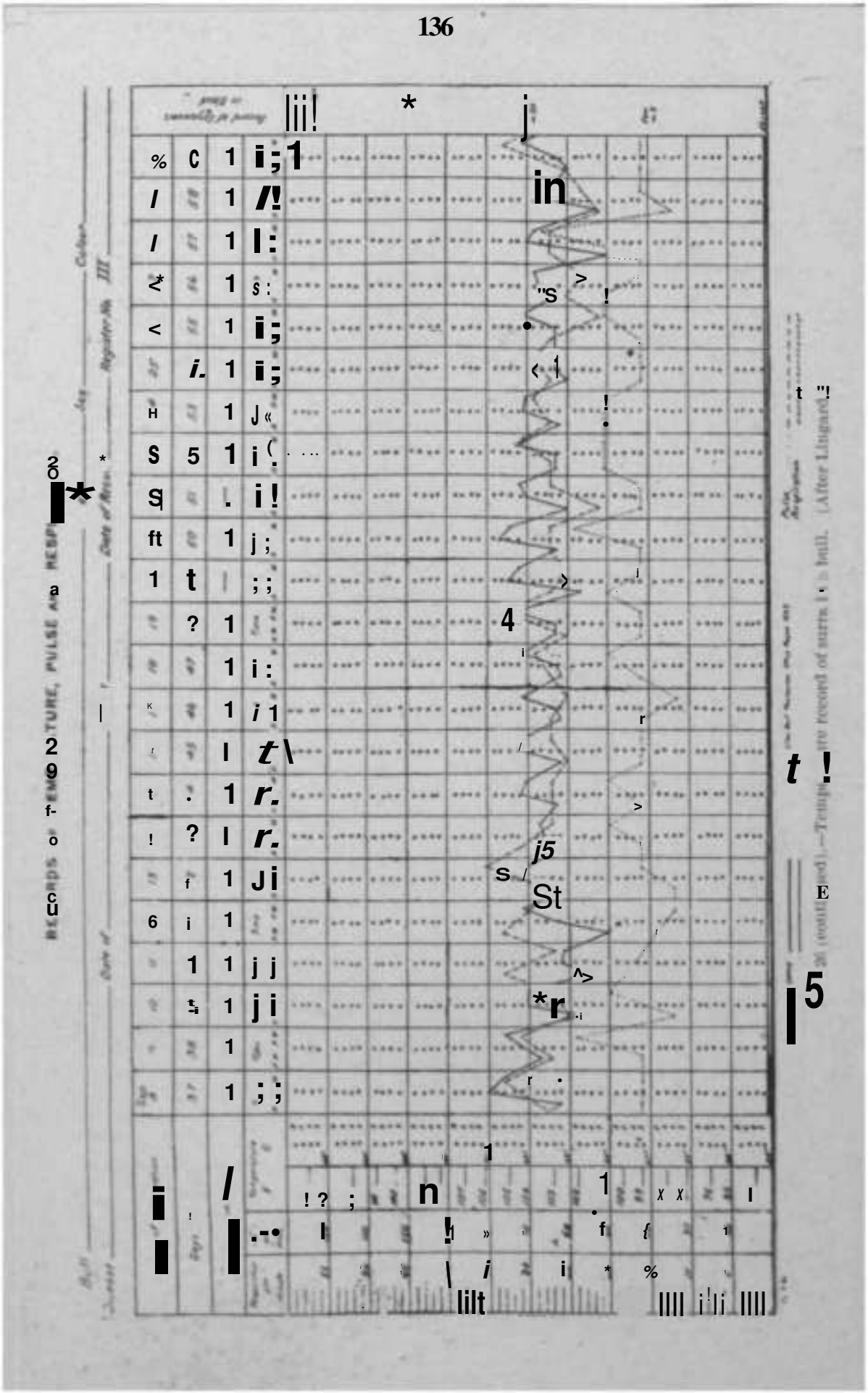


Fig. 138 (continued).—Temperature record of an ... n hull. (Admiralty Lingard.)


RECORDS OF TEMPERATURE, PULSE AND RESPIRATION
Temperature
Pulse
Respiration
Date of Admission
Date of Operation
Register No.
Ward
Bed
Case
Name
Age
Sex
Occupation
Married or Single
Nationality
Religion
Diagnosis
Remarks
Date
Hours
Temperature
Pulse
Respiration
Urine
Stools
Medicines
Diet
Baths
Dressings
Operations
Nurse
Weight
Height
Chest Measurement
Urine Analysis
Blood Pressure
Pulse Rate
Respiration Rate
Temperature Chart
Pulse Chart
Respiration Chart
Weight Chart
Height Chart
Chest Measurement Chart
Urine Analysis Chart
Blood Pressure Chart
Pulse Rate Chart
Respiration Rate Chart
Temperature Chart
Pulse Chart
Respiration Chart
Weight Chart
Height Chart
Chest Measurement Chart
Urine Analysis Chart
Blood Pressure Chart
Pulse Rate Chart
Respiration Rate Chart

HECOHO6 or TtMPCAATUftf, PULSE AMB MCSPIRATION.

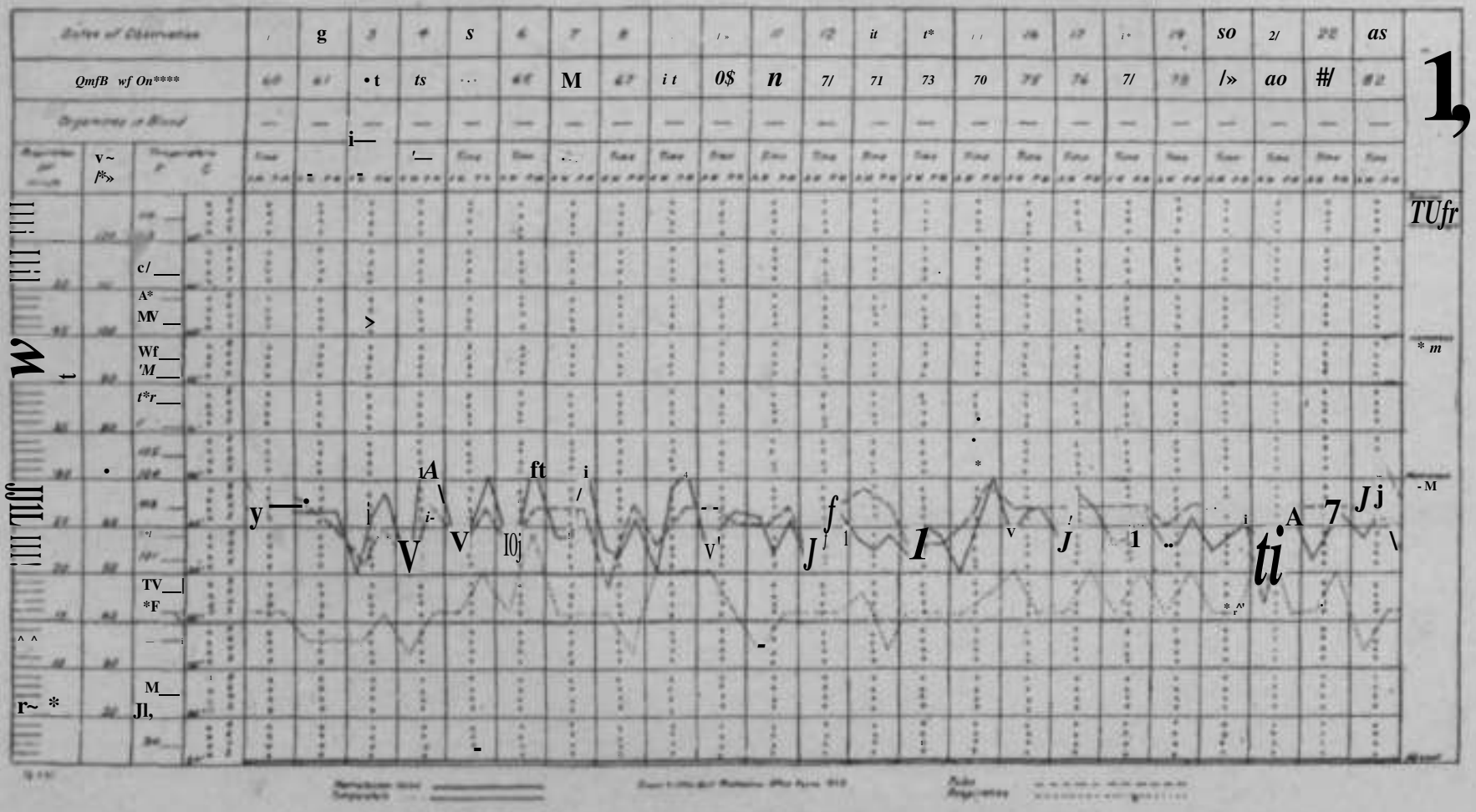


FIG. 126 (continued).—T«mper»tun< reford ofmrra in » bolJ. (Aftor Ungafd.)

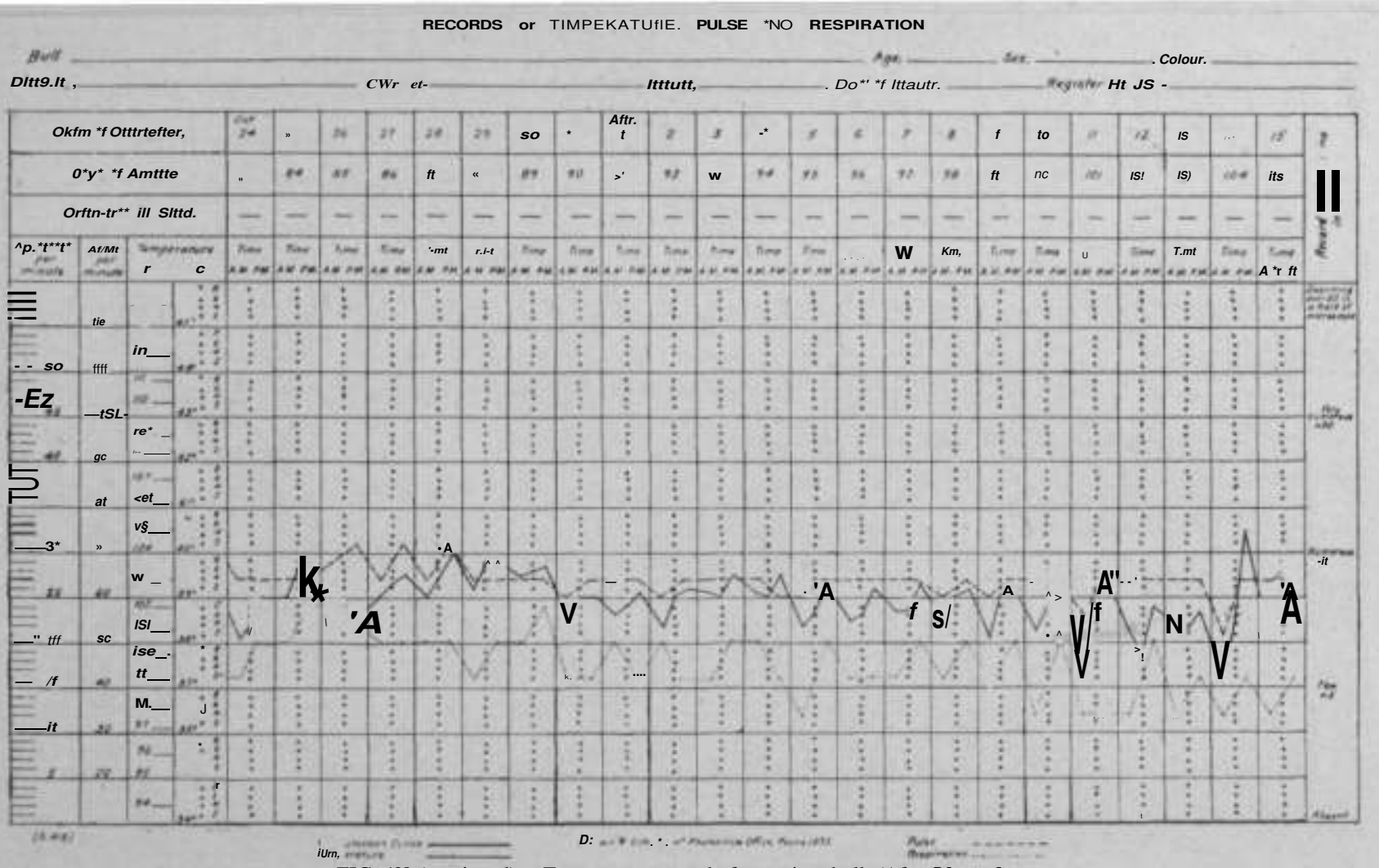


FIG. 128 (continued).—Temperature record of surra in n bull. (After **Llngard. t**

RECORDS Or TCMPERATURE.' PULSE AHO RESPIRATION

Age. Sex. .Cstour,

Ootr of .fttsuit. .Oatt ef Result, Register No.

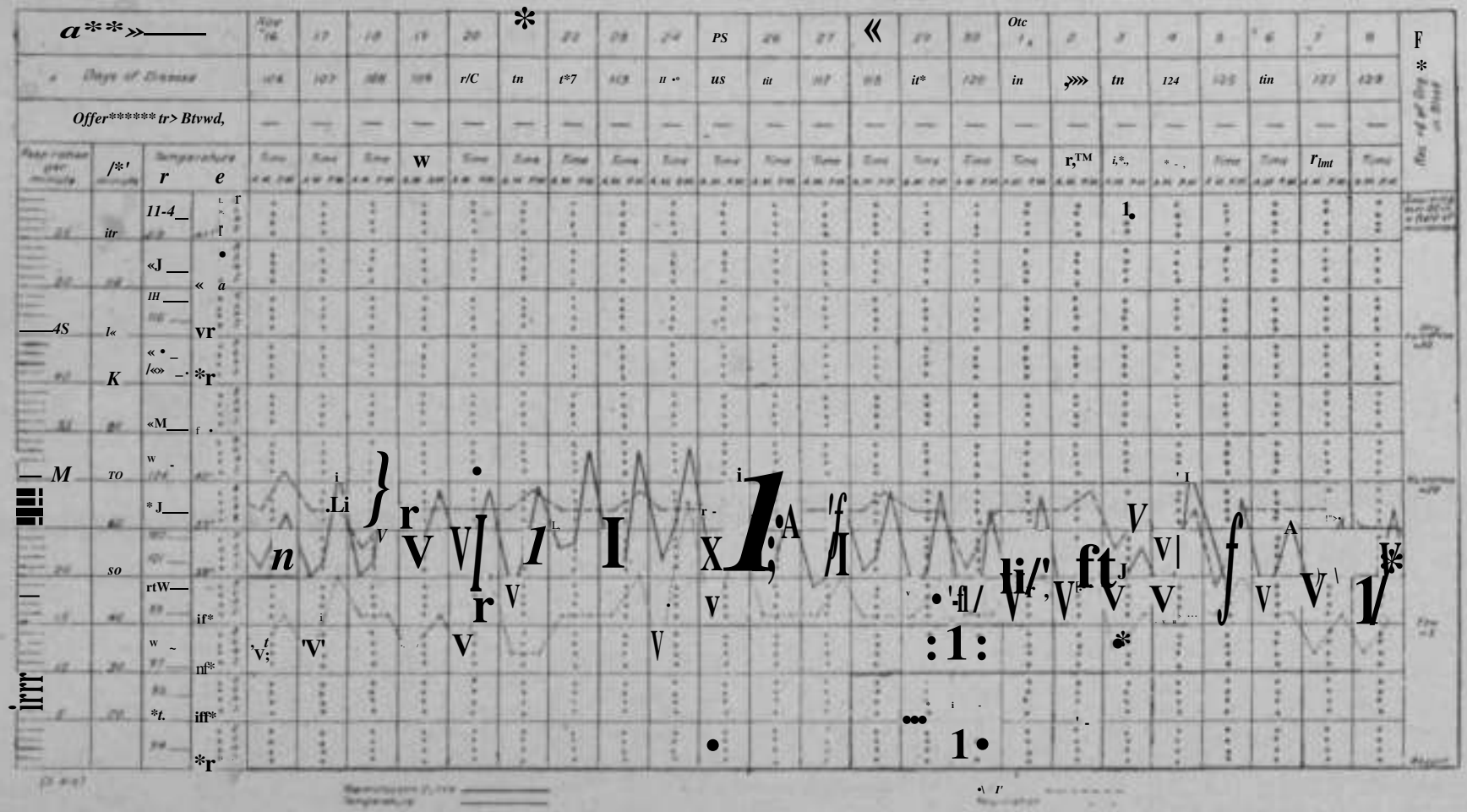


Fig. 126 (continued).—Teinjrt.'riitwv roi-^rd fif MiitH tnahnH. (After Lingiird.}

RECORDS OF TIMPERATURE, PULSE AND RCSPt«ATtO N

Boll _____ *vr* **IwrUMtUK, fULAt *«0** RESPIRATION

6uff _____ Age. _____ Sex. _____ Colour _____

Disease. _____ EMr«r _____ Result _____ Date of Result. _____ *Htystf Mt* **flT** _____

Date of Observation	On I						IS						2f		«									3'	
Days of Disease	129	150	151	152	153	154	1SS	«			158	159	,**	140	142	145			/-•	147	Ht	149	150	'*	
*Crpeir,M*tl* in *Btt*4.*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	r

Respirations per minute | Pulse per minute | Temperature *r* *e*

114__ 111.-.. IK __ T »._ ' « — rDJ.__ T tr' nr' J

— fp — r* ~~ *ii* _ff.

Kit;. VJ'i M'OiltiniHxl'),—Ti'Diy*ratlin[1] **nCOTd** "l snrni in **B boll.** I Aiirr **I.ingard.)**

other symptoms begiu in very much the same nifinncr. The tempera-* ture (figs. 127, 128 I as a nilg is less iilterinittent than in the horseB and does not Tun so high. !N'o relatio:Q can be estildished between!

BUR EAU OF GO'I'ERNMENT LABORATORIES
BIOLCKSICAX, I.AItnit

ANIM.AL RECORD.

cow ,\s, aao

Jun« 1 , *190*.*

Wright **500** ***ibxge*** **8** VS. *Sax* *m** ***Colo*** **Red** **,** ***ilotion*** **Surra.**

History **JUnderpeal** ***senim anwil*** **under obs«rvation Cor jever&l month*.**

TKLATMKNT	34	35	*M*	37	38	39	*w*	41	42	t hill-	UBUun
1500 c.c, bleod **of con suffering from**										June 1	
										2	
										3	
										4	
										B	
										e	
										7	
										S	
										9	
										10	
										) 1	
										12	
										13	
										U	
										IS	Tryp. nee.
										16	Tryp. "eg.
										1?	TT^p. neg' NonXty
										13	Tryp. n«g.
										19	Tryp. r\tg.
										20	Tryp. neg.
										2J	Tryp. neg.
										22	Tryp. n«g.
										23	
										u	

Flu. **127.—Sana In a oow wfth** very **rapid oourse.**

the temperature and the number of parasites. *Trypanosoma* in sufficient numbers to be detected by the usual microscopic **examination** are intermittently present in the blood; but **the latter, aa** in **other** animals, is **constantly infectious** by animal **experiment.** The appetite

usually remains good, but there are transient periods of anorexia in almost all cases and some animals refuse food for days at a time. The bowels remain normal or show a tendency to constipation.

Emaciation is rapid and as a rule begins earlier than in the horse. Anemia, as shown by the pallor of the mucous membrane, is probably less marked than in the horse. The catarrhal symptoms of the nose and eyes are slight in most animals, but in those cases which prove fatal may become a prominent symptom. Edema is decidedly less marked than in the horse and in some animals is scarcely perceptible, while in others it appears particularly in the dewlap and less so on the abdomen and hind legs. The hair becomes rough and in places falls out. Urticarial eruptions are quite frequent.

On the whole the picture is similar to that seen in other animals, and in well-advanced cases a diagnosis should be easy. Owing to the scarcity of parasites in the circulating blood and their apparent intermissions, the laboratory diagnosis of these animals should include animal experiment.

The course of the disease is usually chronic, and in animals observed here the mortality is low. In some cases the disease may be very acute; one of our inoculated animals, for example, lived only twenty-four days. (Pig. 127.) We have not been able to examine a sufficiently large number of cases, and for that reason do not desire to give definite figures as to the mortality.

Several varieties of cattle are found in the Philippine Islands in addition to the native ones, these including Australian, Chinese, American,. Straits Settlement, and Javanese.

T11YPAN0S0MIASIS OP CARABAO.

The Indian buffalo, of which the so-called carabao of the Philippine Islands is a species, has been proved susceptible to surra by Lingard.

The course of the disease in his animals very closely resembled that of the cow. The incubation period was about five days in inoculated animals; and the duration in two of his animals was forty-six- and one hundred and twenty days, respectively, followed in each case by death. According to his description, there were very distinct exacerbations and remissions of temperature in both cases. The appetite remained good, but emaciation was marked and progressive. Nothing of especial interest was noted at post-mortem examination.

Curry mentions Trypanosomiasis of carabaos in the Philippine Islands, but does not give any data of importance.

TRYPANOSOMIASIS OP MONKEYS.

Monkeys, where available, are among the most valuable animals for the study of Trypanosomiasis. They are seldom naturally infected, but are very susceptible to inoculation and run a regular course.

ANIMAL RECORD.

Bull *JVo* **383**

lkay i5; • *lfif>**

Weight *Age* ***Sex*** *Cnhtr* ***tntmuitttiam*** **Tr.** evansi*

ffirtwy

TKKATMFXT	a	Rmrtn
2 C«C« •UXra blood subcutaneously	11	
	16	
	1?	
	IB	
	19	
	30	
	XI	
	S3	TiTP- l»a.
	.-J3	
	84	
	XI	tryp. neg.
	27	
	36	
	39	tryp. neg.
	80	
	31	
	June	tryp. neg.
	8	
	3	
	4	
	5	
	0	
	T	Irm. jio.T.
	S	
	9	
	10	
	11	tryp. pos. (few)
	13	
	13	
	14	
	10	
	lfl	
	IT	
	18	?ryi>. rta;;.

Kanthuck, Durham, and Blandford inoculated a monkey with *Tr. bruceu* During the two weeks of its illness parasites were constantly present. The post-mortem examination showed advanced pulmonary tuberculosis,

Noeard subcutaneously inoculated an old monkey with several drops of blood from a nagana mouse. He gives the incubation period as four days and the duration of the disease as fifteen days. Parasites

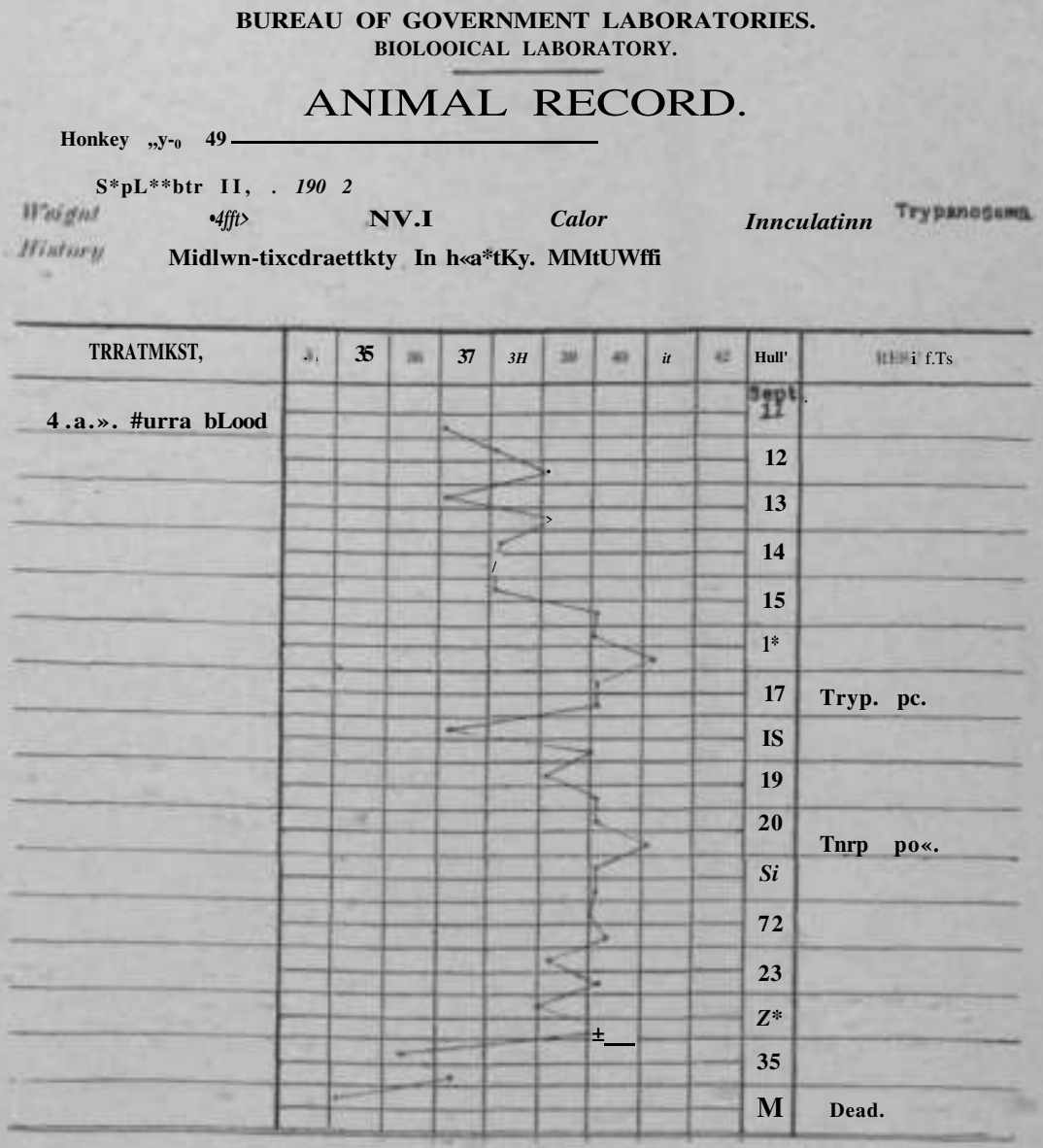


FIG. 129.—ToniiKTjituru record of surra in it monki i

were very numerous thro^hout its course and at the time **of death** exceeded the red blood cells in number. The principal symptoms were high temperature, edema of the eyelids and pockets, and dejection of spirit.

Sivori and Lecler **give** the incubation period in "surra americain" as three days, followed by death about the sixth day. The temperature is high at first, and just before death **drops** to 36° C. , Anemia is rapid and

progressive. The appetite remains good. Toward the **end** there is som<? **dronreinesB, followed by death** in **coma. The post-mortem examination** shows an **enlarged** spleen **with dark-red pulp,** edema of the lungs, and a small quantity of **citrine** liquid in the serous sacs.

Voges says that monkeys *(Nictipitechus felinns)* **inoculated with** *Tr. cqttinum* **succumbed** to the disease. Several observers in India have show11 **monkeyB** to **be** susceptible by inoculation to the surra of that **country : the] have** also **been** proved capable of contracting do urine.

BUREAU OF GOVERNMENT LABORATORIES.
BIOLOGICA I. LAIKHIATOtlV.

ANIMAL RECORD.

Monksy -'" 66
October 21 1902

Weight ***Age*** ***Sf.v*** ***Color*** ***Inoculation*** Trypanosoma
History

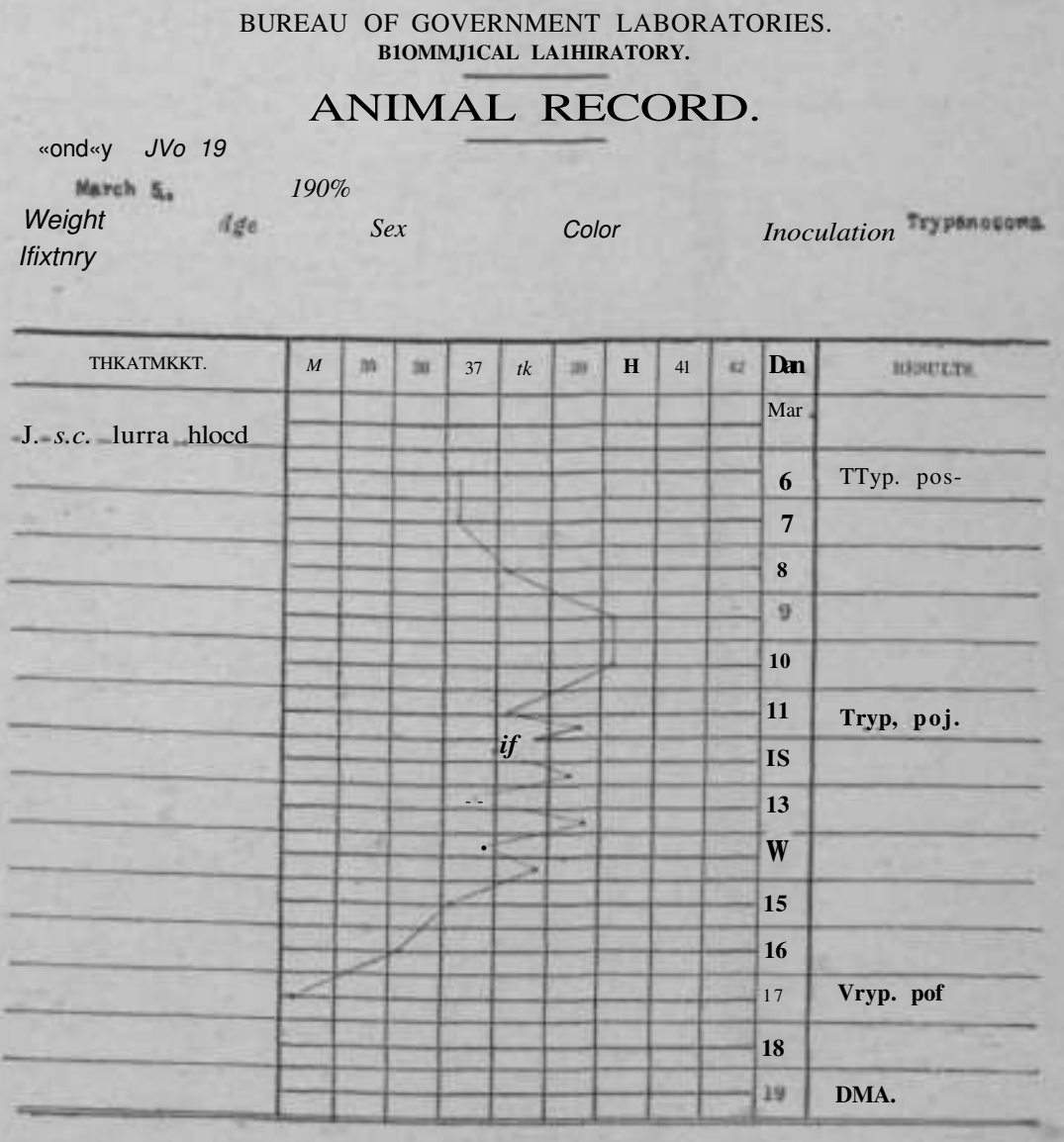
TUKATV1.M	M	B	30	31	29	30	40	*H*	+•	Date	KKSCNTS
5 c.c. surra blood subcutaneously•										Oct 21	
			• <		i					22	
										23	
			•							24	
										t%	
										SB	Tryp. pos.
						\				*rr*	
						\				28	
						>					
							B			ea	Tryp. pos.
										30	
						!				31	
											Xryp. po£.
										1	
										£	
					/					3	Dead.

Pro.];!(*.— 'I'i-iit|i'-riiinri' record otttiirniin a monkey,

Monkeys **have been** eartensively used in our work, **and the foUoving** st;it<mriiirf are based upon **the clinical** and post-mortem study of a large number of 'these animals. In **the** course of this **investigation** the blood of hundreds of monkeys from all parts of the Islands, from infected areas and from those not infected, has been **examined** ; and onlv once has ;i naturally infected **animal been** i'mtud, althoujjl' **fchej are** \ery susceptible to **thf disease, which,** when **given** by inoculation, **invariably** proves fatal.

The **Lncubatiqn period** in these animals varies with the manner of inoculation, being on the average one to three days by subcutaneous or scratch inoculation, **whether by syringe** or insect, and somewhat shorter by inter-abdominal inoculation. The duration is from five **to** thirty-five **days** and the mortality 100 per cent.

Monkeys are the only animals that show nmlouljtrd i\ iilcnce of having pain caused by the infection. The manner in **which** for hours at a time


BUREAU OF GOVERNMENT LABORATORIES.
B1OMMJ1CAL LA1HIRATORY.

ANIMAL RECORD.

«ond«y JVo 19

March 5, 190%

Weight Ifixtnry | Age | Sex | Color | Inoculation Trypanosoma

THKATMKKT. | M | 36 | 38 | 37 | tk | 39 | H | 41 | 42 | Dan | RESULTS

Mar

J. s.c. lurra hlocd

6 TTyp. pos-

7

8

9

10

11 Tryp, poj.

IS

13

W

15

16

17 Vryp. pof

18

19 DMA.

FIG. 181.—Temperature record of surra in u monk.y.

t lit-y bold their heads between their hands leaves little doubt but that they sufl'cr I'roni headache.

The character of the **fever** varies **considerably.** (**See** figs. 129-132.) It is generally **qitermitteni 01 markedly remittent,** and always higher in the afternoons, hi some eases it may be nearly continuous, **especially** in the later stages of the **disease.** Just before **death** there may be hyper-

pyrexia and the temperature may fall to subnormal, although death may occur without either of these changes.

ftTTREAU OP GOVERNMENT LABORATORIES.
BIOLOGICAL LAIfOKATOKY.

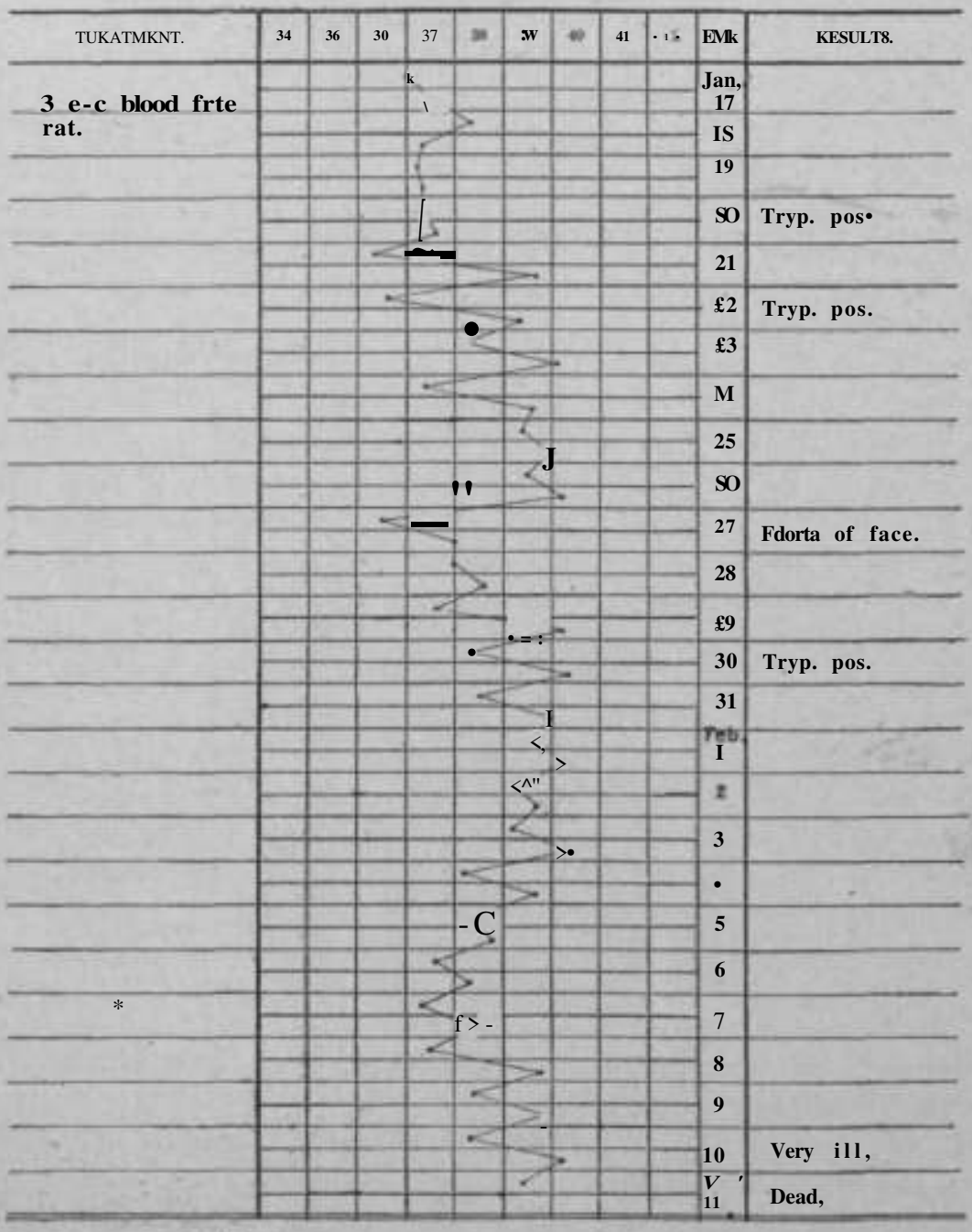
ANIMAL RECORD.

Munkey *No* 1 s T

January 16, *190* s

Weight **Mcdiu«^fl** *Sex* ***W*** *Color* *Inoculation* **Tryp. from rat.**

History **Hea.Hhy <uu«*l wider observation for ona «onth**



in.. I3&—.**Temperature** record of surra In n numkey.

Parasites may as a rule be found by microscopic examination throughout **the** course *t* of the disease. In not a few cases, however, there are

intermissions of short duration; and in one case we found parasites only once in daily examinations for seven days, though the blood was infectious by animal experiment during this time.

Edema as a rule is not a prominent symptom, but is sometimes noticeable about the face and genitals. Anemia is rapid and severe, but the emaciation is not so great as that observed in other animals. Some interference with the gait is occasionally noticed, but it is neither constant nor very severe. Gastro-intestinal symptoms are absent in most cases, but diarrhea is sometimes noticed toward the end.

Necropsy shows the general lesions seen in other animals. In addition to the evidence of severe anemia, the most constant changes are an enlarged mottled spleen, enlarged lymphatics, fluid in the serous cavities, and flakes of fibrin over the surfaces of the organs.

TRYPANOSOMIASIS OF DOGS.

Dogs are susceptible to surra in India, and show the same general symptoms as those seen in other animals. The incubation period is short and the course rapid.

Lingard mentions as the principal symptoms: Paroxysmal fever, anorexia, later a swelling of the skin about the head and throat, injection of the conjunctiva, increased lachrymation, in some cases effusions into the joints, marked edema of the limbs and the belly, extravasation of the blood into the anterior chambers, opacity of the cornea and later total blindness. He gives as the principal anatomic lesions subpleural extravasations and sometimes localized consolidation of the lungs, enlarged spleen and kidneys with subcapsular petechiae.

Rouget proved dogs susceptible to dourine. The symptoms were edema, particularly marked in the genitals, paralysis of the hind quarters, and conjunctivitis, sometimes followed by keratitis.

Dogs, according to Voges, contract mal de caderas by eating the flesh of animals dead of the disease, not, however, through the sound mucosa, but through injuries, which are always found to be present on examination and are caused by fighting. The incubation period is short, and the duration of the illness varies from two to three months.

He describes the symptoms as follows:

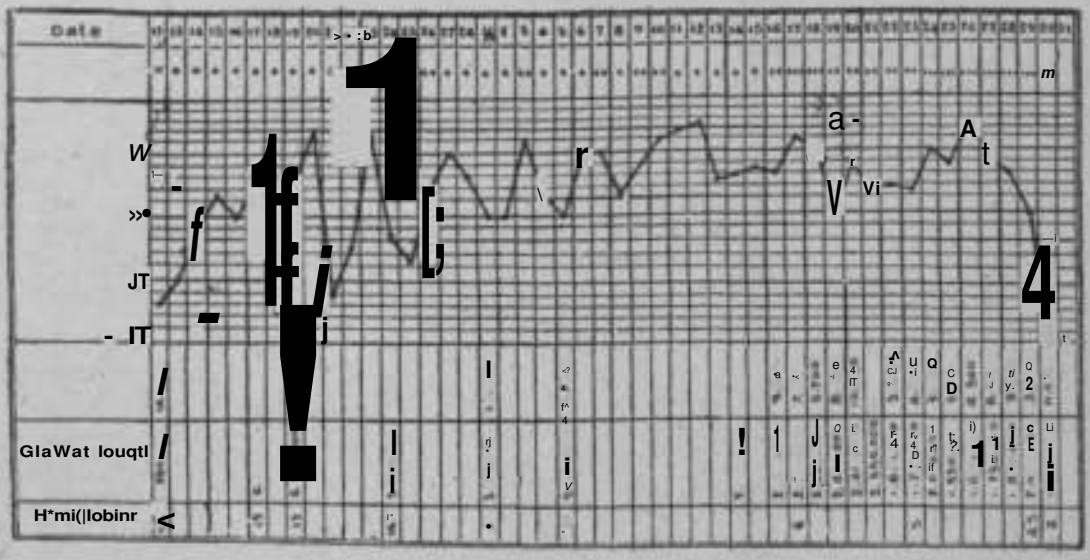
> The animal becomes stupid, emaciates, no longer responds when called, sleeps, hides in dark corners, and its head becomes swollen (bulldog appearance) as a result of the edema, which affects particularly the eyelids. The conjunctiva are involved to a pitiful extent and secretions similar to those seen in the rabbit are observed. The hair aboi.* the eyes falls out. The vision is likewise impaired by the chronic conjunctivitis. There is marked edema of the scrotum, which is first revealed by the swelling of the testicles. * * * The penis-is not involved. On section enlarged spleen and serous exudates are observed. * * * There are days when *Trypanosoma* are not found in the blood.

Nagana, according to Bruce, has a rapid course in these animals (eight to sixteen days) and is invariably fatal. He mentions as the principal

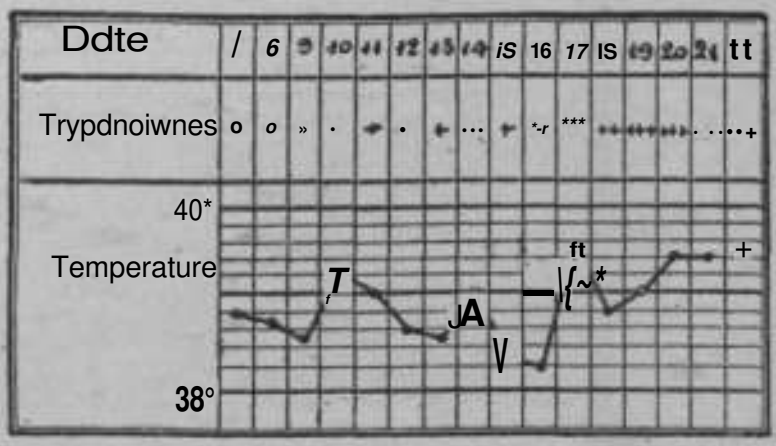
Fig. 1.—Temperature reco o f surm in a dog. (gard.)

symptoms **continuous** fever (rarely intermittent), with elevations to 40° and 41° C, extreme **emaciation, pustular** eruptions near the extremities, and a milky aspect of the cornea.

Kan tl tuck. Durham, and Bland ford give the period of incubation **as from four to six days, and the** average **duration** of **the** disease as eight-



K » . 1 •») —Temperature record of dog inoculated **February** 1-. 1902, Intravenously with 1 e. & of [illegible] very rich in **TrypoooBoma. Dead la I- toys.** (After **LIgnieros,** in Kvcueil **4, lied.** Vn. \n1. 10, No. *4,* **Feb.** 28, li»03, **p.** 131.)



FIQ. 1S6.—Tempeature raoord oi iarmliiftdog. tnoeolated on Jannary 5, 1903 -.....oitaa«nul; with **u** o. c. oi iiloix) from Dog No. 2, contfltning from ;t **to** l **parasttee In the microscopic fleld,** Dead in 10 **daya** (After **LignleraB,** In Itccueil d. Med. Vet. Vol. m. v. i **PebruMy 28,]908, p. UQ** i

Ivn **(„i\>. Fever ie** a **constant symptom,** the **temperature becoming sub-normal** in M-'loath. Kfli **uraonand more toarked about theheadj** h'gs, belly, **and** genitalin. Turbidity **of** tin; **aqueons hnmor,** fibrinoua **plaques in the anterior chamber and cornea] opacities** are **occasionally** sri-n. Corneal u **ad conjunctivitis are frequently** associated **with** the **edema of** the eyelids and **face. Parasites may be absent** from the blond fn ID **four** to six days, but **continue to** increase in number, and before death **may reach 100,000 to 800,000** per **cubic millimeter. Ter-**

minal bacterial infections are apt to occur in these animals, thus accelerating death.

Anatomically, muscular wasting is well marked, but the fatty tissues are less affected, except at the base of the heart, where the fat may undergo edematous degeneration. Lymphatic hyperplasia is well marked, the glands being congested or hemorrhagic. The spleen is enlarged, granular, firm, and friable. Serous effusions and subserous hemorrhages arc present.

Laveran and Mesnil state that the virus was frequently more active in their experience than in that of others. Their dogs lived from six and

BUREAU OF GOVERNMENT LAJBORATOKIE8.
BIOWXJICAI, TLABORATOBY.

ANIMAL RECORD.

Dog
Uaroh 20, *190* 3
Age *Sex* *Color* *Inoculation* Tr. Brucei
History

TREATMENT	34	35	X	IT	3*	39	4H	41	42	DM*	RESULTS.
2 C.c. BUTT4 bIOOd auboutansoualy										Ui.r. 20	
										21	
										SS	
										23	
										24	Tryp. post
										SB	
										26	Hunercus tryp.
										a?	
										SB	Dttuk

l'lit, 130.—Temperature record of surra ^*n a* dog,

one-half to twelve days. The incubation period from subcutaneous inoculation varied between two and four days. Parasites could always bo demonstrated to be present in the blood by microscopic examination, and from the time of their firBt appearance until death they usually increased in number; but in the dogs which lived for twelve days there were remissions on tin.; eighth and ninth days, followed by augmentation. Parasite- were always **numerous at the** time of death.

The principal symptoms, according to **fcheae authors,** are edema of the **genital** organs and hypertrophy of the inguinal **lymphatics,** ilthough these symptoms **may** bo absent Less frequently edema of the **head** and slight and transient paresis of the posterior extremities may occur, Im- [.nit nut lesions of the nose and eyes are found only occasionally. Tin[1]

temperature rises on the third to the fifth day and usually remains above 40° C. until death. Considerable loss of weight is constantly observed.

In the Philippines dogs are very susceptible to surra by inoculation, and we have thus far observed two whieh contracted the disease naturally. Owing to their susceptibility and the ease with which an unlimited supply of the animals may be obtained for experimental work, they have been used in large numbers in the present investigation.

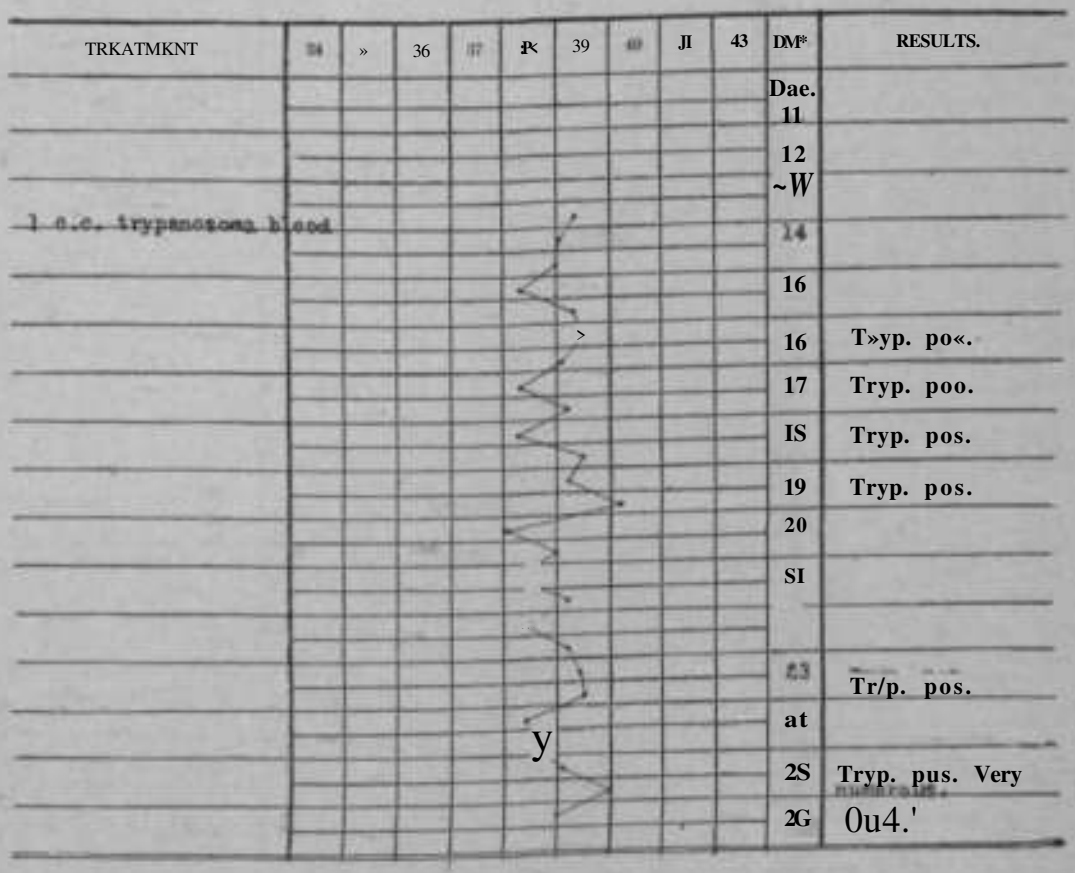
BUREAU OF GOVERNMENT LABORATORIES.
BIOLOGICAL t^ABORATORY-

ANIMAL RECORD.

Bog ***JVa*** **99**
Deceufcer 11, *f* 1908

Wtighi ***.-la?*** ***Sex*** * ***Color*** ***Inoculation*** Trypanosoma.

History **Dog under observaliarv** ***ant*** **weflfc.**



FJG. 137.—Temperature record of surra in u dog.

The ini'uliiuinn period is from four to soven days, the course is rapid, being from eight to twenty-four **dajs in** length, and **the** mortality is 100 per cent.

The temperature (figs. 136-138) varies considerably, but is usually **remittent** and rarely runs as high as in some >ither species of animals. Death may occur with hyper pyres in, but more usually it is preceded by a 'hop of the temperature to normal or subnormal.

The animals rarely live long enough for anemia and emaciation to become extreme, Inn both are very noticeable from the beginning. In dogs the appetite aa a rule is very poor, although there are exceptions

BUREAU OK **GOYSRMMEirr** LABORATORIES.
BHH.I.I.H \1. LABORATORY.

ANIMAL RECORD.

Dog Ao 156
January ^ > , *190* 3
Weight Average *Age* *Sex,* "11e *Color* *Inoculation* Rot tryp. bonkey
Jftxiiirij **113.**

Under eb«TV&Uon ror ten ttavs.

nUUHIK	Date	RESULTS
3 drops tryp. blood fyoFi Monkey Ko. 113,	Jan 116	Tryp. nee.
	17	
	18	
	19	Tryp, Tiejf,
	20	
	21	
	2E	Tryp* po3»
	a}	ityp- po*.
	24	
	15	
	26	7JTI* P*s-
	27	
	a	
	K9	Tryp. pot.
	JO	
	31	
	Feb. 1	
	Z	Numerous tryp.
	3	
	•	
	G	DMA.

KH;. 13S.—Temperatun> rt'ctjni of *?urra* In ri dog,

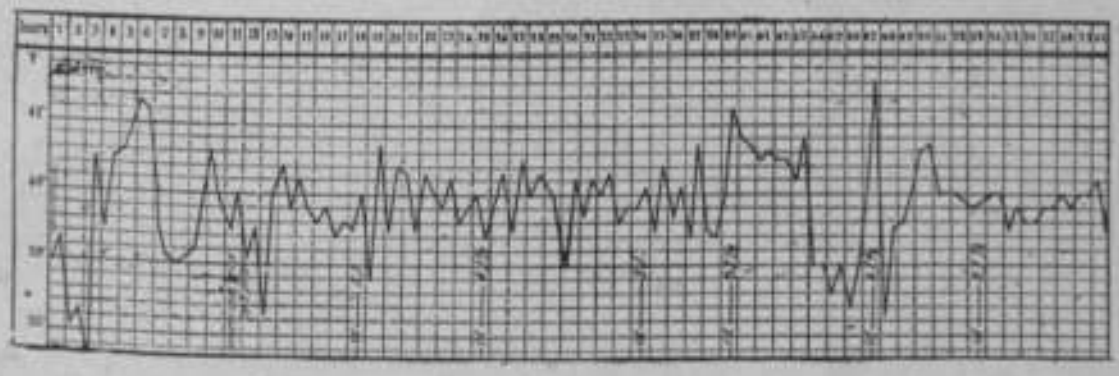
in which it is ravenous throughout the entire course of the disease. The bowela remain normal.

'Hie "balldog bead$M pf)»duced by the suix-uijim *dvuia* »bout tie [ace, occura to B *ttctying* <l<'.!iree, vibich depeiids somtewhal upon the length of time the niiiinnl lives. Edema <if the scrotum and bellj

is also present, but sometimes where the course is very rapid it mav ^-lively In' noticeable.

Urtiearial eruptions on varioijs parts of the body are hardly a promimt symptom; they do occur, however, and occasionally are ven marked. As in other animals, the hair becomes rough and falls out: ;his is especially true of the eyelashes and the long hairs about the nose.

Catarrhal symptoms accompanied by watery discharges from the nose and eyes are noticed early, and later become severe. The discharges become muco-purulent and acrid, excoriating the sides of tlie nose. Clouding of the fluid in the anterior chamber is of Erequeni occurrence and may lead to total blindness. Partial deafness also occurs. In ""my eases the partial paralysis of the hind-quaaH ers seen in other animals ia also observed. Parasites as a rule are constantly present



Fio, 139.—Nagann in o gont. (After Uveran and Mama, 1W2Γ Pljr. &)

in the blood fr.....the time of their first appearance until death. Post-mortem examinations show lesions closely resembling the ones found '» other animals.

TUYPAXOSOMIASIS OF GOATS.

Phis species of animals is apparently not susceptible to natural infection, and on inoculation the disease runs so chronic a course that some authors consider them immune. The duration and the mortal ity "c' '•"' apprar to be well defined.

Bost says that #oats inoculated with surra blood have fever, but soon recover, and subsequent doses do but ven' little harm. They arc refri tory to the disease and parasites are not generally found in the Mood.

Voges considers them susceptible to maI de eaderas by inoculation and says the disease lasts for several months. The animals at lirst show no symptoms, and often do not do so for months; hut emaciation finally begins, and death is usually sudden. *Trypanosoma* are periodically abseni from the blood.

Bruce considers goats susceptible to nfigiimi by inoculation, but says lM:i(l!l,, diseai • runs a chronic course, often lasting for several months. Laveran and Mesnil inoculated a goal with 7V. *bruoei,* and it was still alive at the time oi' publication of their article three months later.

They say that the Hjginning of the dis<jase in these iinimals is much the same as in horses, the incubation period being frotn three to eight days, followed by a rise of ternperature lto about 41° (1 Parasites are only temporarily piesent and are not ag•ain found, bu**t the** blood continues to be infectious by inoculation.

In our experience goats have always pr^ved susceptib]e by inoculation.

BUREAU OF GOVERNMENT LABORATORIES
BIOIJOGICAJL LABORATOBY.

ANIMAL RECORD.

Coat .*Yo* **143**
January 3, , *190* 3
IfVajJW *Age* *Sex* 1[w] « ,, *CoU r* *Inoc.}dattm* 3urTa
History **Healthy** *tm\imX* under *obt*•rv«tion A wmth,

TREATMENT	34	*m*	36	37	3*	39	M	41	a	Due.	KHIULTB.
										Jon	
2 fi.c, aurra. blood										2	**Trjp. net.**
										3	
							-*			*	
										6	**Try P. ne»r.**
						<;				6	
						--'				7	
							•			8	Try p. pos.
										9	
						<				10	
										LI	
							.			IS	Tryp. pos.
								--		13	
_ ,										14	
						-				15	**Tryp. po3.**
							i			16	
							s				
										17	
										IS	
										19	
										20	**Dead.**

Fio. 140.—TeiiiiKTiiinri! ivaord of surra in a trout.

Parasites arc usually scarce in the **peripheral** circulation, and indeed in some of our animate weie not found at any time during the disease, but the blood was always infectious by inoculation and the disease invariably proved fatal.

The incubation period varies in length and is difficult to **determine**

accurately without daily animal experiment. The temperature curve is illustrated in figs. 140-142, and does not show anything characteristic, nor does it differ much from that of other species of animals. Neither emaciation nor anemia are marked. Edema is never prominent and may be entirely absent. Paresis of the hind parts was observed in only one of our animals.

BUREAU **OF GOVERNMENT** LABORATORIES.

I'.KII <x.i(\ i. [. \I«»I;AT<>ISY.

ANIMAL RECORD.

feat *JV0* H3

January 2, *igo3*

:¨ **I** *eight jge* .^ . *se.v* **u-i**– M91e - *Cnlnr* **Tr, Evans** *Inwitlntion* **i**

History **Healthy aru*al under observation for £ months.**

TREATMENT	M	35	36	37	38	39	40	41	42	Dltr	RESULTS
-2_C.C. Surra hlnnrf										**ran**	**Tryp. neg.**
										7	
										A	
										5	**Tryp. n«g.**
										6	
										T	
										S	**Tryp. pos.**
										9	
										10	
										11	
										12	**Tryp. pus.**
										13	
										14	
										15	Tryp. **nftg'. Veyj 111.**
										10	
										17	
										18	
										13	
										20	**Dead.**

1

FIG. in,—Trulu nrd of Mirrn in a goat.

Goats manifest **their** ill]oss by pniferably lying in the **shade** and **by** the listlessness and sluggishness of **their** movements. They seem to suffer some pain, just as is tle <jase with monkeys,

Post-mortem examination revejils nothing characteristic, the lesions closely resr-mhling those observed in other animals.

TRYPANOSOMIASIS OF SHEEP.

Most **authors,** writing of surra, nagami, dourin*[1], **and** mal de caderas, regard the nature of the disease in **these** animals as very similar to that in goats. The sheep of **eastern** Africa are considered by **Bruce**

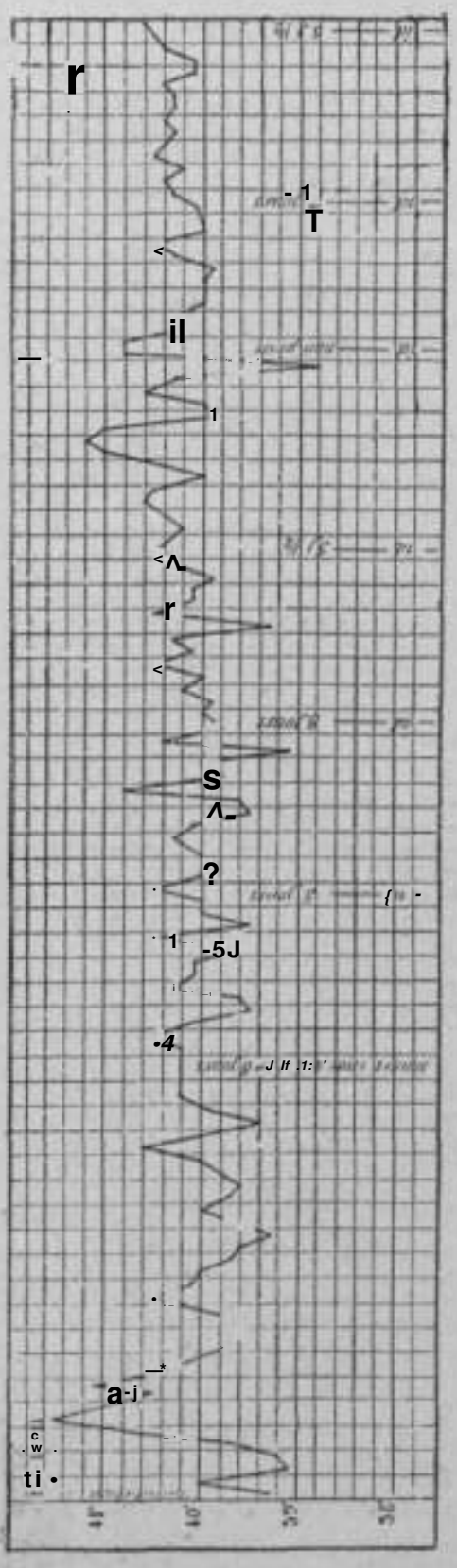


Fig. 148.—**Sana In *A* Mliecp. (After Liivemri and Mcsiiil,** 1902, Fig. 6.)

BUREAU OF GOVERNMENT LABORATORIES.
BIOIXKUCAL LABOHATORT.

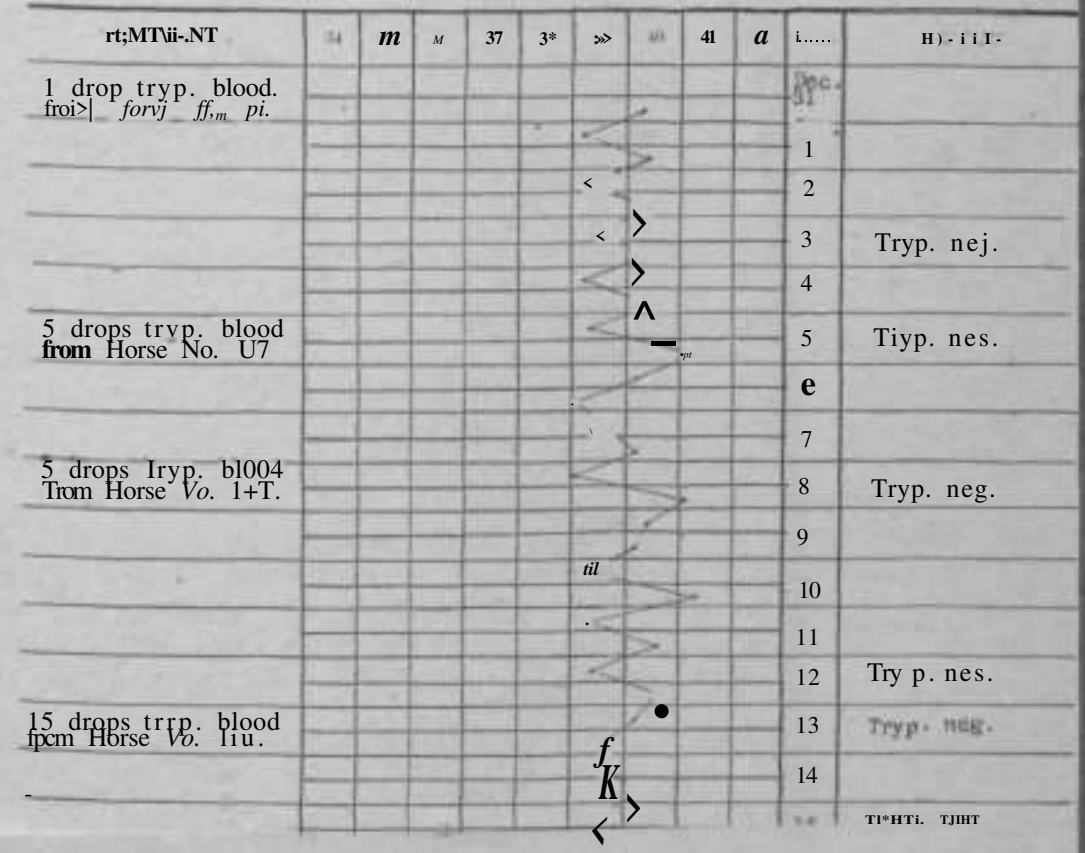
ANIMAL RECORD.

Goat ***Jfo*** 131

^**©ember** 31, . *3no Z*

If *Wghi* ***Age*** ***Sex*** < Ww *TmenlnNm* SUTra

History Healthy native goat under observation for three months.



to be somewhat refractory. The disease in these animals, he says, runs a very chronic course and some of them live for five months.

Laveran and Memil inoculated a sheep with *Tr. Irucei,* and in an article published three months later stated that it was still living. They consider the beginning of the disease much the same as in horses. There is generally an incubation period of three days, followed by^the appearance of parasites and an elevation of the temperature to 41° C. *Trypanosoma* then become so rare that they are not found in the blood by microscopic examination, although the blood is constantly infectious when injected into mice. The temperature remains near 40° C. with occasional intermissions, although it sometimes'' rises to 41° C.

Regarding one sheep, which lived exactly one hundred and ninety-seven days, they write as follows:

> On the sixth day after inoculation it showed a temperature of about 41° C, which shortly afterwards fell to between 39° and 40° C; on the twenty-fourth day there was another rise to 41.5° C; after which the temperature remained for a long time in the neighborhood of 41° C, taking thirty days to return to 40° C; multiple edematous areas appeared in the face and eyes and then in the testicles. It was only during this period that *Trypanosoma* could be found by microscopic examination, and for eight days there were several in the field. The edema increased and extended to the neck and shoulders (end of the third month). Its disappearance was rapid; the animal (during the fourth and fifth months and the first half of the sixth) appeared well (the temperature being between 39° and 40° C.); but the blood was still virulent. During the last month the animal emaciated rapidly and died with profound lesions of cachexia and gelatinous exudates of the throat, the pericardium, and the lips.

As with some of the other animals, neither the study nor the description of the infection in sheep is as accurate as might be desired for purposes of comparison. In the Philippine Islands they do not appear to be naturally susceptible to the disease. We have kept a sheep in the same ground with surra animals for several months, but no infection has resulted.

The symptoms, the course, and the duration of the disease m these animals are so similar to those observed in the goat that a description of them is considered unnecessary.

TRYPANOSOMIASIS OF GUINEA PIGS.

There arc on record a few instances in which guinea pigs have been found naturally infected with *Trypanosoma,* but literature affords little detailed study of any of the forms of the disease in these animals. It is admitted that they are susceptible by inoculation to *Tr. cvansn, fr. brucci,* and *Tr. elmassianii,* while some of them show a transient infection from *Tr. lewisii.*

Laveran and Mesnil noticed multiplication forms on the second and fifth days after inoculating one of these animals in the abdominal cavity

BUREAU OK GOVERNMENT LABORATORIES
Itdil.ix.KAI. I.AHORATOltV.

ANIMAL RECORD.

Sheep JVo » 0

jint S5, • $^{i/>n}t$

Weight *Age* ***Sea*** *Colot* ***htm-nlnlinn*** **3 c.c »urr» Wood.**

Hiitory Laxg*,-healthy native **sheep**

TKKATMEST	M	•	H	37	TO				IWr	• *tarn \r<*
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Jl *a* r. **mrTa** tklood aubcutanoously									36	
									37	
									28	
									29	
									30	
									July 1	
									3	
									3	
									4	Tryp. *nog.*
									5	
									C	
									T	
									S	
									8	
									10	
									11	
									12	
									14	
									14	Tryp. ney.
									15	
									16	
									17	**Tryp. nee. (Tryp.**
									19	pti. by anld&l «j—
									19	
									20	
									21	
									22	
									23	
									24	

Fit;. **144.**—Temperature **record** <•(surra in • sin > **p**

with *Tr. leivisii.* Many of the parasites in the abdominal cavity were in various stages of digestion by the large mononuclear leucocytes. There were a few *Trypanosoma,* in the blood on the fifth and seventh days.

Sivori and Lecler *give* sixty days as the average duration of *surra*

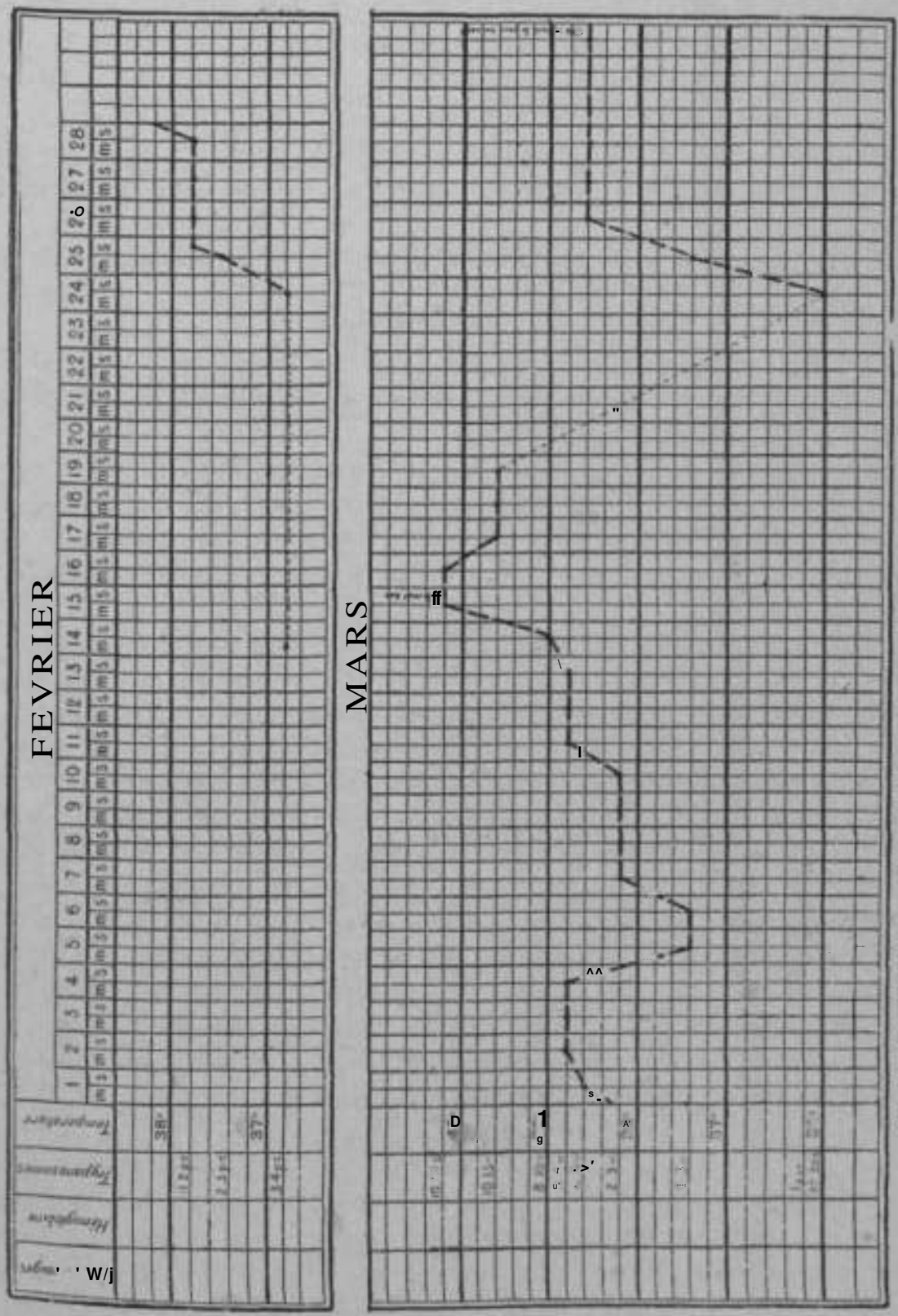

Fig. 145.—Temperature record of mal de caderas in a guinea pig. (After Sivori and Lecler, 1902, Pl. IX.)

americain in these animals, although it varies from twenty-five to one hundred sixty days. In pregnant females parasites are more numerous than in other cases, and almost constantly present.

Voges says that one-half to two-thirds of these animals when inoculated with mal de caderas die of the disease; the duration in those which finally succumb being from two to five months. He has some guinea pigs that have been alive for a year, have grown fat, and have had young. The generative power of the male suffers from the infection more than does that of the female;

We have succeeded, as did Laveran and Mesnil, in producing a slight infection with *Tr. lewisii,* but it is always transient and devoid of symptoms.

Guinea pigs do not naturally contract any form of Trypanosomiasis in this country, but when inoculated with the *Trypanosoma* of the present epidemic always show a long chronic infection.

As nearly as can be determined, the incubation period varies from two to eleven days. The duration of the disease is from one to four months, and but few animals recover from it.

The appearance of parasites in the circulating blood is very intermittent, not always in sufficient numbers for microscopic diagnosis, although the blood is constantly infectious by animal experiment. Sometimes parasites arc not found by the usual microscopic technique for days and even weeks.

The temperature curve (see fig. 145) is very irregular, more so than in any other class of animal with which we have worked. The symptoms in general resemble those of the rabbit. Edema of the genitals is marked, but in the rest of the body is less prominent than in the case of other animals. Anemia and emaciation develop slowly, but reach an extreme degree before death. The hair falls out in places, and small ulcers may appear on the belly and prepuce or vulva. Partial paralysis of the hind parts occurs but is not constant, being absent in some cases while well marked in others.

Post-mortem examination reveals a condition similar to that observed in many other animals. There is as a rule less fluid than is ordinarily found in the serous cavities of other animals, and the changes in the spleen are often slight. The gelatinous infiltrations in the subserous and subcutaneous tissues closely resemble those seen in the horse.

TRYPANOSOMIASIS OF RABBITS.

Rabbits are susceptible by inoculation to all the important forms of Trypanosomiasis, but we have read of no reported cases of natural infection in these animals.

Bouget very irregularly found the parasites in the blood of rabbits suffering from dourine, but their presence in the peripheral circulation was intermittent and bore no relation to the temperature of the animals.

BUREA(J (> F GO IT.KSMFNT LABORATORIES.
BIOLO IIC \/ LAJ3OB A TORY

ANIMAL RECORD.

ftiinea pig *Jfo* 3*8

April 16, 190?

H *'fight* ,4ge Sex *Coinr* *Inoculation* ilurT*'

History ball h«aH faf animal. 1^aap«rBture r<loord after list. d*y of the dlssase.

Parasites ••TO praaent in the p«rlihsrU circuititicn after ?th. day.

TRKXTKSKT	**	a	H	n	1 u	REVCLTS
					as	
					37	
					as	
					39	
					39	TTVP, po*itiv«.
					31	
					June 1	
					2	
					3	
					4	
					S	
					B	
					7	Tryp> positive. Ko
					e	lllnaaj sppannt.
					9	
					10	
			r			?7IP- positive.
			f		11	
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					14	
			-,		IS	
					10	Tiyp. positive.
					17	
					IS	
					19	
					30	fryp< positive.
					21	
					32	
					33	
					34	Iryp« negative•
					36	
					36	
					37	
					28	
					2»	
			J		30	
			-_-''		July	
			——1 -			

RECORDS «F TEMPERATURE, PULSE MD RESPIRATION,

Rabbit inoculated with 0.25 c f *ef blood from tfrt htort ot Horse ** ' w/*_____*Age I*_____*Stx 8itck*_____*ta

Disease, *ffct Surra* _____ *pfftf ^ lnrr„infm* J? Jytf lg?Z—^fitsv/r Death* _____ *n~*» */ *yTtf^ A„f 12 H? thptttrfio. JZ .*

FlS. 147.—Twnpetattiro reconl of surra in fi rabbit. (After Ungerd.)

BUREAU *OF* GOVERNMENT LABORATORIES.
UK.I.ix.H A I. LABOHATORY.

ANIMAL RECORD.

Rabbit. *JV₀* 169
Ja**nuary 26,** 1903

Wright .1?<. *Sex* *Color*

Liver and blood *Innruhitimi* **of THUl« d«ad of surra.**

Hi tit (try

Large Jwallhy *t*inlnal under obaarvation for month:t.

TKKATMEST	34	n	36	n	38	»	40	41	a	Date	RERUUl
r«d 1iver and blood fi aule dead of surra.										iiff[l]-	
Mucuous membrane of mo th probably injurfld in th operation.										87	
										38	
										::y	
										3U	
										31	Blood nag, for 1tryp
										Fwb.	
										3	
										3	Pos. Tryp.
										4	
										3	
										6	
										7	
										8	
										t>	
										10	Pea. Tryp.
										11	
										12	
										13	
										14	
										15	
										16	Po». Tryp.
										17	
										18	
										19	
										30	K«. Trypi
										m	
										33	
										35	
										24	
										3D	
										3n	Bap. tryp.
										27	
										as	

as a rule, followed by a sharp rise of temperature and the appearance of parasites in the blood, a fact which probably accounts for the great variations in length of time assigned to it In fact, there does not appear to be a distinct incubation peri oil in all cases, for in some cases animal experiment may prove the blood infectious as early as eight hours after inoculation, while in others it doeB not become so until the fourth or fifth day. The course of the disease is Somewhat chronic, lasting from fifteen days to three months or more, with a mortality of 100 per cent.

It is seldom that parasites are numerous in the peripheral circulation; and determinations by simple microscopic examination shorn thai inter*

Fig. 150.—Showing mneo-paittUmi dtoduucge from eyes, fulling ol l<nig hairs, blepharitis and conjunctiviits in nshliii

missions uiv frequent, lasting from one or two days to several weeks, during which pirasites are no! found. As in other animals, tiowei or, the blood is continuously infectious by animal inoculation. The temperature Isee figs. 148, 11!)) throughout the disease is less markedly remittcni than is usual in most animals, while exacerbations and remissions are rare.

Anemia and emaciation come on rather slowly, but develop to an extreme degree before death. Water] discharges from the nose and eyes appear early, gradually becoming mueo-purulent and tenacious, solidifying on the margins ol the eyelids and nose, and encrusting and entan-

gling the long hairs, *which* **fall** out ami leave **excoriated** surfaces. Edema occurs around the base of the ears, the nose, and **the** abdomen, involving especially the scrotum, which becomes enormously **distended and** in;n **break "pen and rappttrate. (Sir Bg. 151.) There** i* a discharge from **the prepuce** similar **to** that from the eyes and nose. In **the female the external** genitals are scarcely !◂× **affected** than in **the** male. **Orticaral** eruptions ami **foiling** out. **of the hair** are common **symptoms.** lameness of the hind parts occurs *iu* most cases, and may **reach** to such a degree that the posterior extremities become useless. The subcutaneous lymphatics are often **palpable,** ami in **some instances swelling** of the joints occurs.

Fjii, l.'ii.—Showing enormous BweHtag oJ gonitab Is rabbit.

Necropsy reveals lesions similar to those observed in other animals. The **lymphatics, particularly of the inguinal** and **postperitoneal regions,** are somewhat **enlarged and** red in color. The serous sacs **contain** llnid and often show **Sbrinous** Hakes over the surfaces and adjacent organs. **The spleen la usually enlarged and** friable, but a **typical** acute **splenic** tumor **is often** seen, while "sago spleen" **occasionally** occurs.

TRYI'ANOSOMIASIS OF CATS.

Cats are reported **susceptible by** inoculation to **surra, oagana, dourine,** and mal de caderas; **but** the **course** of **the disease does uoi Beem** to have been carefullv studied m them.

;CORD.

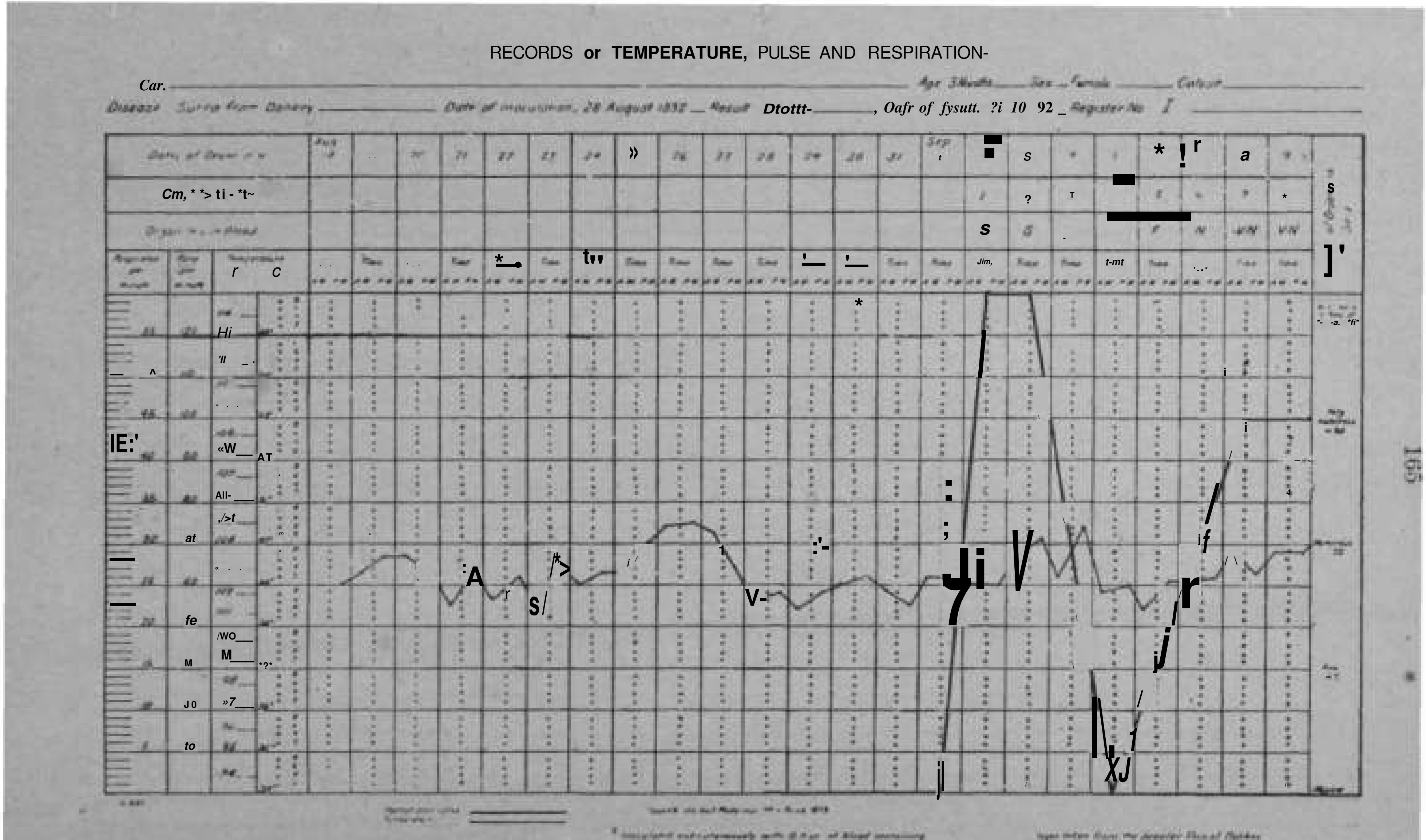
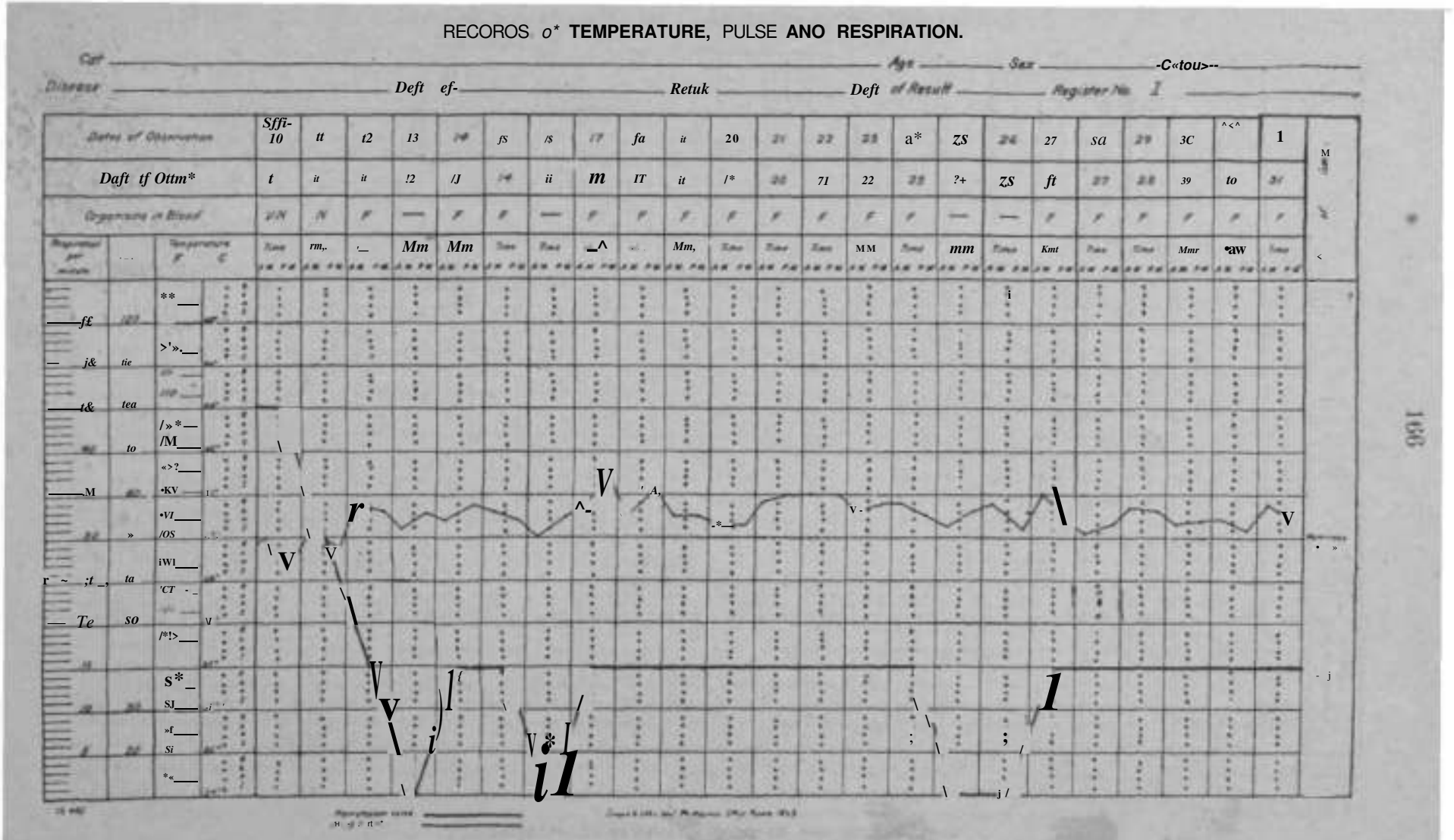


FIG. 3.V2.—Tem[)orature w<H)rd of surm in a i't»(i Afier Lingnrrt.)



Fu;. 152 (continued).—Tem^ruiurt' record of surra in a **CAt** (**After** Lingard.)

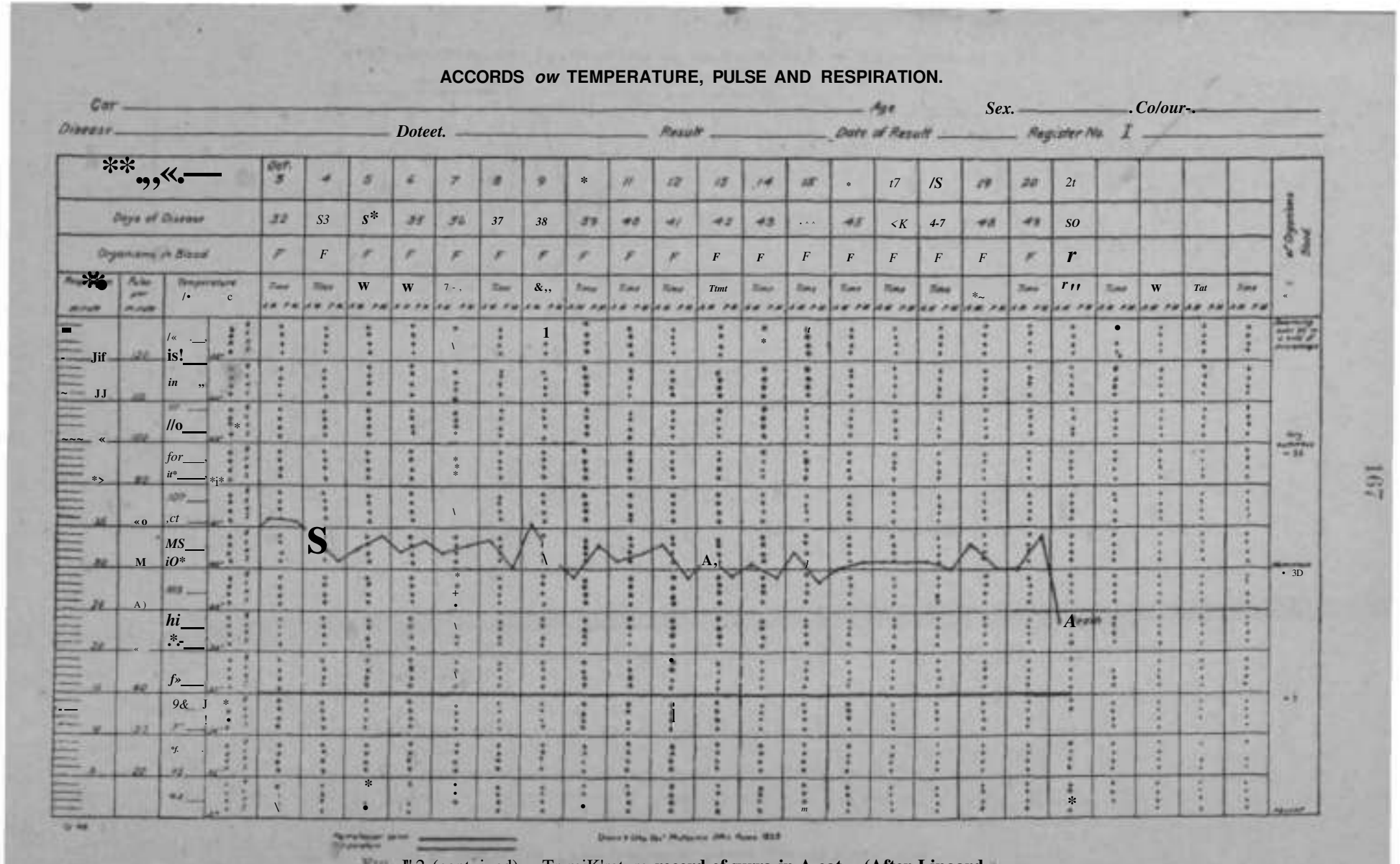


Fig. J½2 (cantuiucd).—Tr-mjK'rature **record of surra in A eat. (After Lingard.)**

Fig. **150** illustrates **the temperature** record in surra as given by Lingard and fig. 151 that of "surra americain" as given by Sivori and Lecler.

In **the Philippine** Islands they are susceptible to **the** infection by **any** of the usual forms of inoculation. The **incubation period is from two** to five days, the course rapid, varying from three to fifteen days, and the mortality 100 per cent.

Parasites are constantly **present** in **the** blood, but vary considerably in numbers at different times. The **temperature** curve is **illustrated** in figs. 154 and 155.

BUREAU OF **GOVERNMENT** LABORATORIES.
BIOLOGICAL LABORATORY.

ANIMAL RECORD.

Cat ,Vo

22, , 1903

Weight ***Age*** *Sex* *Inoculation* **Tr.** Evans L

HiBtpry **Small white «at -**

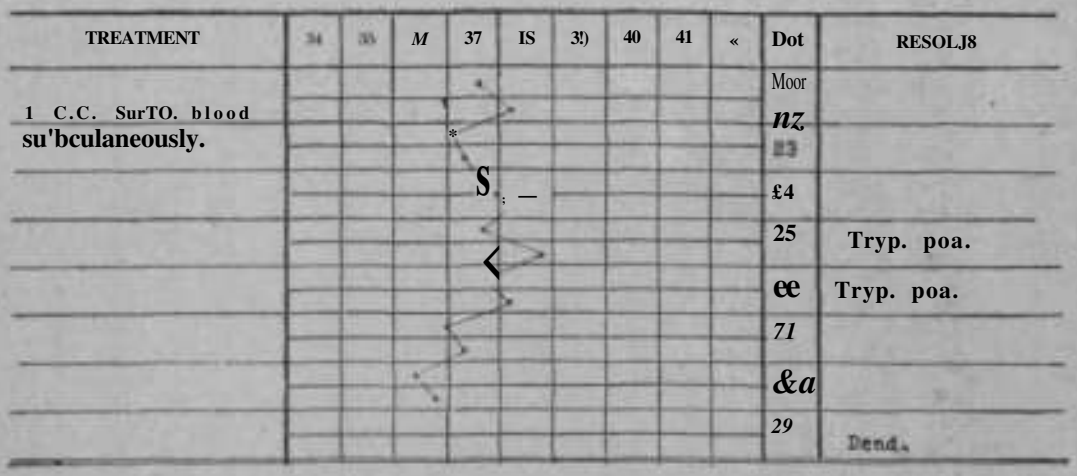


FIG. **1M.**—Temperature reeoKl of surra in a cat.

Skin lesions in **these** animals are very **prominent** and are similar i" those described for dourine. Urticarial and nuuular **eruptiona axe eom-**mon, and not a few animals **show** phlegmanous ulcers, particularly **on** the• abdomen and Hanks. **Edema is slight**

'Flic hair, **particularly** about the nose and eyes, becomes rough and falls out. Profuse **dischargee** from the nose and **eyes, resembling those** in tin-rase of **rabbits, are** usual **symptoms. Cloudiness of the fluid in** the anti-riiir rhamluT and opacity of **the cornea may occur** in **one or** both **eyes. Anemia is profound** and emaciation **moderate.** Tin- **appetite** is usually poor, but **the bowels remain** normal. **Tendency to paralysis in** the hind **quai**ters was **noticed** in **only** one **animal.**

Necropsy reveals the usual **lesions, in addition to the** changes alre;idy men*ioned as pre aent during life. The acuteness of the **disease** in **these** animals probably **accounts** for the fact thai the **Lesions axe tees pro-**

Tnjutmn ioas-QtUme <»>ec20(i*'iJ!!iang du Chtvet'bat• (Mated* ™ w y ,

Globules rouges

Hémoglobine

Trypanosomes

Température

AVRIL

BUREAU OF GOVERNMENT LABORATORIES.
BIOLOGICAL LABORATORY.

ANIMAL RECORD.

Cat 268

Medium-sized healthy cat.

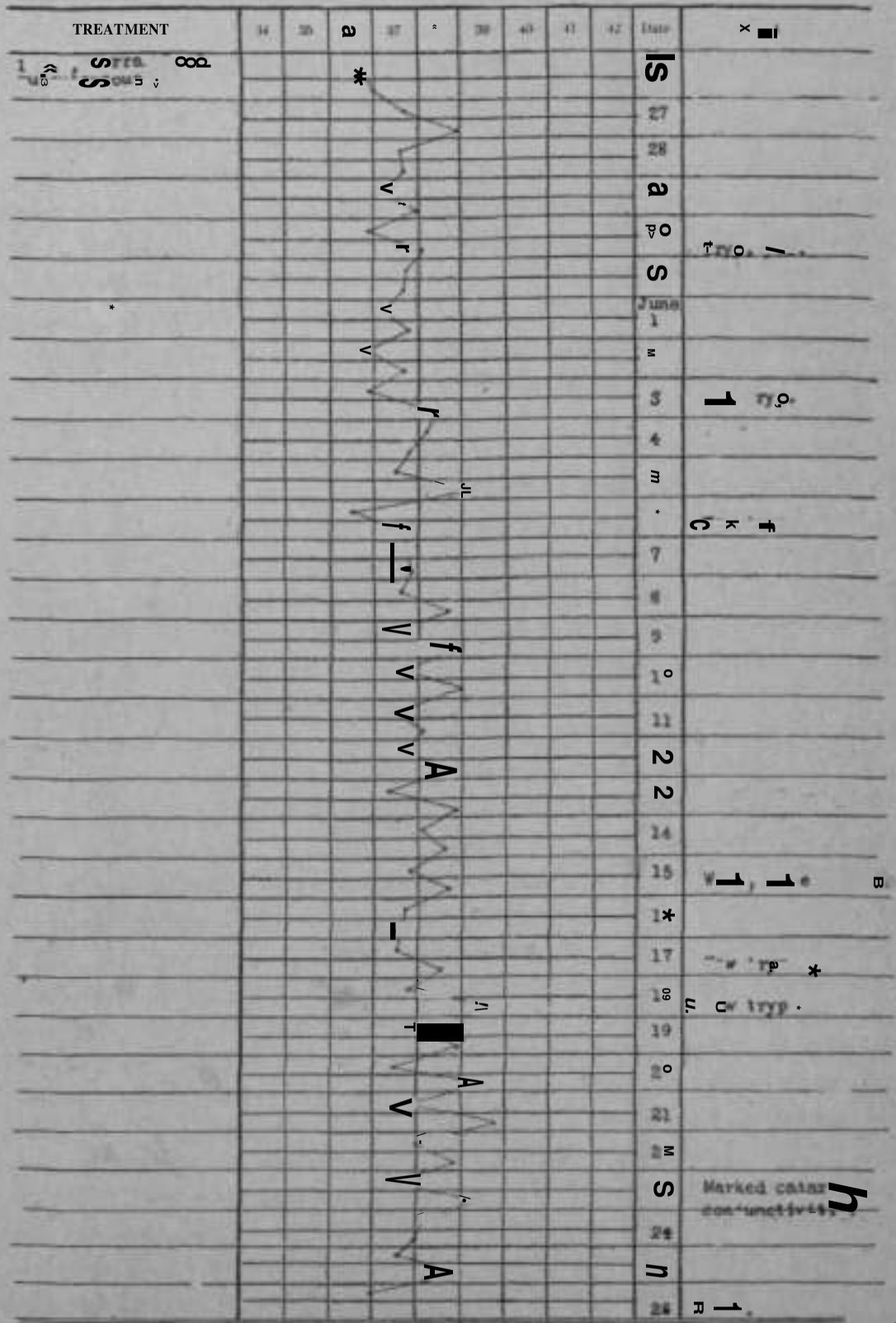


FIG. 155.—Temperature record of surra cat.

nounced. The spleen is enlarged, but assumes more nearly the type of acute splenic tumor, while subserous hemorrhages are numerous.

TEYPANOSOMIASIS OF RATS AND MICE.

Tr. lewisii, the common *Trypanosoma* of rats, has already been described. Most writers agree that it is harmless for rats and noninfectious, by inoculation or otherwise, for other animals.

Large numbers of rats have been found naturally infected in various parts of the world; a partial list of the regions is as follows: Lewis in Calcutta found 29 per cent infected; in Bombay Carter found 12 per cent infected and Lingard 30 per cent; Koch in Africa, 41.7 per cent; Crookshank in London, 25 per cent; Rabinowitsch and Kempner in Berlin, 41.8 per cent; Laveran and Mesnil in Paris, 4.6 per cent; Raillet in Alfort, a large percentage; Chemette at Lille, a large percentage; Sivori and Lecler at Buenos Ayres, 3 per cent; and Chalachnikaw and Danilewsky in Russia found the infection present. In Togo eight rats examined were negative (Luman). Voges in South America did not find these animals naturally infected. In a personal letter Kitasato in Japan states that many of the rats there harbor the parasite.

In Manila rats *Tr. lewisii* has been found in from 20 to 65 per cent of the individuals examined, varying according to the season and the locality from which they were received.

Van Dyke Carter inoculated dogs, cats, horses, and monkeys with rat *Trypanosoma,* and always obtained negative results. Koch failed permanently to transfer the infection to other animals. He gave a rat *Tr. lewisii* and *Tr. evansii* and afterwards found both in its blood. He then inoculated a dog with some of this rat's blood and the animal contracted the disease, but its blood was found to contain only *Tr. evansii.* The efforts of Rabinowitsch and Kempner to inoculate other animals with *Tr. lewisii* proved unsuccessful. In their experiments they used white and gray mice, field mice, guinea pigs, rabbits, dogs, goats, horses, and hamsters.

Lingard, on the other hand, inoculated twelve horses with infected rat blood, and four of them, after an average of seven days, died of a virulent form of surra. He argues that some *Tr. lewisii* are infectious for other animals, as demonstrated by his experiments. This statement has caused considerable confusion and his work has been questioned. Judging from our observations in Manila, it would appear, however, that Lingard's mistake consisted in considering these pathogenic parasites *Tr. lewisii.*

Kanthuck, Durham, and Blandford showed rats to be refractory to a second inoculation with *Tr. lewisii.* Rabinowitsch and Kempner noticed that some rats are absolutely refractory to these parasites, but that most of them are susceptible. After inoculations into the abdominal cavity, *Trypanosoma* were found to be present in the blood after

from three to seven days, and occasionally at the end of twenty-four hours. In rats inoculated in the abdominal cavity they found multiplication forms to be numerous in the exudate during twenty-four to thirty-six hours, at the end of which they disappeared permanently from the abdominal cavity to reappear in the blood. Rats could not be given a second infection, no matter how large the dose of infected blood used; and they employed the important fact that some of the animals are refractory as a basis for the preparation of a specific serum.

Laveran and Mesnil in general confirmed Rabinowitsch and Kempner's work and in addition showed that the young born of immune mothers are very slightly if at all immune. They also demonstrated that the agglutinating properties of the blood are not transferred to young. In immune rats *Trypanosoma* are destroyed in the abdominal cavity, and the agglutinative power of the blood lasts no longer than the preventive. In their opinion the treatment of rats with serum is unsuccessful. They state that as a rule the parasites appear in the blood at the end of twenty-four hours, and that in not a few cases, especially in young rats, they are found in considerable numbers before this time. However, many cases came under their observation in which the parasites did not appear in the blood until two to seven days after inoculation, and, indeed, in a few instances no infection resulted at all.

Adult parasites are the first to be seen in the blood, then there is a period, rarely extending beyond the eighth day, when multiplication forms may be observed, after which adult parasites are visible throughout the course of the disease. They believe multiplication to take place in the abdominal cavity during the period from the first to the fourth day, and in the blood between the fourth and the eighth days, after which time multiplication forms are no longer present.

Infection of these animals with *Tr. lewisii* lasts from twenty days to four months or more. In old ones the *Trypanosoma* often disappear in two to ten days, and in these no active immunity is established. Subcutaneous inoculations, according to these authors, give infections which are less severe than those produced by other methods.

Blood infected with *Tr. lewisii* and kept on ice does not give an increased incubation period or produce any alteration of the infection, as long as motile parasites are found to be present. If, however, the blood is allowed to remain for a considerable length of time (forty-seven days), the incubation period is increased from six to nine days, and the infection is less severe. After fifty-one days or more on ice the blood no longer contains living parasites, but is still infectious for rats, with an incubation period of twenty-seven days. All writers agree that rats infected with *Tr. hivisii* show no symptoms of illness. The constant anatomic lesion is hypertrophy of the spleen.

Our work as a whole has been in conformity with that of others. In the tlinnsnnds of rats found to be naturally infected with *Tr. lewisii* and

in th'ose inoculated, we have never observed either apparent illness or death which could positively be attributed to infection with this parasite, although it was present in enormous numbers in the circulating blood. Our observations have been exceptionally easy on account of the great number of rats furnished the Laboratory for examination to determine the possibility of their infection with plague, since this disease has become endemic in Manila.

Very little is found in literature relating to the clinical manifestations and morbid anatomy of *surra* in rats. We have not seen a specific reference to the natural infeçtion of these animals by *Tr. evansii,* though from our experience, which is to be described later, it is believed that Lingard must in some of his experiments have been working with such an infection.

Lingard states that the latent period in *Mus decumanus* as developed by the subcutaneous inoculation of 0.1 to 0.2 c. c. of virulent blood varies from one to two days; and in *Nesokia providens,* by subcutaneous inoculation of 0.2 c. c, from two to five days.

Kanthuck, Durham, and Bland ford state that rats, when inoculated with nagana-infected blood, often exhibit convulsive seizures just before death, but otherwise show no symptoms of the disease, except dullness in the later stages. Transmission from one animal to another by coition, by suckling, or by any other method than by direct inoculation was not observed. Infected mice lived from eight to twenty-five days and r«t< from six to twenty-six days.

As the morbid anatomy of nagana in rats and mice they describe lymphatic hyperplasia, most noticeable near the point of inoculation, congestion, edema, and occasionally hemorrhages of the glands, great enlargement of the spleen, which is generally firm, friable and dark in color, enlargement and fattiness of the liver, and occasionally a small amount of fluid in the pleural cavity.

Laveran and Mesnil state that in rats and mice of all varieties, including white ones, nagana has a perfectly regular course. No symptoms are manifest, the animal appearing well until near death. Mice appear sleepy and die without suffering from dyspnea. One mouse had convulsions two hours before death. Some rats die with the same symptoms as mice, but most of them show great agitation just before death, crying out and dying in severe convulsions. There are no sensible variations of temperature in these animals. Parasites appear in the blood twenty-four hours or more after inoculation in the abdominal cavity, and on the second or third day after subcutaneous inoculation; they progressively increase in number until death. In white rats and mice death occurs in two and one-half to three days after intraperitoneal inoculations, and after three and one-half to five days following subcutaneous inoculations. Wharf rats *(Mus decumanus)* die in about the same length of time as white rats *(Mus rattus).*

According to Eouget, mice inoculated with *Trypanosoma* of dourine show no symptoms until near death, when the hair becomes rough and the cornea cloudy. The post-mortem changes observed are hyperemia of the abdominal layers, inflammation of the liver and spleen and of the lymphatics near the point of inoculation. Parasites are found in all of the organs and fluids, except the intestines and the urine.

Voges says that death may occur without any preceding signs of illness. In rats and mice inoculated with the *Trypanosoma* of mal de caderas there may be a few hours of comatose condition. The duration of the disease in these animals is given at about four weeks.

As has been stated above, the natural infection of rats with the *Trypanosoma* which cause the disease in domestic animals has not before been reported, except perhaps by Lingard, who, if such was the case in his work, misinterpreted his results.

In a preliminary report on Trypanosomiasis in the Philippine Islands, published as Bulletin No. 3 of the Bureau of Government Laboratories, 1903, Musgrave and Williamson reported that a certain number of rats in Manila were found to be infected with the *Trypanosoma* which in this country causes surra in horses. This discovery was brought about by accident, while the authors were attempting to immunize a monkey with a parasite supposed to be *Tr. lewisii.* As a result the animal contracted surra and died. At first, following Lingard, we thought this to be a pathogenic *Tr. lewisii,* or supposed accidental infection with *Tr. evansii* to have occurred; but more careful study and the repetition of the experiment with the greatest precautions has demonstrated that a small percentage of these rats harbor the parasite causing the disease in the horse. This *Trypanosoma* has the same. morphologic characteristics, and upon inoculation is infectious for the same animals, producing the same disease with the same incubation period, course, termination, and lesions.

Wild rats are very unsatisfactory material to work with, because so many die after being in captivity a short time. The duration of life ip so uncertain that but little confidence can be placed in results, even when control animals are used. The ones which live for a week or more after caging are likely to survive for some time, and, in order to obtain the best results, these have been employed as far as possible in our experiments.

As has been shown in other countries during the study of the disease in these animals, the infection is not evidenced by any symptoms of moment until just before death, when convulsions often occur. Too much importance should not be attached to this symptom, for time and again we have seen our control animals die in the same manner. Wild rats suffer such great excitement during the taking of temperature that no conclusions can be based upon the results. We must there-

fore believe that rats and mice infecjpd with surra show no constant symptoms of practical significance. Some of the rare manifestations are cloudiness of the fluid in the anterior chamber, falling out of the long hairs about the head, and in a few cases edema and a tendency to paralysis of the hind parts. The incubation period, as determined by the appearance of parasites in the peripheral circulation, varies from a few hours to five days or more, and the duration is from two to twelve days.

The post-mortem examination shows an enlarged spleen, which may be hard and friable or more nearly approach acute splenic tumor with the organ usually dark in color; and there is generally enlargement of the lymphatics, especially of the inguinal regions, which may be hemorrhagic. The changes in the other organs are not significant, except in a small number of cases which show gelatinous infiltration of the subcutaneous and subserous tissues.

These lesions, particularly the enlarged spleen, are found in rats dying from *Tr. lewisii,* which is considered harmless. After discovering that a number of rats harbor *Tr. evansii,* we suspected the ones which died supposedly from *Tr. lewisii* and showed enlarged spleen, etc., on post-mortem to be in reality infected with *Tr. evansii*; but animal experiment absolutely disproved this theory.

The study of Trypanosomiasis in rats has not been completed. It i? certain that rats in Manila may be infected both with a *Trypanosoma* harmless by inoculation to other animals and with one pathogenic for them. These parasites correspond microscopically to the descriptions respectively of *Tr. lewisii* and of *Tr. evansii.* We are not fully convinced that *Tr. lewisii* is always harmless for rats, or that some of the rats in Manila do not even harbor a third speciës of parasite.

TKYPAXOSOMIASIS OF FROGS, FISH, AND FOWLS.

Trypanosoma have been found in *frogs* obtained from points scattered over a large area of the world, but they are usually considered harmless in these animals. The infection, so far as we have been able to determine, is not artificially transferable from frog to frog or from frogs to other animals. As already mentioned, we have not been able to find *Trypanosoma* in the blood of frogs in this country, and these batrachians have not been proved to be susceptible by inoculation with any of the *Trypanosoma* we have studied.

A number of observers have found *fish* harboring *Trypanosoma,* but all agree that no symptoms arc produced. The species reported as infected are mudfish, trout, pike, redeyes, soles, and salt-water fish of the Mediterranean (species not given). The different specios of these parasites have already been discussed.

Laveran and Mesnil, whose work is the most important in this line, found the infection of the redeye with *Trypanoplasma* to be very com-

nion, but proved the young rareljfcto be infected. In the sole, however, Trypanosomiasis is Uncommon, being found in only four cases out of a large number of fish examined. They did not observe any symptoms of disease in fish caused by *Trypanosoma,* and were unable to transfer the infection by inoculation. Doflein, during a fatal epidemic in fish, found *Trypanosoma* in a number of the diseased ones, but he was not sure of any pathogenic action of the parasites.

We have examined a number of fresh and salt water species of fish in Manila, but have been unable to find *Trypanosoma* in any of them, nor have we been able to infect them with *Tr. lewisii* or *Tr. evansii.*

It has already been shown in the discussion of *Trypanosoma* that some *birds* are occasionally found to harbor a specific *Trypanosoma,* which, however, does not appear harmful to them. With reference to the inoculation of *Tr. evansii, Tr. bruceii, Tr. rongetii,* and *Tr. elmassianii* into birds, the evidence is somewhat contradictory for the different species. Most writers agree that birds are not susceptible to infection, but Voges, writing of mal de caderas, considers turkeys, ducks, and chickens susceptible by inoculation. He says that chickens die in from two to three weeks in great agony, from either subcutaneous or intraperitonoal injections. The only symptom noticed is emaciation, and parasites are very few in number in the circulation.

We have so far experimented with several varieties of birds, including maya, pigeons, doves, and chickens, but have been unable to infect them. No symptoms are produced, parasites are not found, and the blood proves noninfcctious when inoculated into susceptible animals.

TRYPANOSOMIASIS OF MAN.

In 1898 Nepveu published an account of the occurrence of *Trypanosoma* in human beings. An extract from his article, translated, reads as follows:

So far *Trypanosoma* have been found only in the blood of animals. In India they have been found in the blood of the rat (Lewis), the horse (surra epidemics), the dog, and the domesticated elephant. In Africa they have been discovered in the disease caused by the tsetse* fly, and in Europe in the blood of the rat, the rabbit, various birds, and the frog. No one seems to have as yet observed them in man, although Laveran states that Barron found certain flagellated protozoa of an undetermined genus in the blood of an anemic woman. In 1890, while making researches on malarial parasites in Algiers, I found flagellates in the blood of a patient, besides *Laveranii,* and I was able to count three to each preparation of 18 square millimeters. At about that time (see Nepveu, Etudes sur les Parasites du Sang chez les Paludiques, 21, 1891, in Bulletin et Memo ires de la Socie*te* de Biologie) I published some of the drawings I had so far collected. I hoped then that I might be able to complete my first observations by a more detailed study, but since then I have rarely been able to find the parasites. I have therefore decided to publish the following facts in the hope of drawing the attention of such naturalists and physicians as will have the opportunity of completing these researches. * * *

In over 200 patients, mostly malarial, of whom I have examined the blood, I have found these various forms of *Trypanosoma* in only six, three of whom were suffering from quotidian fever (Khill, Langevelle, and Bichielli), one from double tertian (Hendriek), and two from pernicious comatose fever (Cabane and Ginestet), while the seventh observation was made on Dr. X., who was apparently in good health. In none of these patients have I been able to observe any symptoms characteristic of this special parasitic invasion. They were almost all suffering from the effects of *Laverania,* which prevailed everywhere in its various forms. This seems, therefore, purely a coincidence, which has appeared to me worthy of notice.

His article attracted very little attention, some writers mentioning his work with the remark that his descriptions were inaccurate, and many overlooking it entirely. He did not attach clinical importance to the appearance of these parasites in the blood, but his remarks regarding them seem to us perfectly clear as to the occurrence of *Trypanosoma* in the blood, sufficiently so as to entitle him to the credit for priority in the discovery of *Trypanosoma* in the human blood. His description does not appear sufficiently ample to designate the species of his parasite, but when one considers the confusion which exists even at the present time regarding the classification of these organisms, Nepveu can not be denied credit because in 1898 he failed to classify his *Trypanosoma.* The parasites more recently discovered in human blood, as in his case, have not been clearly classified. Nepveu observed seven cases.

The eighth case of Trypanosomiasis in man is published in the British Medical Journal for January 1, 1902, in an editorial and telegram from Dutton, in which he announces the discovery of a *Trypanosoma* in a European, who displayed peculiar symptoms. *The* same Journal for January 11, 1902, contains a letter from Ross, in which he gives Dutton credit for the following clinical data:

The patient has been suffering from a form of relapsing fever with peculiar edema of the eyelids and puffiness of the face, also edema of the legs, general weakness, abnormal frequency of pulse and respiration, and enlarged spleen. There was no organic lesions of the heart and kidneys, and no malarial parasites were found after repeated examination. The relapsing fever recalls that of horses suffering from the same parasite. It is not yet certain whether the parasite approximates *Tr. brucei* or *Tr. lewisii.*

Dutton considers the most valuable features presented by his case as (1) its chronic course, (2) the general wasting and weakness, (3) the irregular rise of temperature, which is never very high, and of a relapsing type, (4) the local edemas, (5) the congested areas of the skin, (6) the enlargement of the spleen, and (7) the constant increased frequency of pulse and respiration (hurried breathing).

He examined the blood of one hundred and fifty healthy children between the ages of one and 'fifteen years, natives of Gambia, and says that he found *Trypanosoma* apparently identical with those observed in the European in the ninth case. The child is reported as showing no clinical evidence of the disease.

Forde (Journal Tropical Medicine, September 1, 1903) publishes the case already described by Dutton. He deals particularly with its history and symptoms previous to Button's personal observations.

The patient was a European, 1* years old, and at the tune he came under Dr. Forde's can-. May in. 1901, at the Colonial Hospital, Batlmrst, was a man of robust constitution, living a regular and steady life.

He was at first thought to be suffering from malarial fever, but quinine produced very little change in the course of the temperature. His blood was examined and malarial parasites were not found, but in nearly every specimen Forde found "small worm-like bodies," which he at first considered a species of *Fikma.* After repeated observations, however, the diagnosis became doubtful, and he associated these bodies with the symptoms of the disease.

The patient was invalided to Europe and returned to Bathursi in December, 1901. At this time Dr. Dutton, being informed of the case and examining the patient's blood, again found parasites, and immediately recognized them as *Trypanosoma.*

Forde gives as the chief characteristics of this case: (1) The Irregular intermittent temperature, (2) the edemaftms condition of the Eace and lower extremities, (3) the rapid and variable pulse and respiration, unaccompanied by any evident cause, (4) the loss of weight with marked debility, wasting and lassitude, (5) the persistence of these symptoms and their resistance to treatment.

In the Join-mil of Tropical Mnlicino for November L, *1902,* \e publisl ed "A Case of TrypanosomiasiB in a European/' under the rare of Dr. Manson—the tenth case. Hanson had been si ruck by the peculiar clinical features of Forde's case, its chronic irregular fever, the enlargement of the spleen, the edema, especially of the face, and the rary well-marked erythema multiforma scattered over the trunk and limbs.

The patient under Mausinvs observation was the wife of a missionary, who bad resided on the Upper Oongo for about, a year and had been sent to Manson bj Habershon. She bad been suffering while MM Hie Congo from an irregular fever, which was still present when she came under observation, though she had been living in England for the past eight ....nthfl and had been drugged with quinine and arsenic.

On examining her Manson n o<niized the same grouping of symptoms he had seen in Forde's ami Dutton'a case. The patient was admitted to iln hospital anrl bej blood was examined daily for two weeks, Imt no *Trypanosoma* were found. While arrangements were being made to test Hie tentative diagnosis by injecting blood into animals, Dr. Daniels, while making a blood count, found a *Trypanosoma,* and on subsequent examinations more parasites were observed. In the British Medical Journal, May 30, 1903, this case is accurately described by Manson and Daniels.

Manson published the eleventh case of Trypanosomiasis in human beings. The **patieni** was a **European Lady** who had resided on the Congo. In this case an erythema tous rash was a prominent **symptom,** preceding or accompanying the attacks of fever, **which** occurred every ten days and lasted cadi time lor about three. The cause of the disease is attributed to the **bite** of some insect on the foot. Manson is inclined to attribute significance to a tick *(Argas movbaia)* as a transmitter of the infection.

Broeden, according to a letter received by Dr. Manson, has discovered **two** more eases in human beings—the twelfth and thirteenth. Both of these were Europeans. Baker has recently reported **three** more cases in human **subjects** in Uganda.

Of the sixteen cases of Trypanosomiasis in man, two **have** been in apparently **healthy** persons, six associated with malarial fever, and ei^rhi have shown clinical symptoms apparently entirely due to the infection with *Trypanosoma.* In these five cases the clinical picture, which has **already** hcen reviewed, was peculiar and quite similar.

CasteUaxri has **reported** ih> discovery of a *Trypanosoma* in the cerebrospinal fluid of twenty out of thirty-four cases of sleeping sickness. He has **described** the parasite and proposed the name TV. *ugandense.*

Bruce has continued Oastellani's work and has reported to the Royal Society the discovery of *Trypanosoma* in the fluid obtained by lumbar punctures in all of the thirty-eight cases examined, and in twelve out of thirteen of these cases he found the *Trypanosoma* also in the blood. The importance of this discovery can hardly be estimated at the present time, but it is certainly additional evidence of the increasing importance of this subject. Liesbman has also recently reported the possible appearance of *Trypanosoma* in **the** blood of patients suffering **with** "dumdum" fever . in India.

Since the beginning of the present work in Manila constant vi.irilance has **been observed** in order to discover the infection in man, but so far **with** negative results. Neither the clinical symptoms nor I lie parasites have been found. The blood of hundreds of cases of pi rsons Ml and in health has been examined, particularly that of persons who have come in close and frequent contact with animals suffering from the disease. **Both** writers of this article have repeatedly performed post-mortem examinalimis **OB** animal? **which** had been but a few **minutes** dead of the disease, **and have been bitten** by flies covering the infected organs, but without the slightest inconvenience. A number of assislants during the course of **the** work have **often** exposed open skin wounds to infection both by bloo **directly** and by biting flies, but all with **negative** results.

Tiir **reported** cases show conclusively that human **beings may** Incom**e** infected, and we shall continue our observatinn. in **fchjg country,** where the constant presence of the disease in animals, the sanitary conditions and the anemic state of most of the inhabitants would lead to **exped** a **case eventually** <" occur in a human hoi ng.

Here we shall briefly mention the notes found in literature relating to such animals as have contracted the disease but in the case of which the clinical manifestations have been given but little detailed discussion and on which, owing to the lack of animals, no observations can be made by us.

Bruce proved by animal experiments nine out of thirty-five wild animals examined in South Africa to be infected with *Tr. brucei.* The positive ones included one buffalo, three *niedbeuste,* three koodoo *(Slrepsiceros kudu),* one buch-buck, and one hyena. Many of these animals showed no clinical evidence of disease.

Laveran and Mesnil, in mentioning the animals susceptible to nagana, give several species of antelopes, the dromedary, the hare, the mullet, the hyena, the lapian, the hedgehog, the racque. Bruce mentions the babale and Brumpt the chamois. Lingard and others say that buffaloes and elephants are susceptible. Sivori and Lecler refer to the carpincho and Voges to the nutria *[Myopotamus coypus)* among animals subject to the infection.

Voges considers the nutria extremely susceptible. Death occurs suddenly about ten days after inoculation, without symptoms.

Laveran and Mesnil say that wolves have an incubation period of two to three days and that death takes place in from five to twelve days after inoculation. Parasites vary in number, but are usually to be found throughout the disease by microscopic examination of the blood. Cachexia and irregular fever are the prominent symptoms.

In strong, healthy animals the course of the disease is much longer, being twelve to fourteen days or more, and the period of incubation is. from four to five days. The blood is always infectious, but parasites are not usually found in it by microscopic examination. Local symptoms appear in twenty to thirty days. Emaciation is not noticed until just before death.

The prominent symptoms when once established are conjunctivitis, coryza; edema, particularly of the head, the legs, and the genitals; congestion of the testicles, or even a true orchitis; falling out of the hair about the eyes, nose, and base of the ears; opacity of the cornea, sometimes purulent conjunctivitis and blindness in the late stages; ulcers around the eyes, nose, and other parts of the body, similar to those seen in dourine. In animals dying from twenty to thirty days after inoculation the marked clinical symptoms are not observoc]. English writers give the incubation period at eight days and the duration of the disease at twelve to fifty-eight (average, thirty) days.

Several writers mention hamsters as susceptible.

Hagger states that surra runs a very chronic course in camels and that the natives believe that a small portion of those surviving for three years to recover. He gives as the principal symptoms fever, swelling of the

right side of the chest, in the scrotum, and sheath of males and in the udder of females, frequent abscess formations in these regions, progressive anemia, and rapid emaciation. The appetite remains good. Parasites are present in the blood during fever, which sometimes reaches 42° C, and are absent during intermissions.

The several forms of the disease are said to run a chronic course, somewhat similar to that of the goat and the deer.

IX. COURSE, DURATION, AND PROGNOSIS.

The course of the disease varies in the same and considerably more so in different species of animals. In the language of Laveran and Mesnil, "it always shows the general characteristics of blood infection."

A temperature of remittent, intermittent, or relapsing type is present in nearly all animals, including man. Progressive anemia and emaciation arc also constant manifestations. It is rarely a very acute infection, although in exceptional cases it becomes so intense as to suggest septicemia.

The duration is also variable both in like and unlike animals. Schilling says that the surra of South Africa lasts from thirty-six days to eight months in horses. He considers the acuteness of the disease to be influenced somewhat by the number of parasites in the blood. Bruce says that horses live for weeks and months with nagana.

In the Philippine Islands the duration of the disease in horses does not show a greater variation than it does in other countries. It is from fourteen days to three months, and is about the same for American, Australian, Chinese and native horses.

The length of time the disease lasts in cattle is usually somewhat longer. Bruce had a cow sick with nagana under observation during eighteen months.

The prognosis is influenced to a certain extent by the species of the animal infected. Most writers agree that it is invariably fatal in horses, but there are some exceptions. Schilling believes that some horses recover; and Laveran and Mesnil say that recoveries have been reported in South America, although they hate seen none. A varying percentage of cattle, according to careful observers, recover. Bruce says that cattle occasionally recover from nagana, and Laveran and Mesnil have had similar results. Lingard believes that a large proportion of cattle recover. Voges, on the other hand, considers the^cattle of South America immune.

The annual report of the Division of the Chief Quartermaster of the Philippine Islands for the year ending June 30, 1902, records the death of 13,693 horses and mules out of a total of 17,220 on hand. Ho adds that most of this havoc was produced by surra and glanders.

The courjse, duration, and prognosis of the disease have been considered somewhat in detail under the discussion of the different species of animals.

The duration in particular varies so much with environment, the constitution of the animal, and probably with other conditions which we do not understand, that it can not be fixed except within wide limits. The prognosis is always grave, the mortality in most species of animals being 100 per cent. The only exception to this fact among domestic-animals of economic importance is found in cattle, a varying percentage of which recover.

X. COMPLICATIONS.

Broncho-pneumonia, observed especially in h< rses, has been mentioned by writers as a frequent complication. In this country edema and congestion of the lungs is common, while broncho-pneumonia, moro or less extensive in character, is occasionally Been.

Nephritis, hydropericardium, and hydrothorax sometimes explain unusual symptoms. Tuberculosis and surra are not infrequently associated, especially in monkeys. We have had two cases of surra and glanders in the same animals. Filariasis and surra often occur together in dogs. Einderpest sometimes develops in cattle suffering with surra.

Other diseases which we have found associated with surra are foot-and-mouth disease, pseudoactinomycosis, pseudofarcy, malignant neoplasms, and at least two septicemic conditions not fully understood.

XI. DIAGNOSIS.

In order to carry into effect methods looking to prevention an early diagnosis is very desirable in all cases. Fortunately, in the horse, the most frequently infected of all animals, this is in the majority of cases easily done by a microscopic examination of the blood, which consists in examining a specimen prepared in the same manner as one to be examined for malarial parasites. The *Trypanosoma* are readily observed with a Zeiss DD or AA and ocular 4, and are usually in sufficient numbers to be quickly seen. In many cases, however, they may be so few as to require considerable time and the examination of several specimens before they are found; and as has already been said, they may not be observed at all for several days at a time by this method.

When infection is suspected and parasites are not found in the blood, there are two courses open. First, microscopic examination, carried on for several days if necessary, will usually suffice for making the diagnosis in horses and in several other animals in which the parasites are but rarely absent for more than a few days at a time in the early stages of the disease. The second course is to test the blood by animal experiment. For this determination any of the smaller animals, particularly dogs, monkeys, and white rats and mice, are satisfactory. A few drops to 1 c. c. of blood from the suspected animal may be injected under the skin, or, preferably, into the abdominal cavity on account of the shorter incubation period, after which the parasites may be demonstrated in the usual way.

The objection to the latter method is the expense of the animal and the length of time necessary for the appearance of the parasites. On the other hand, results are certain, and in the case of some animals time is saved. This method, however, is absolutely necessary in many cases of infection in cattle, goats, sheep, and some other animals, and should be employed in all cases of doubt from any cause.

Whatever the method used, a determination of the blood infection is absolutely the only way to make an early positive diagnosis of the disease in any species of animal, and it is well constantly to bear this in mind in performing work which means so much in suppressing an epidemic.

As has already been said, the early clinical manifestations are slight. The temperature, always highest in the afternoon, is constant in most animals immediately after the incubation period, but may drop to normal again very quickly and remain so for days. When present during an epidemic it is significant, but its frequent absence leaves much to be desired. The next symptoms to appear are catarrhal discharges from the nose and eyes and a beginning pallor of the mucous membranes. Even with all of these symptoms, which may not be fully developed for a week, the diagnosis is still not absolutely certain without a determination of parasites in the blood.

With the development of other symptoms, such as edema and incoördinations, in addition to those already mentioned, a diagnosis upon appearance alone is justifiable.

XII. DIFFERENTIAL DIAGNOSIS OF SURRA, NAGANA, DOURINE, AND MAL DE CADERAS.

Very little convincing work has been done to solve this important question, for the reason that very few workers have had the opportunity of studying more than one of the affections. In most cases authors have contented themselves with the conclusion that if not identical they are closely allied. Koch, who worked particularly with *surra* and *nagana,* considered the parasites and the resulting infections identical, and many others have formed similar conclusions, while Voges and Laveran and Mesnil and others maintain certain differences to exist.

Writing of *nagana* and *mal de caderas,* Laveran and Mesnil consider them distinct morbid entities, which can not be separated by their clinical symptoms, and they further maintain that species of animals which arc susceptible to one can also be infected by the other. They classify their reasons for considering the two diseases to be distinct under three headings: (1) Constant morphologic differences between *Tr. brucei* and Tr. *equinum;* (2) animals immunized against *nagana* do not have for *Tr. pquinum* the same activity that they possess for *Tr. brucei,* and (3) animals immunized against *nagana* arc susceptible to *mal de caderas.*

The morphologic differences between the two *Trypanosoma* have already been considered, and regarding the other points of difference Lavcran and Mesnil explain themselves in substance as follows:

A deer recovered from *nagana* at the end of eight months, and, having received during the interval fifteen inoculations of 10 to 60 c. c. of the blood of a dog affected with *nagana,* without contracting the infection again, was inoculated in the skin with 1 c. c. of dilute blood of a rat suffering with *mal de cad eras.* Blood taken from the deer five days after this inoculation was infectious for mice by intra-peritoneal injection.

A sheep cured from *nagana* after a period of one month and which had received during this time inoculations of 10 c. c. to 20 c. c. of blood from a dog suffering with *nagana,* was inoculated subcutaneously with 0.5 c. c. of diluted blood from a mouse sick with *mal de caderas.* The blood of this sheep, obtained five days after the last inoculation and injected into the peritoneum of a rat (with a dose of 3 c. c.) and of two mice (with doses of 0.25 c. c.) gave to them an infection caused by the *Trypanosoma* of *mal de caderas* with an incubation period of less than four days.

Blood taken again after fifteen days from *mal de caderas* and injected into the peritoneum of a rat and a mouse conveyed the disease with an incubation period of four to six days. The blood of a control sheep, which had not yet received an injection of *Trypanosoma* of *nagana,* examined on the fifth and thirteenth days after an inoculation of *mal de caderas,* showed the same virulence as the blood of sheep recovered from *nagana* and infected with *mal de caderas.*

The question as to whether the serum of animals immunized against *nagana* is active for *Tr. brucei* and without action for *Tr. equinum,* is discussed by Laveran and Mesnil as follows:

I. The serum of a deer immunized against nagana, when given in a dose of 1 c. c. containing from one-fifth to one-twentieth c. c. of blood of *mal de coder as,* showed no action on the incubation period or on the progress of the infection in mice inoculated with the mixture. The same quantity of this serum, mixed with corresponding doses of blood of nagana, prolonged the incubation period of the disease about five days.

II. The serum of a sheep which had recovered from *nagana,* when given in a dose of 1 c. c. or even 2 c. c. mixed with doses varying from one-tenth to one-twentieth c. c. of diluted blood of a dog having *mal de caderas,* had no action on the incubation period or on the progress of the infection in mice inoculated with the mixture. The same serum, in a dose of 0.5 c. c. mixed with one-tenth c. c. of diluted blood of a dog, prevented all infection in the rats inoculated with this mixture. We also experimented with a mixture of 1 c. c. of the scrum with 0.5 c. c. of the same diluted blood.

Bruce considers *nagana* and *surra* analogous, if not homologous, diseases. Weber and BTocard have concluded that *surra, nagana,* and *dowine* are the same disease with slightly different symptoms. Schilling con-

siders them all closely related or identical. Curry believes *surra* and *nag ana* probably to be the same, but does not know with which to place the Philippine epidemic.

Salmon and Stiles state that the majority of writers consider *surra* and *nagana* the same disease, but that they maintain *dourine* to be different. Sivori and Lecler from their studies think that the parasites of *surra* and *nagana* are identical.

Voges will ńot venture a decision as to whether *mal de caderas* and *dourine* are the same disease. He points out in detail their great similarity. He considers these diseases different from *surra* for the following reasons:

(1) *"Dourine* and *mal de caderas* can not be transmitted to cattle, which animals are directly attacked by *surra." (2)* "In regions where *mal de caderas* exists cattle do not die from *surra."* (3) "We have no reason to believe that *Trypanosoma* show the same irregularities of virulence as bacteria, so that the different forms of the disease may be said to be produced by different degrees of virulence in the same *Trypanosoma.* On the contrary, during our four years of experimentation, the latter have shown a constant virulence." The fourth reason, which he considers decisive, is based upon the morphologic differences in the parasites, which have already been discussed. In conclusion he says: "I think these four proofs are entirely sufficient to establish for all time the difference between *surra* and *dourine* as well as between ***surra* and *mal de caderas."***

In another article Laveran and Mesnil give extensive consideration to the differences between *surra* and *nagana,* w4iich in substance is as follows:

The same animals are susceptible to both of them: the horse, the ass (except perhaps certain races), the mule, the goat (in the Dutch East Indies they are refractory to *surra),* the sheep, the cow, the camel, the dog, the cat, the monkey (long-tailed macayo), the rabbit, the guinea pig, and the rat. In the horse, the course of the disease is the same, whether *surra* or *nagana.* The animal dies at the end of the same time (30 days on the average). In the case of experimental inoculation, the incubation period is the same, there are the same lesions of the eye and lids, the same edema, the same degree of anemia, the same emaciation, followed by final paresis preceding death. The fever is of the same type, except that it is perhaps more clearly intermittent in the case of surra; besides, during the intermissions, which may last from one to six days, the parasites are not seen in surra by microscopical examination, whereas they are very rarely absent in *nagana* (Lingard insists particularly on this difference). In short, the differences are minimum.

The other equides, the goat, the sheep, and the dog die of the two diseases in the same length of time and with practically the same symptoms. * * * Rabbits, guinea pigs, and rats *{Mus dcoumanus)* succumb to surra with about the same symptoms as to nagana.

Cows remain to be considered. Few survive nagana (according to Bruce, Koch, and African explorers in general). On the contrary, they generally recover from surra. According to Lingard, doath from tin*'rti<*en<«o is in fact exceptional. The

animal beeomea considerably emaciated, but recovers its health; and a second inoculation does no harm. 'J'his appears to be a sharply marked difference between the two diseases. Perhaps this is owing to a difference of race, as Rogers has supposed, recalling the experience of Koch relating to the asses of ICassai. In any case tin- question should be settled by experimental methods. If the supposition of Rogers is considered incorrect, the question may be determined ▷y proving whether cows inoculated with several doaes of *xitmt* blood are siis-ceptible to *nagana.* Not until these experiments have been made can a positive conclusion be given.

Mai de caderas.—Passing next to *mat de cadents.* Laveran and Mesnil 1'rlieve that in most of its principal symptoms—

> h does not differ at :i!l from *surra* and *nagana]* bui hematuria is frequently present. Paralysis of the posterior extremities, * * * a marked symptom of the South American disease, * * * is undoubtedly more pronounced than in surra or nagana.

The dog, lite sheep, the goat, the cat, the monkey, the rabbit. I lie guinea pi^. i In- rat) and the mouse succumbed at the end of various periods, at-cording to the species of the animal (five to twelve days for the rat, four to eight days for the mouse, ten to fifteen days for the monkey, and three months or more far 11 ic goat and the sheep). In the rabbit the course is slow, mid the animal presents the same symptoms oi the eyes and genital organs as we have noted in nagana.

Cows are absolutely refractory; Argentine scientists mention a bull which was inoculated every eight days fur *n* year and a half with 200 tu 300 C. C. of blood from a sick horse, wit limit, sbmvinji any si<_'ns of (lie disease. They ilo not say whether an examination of the blood was made nr a susceptible animal inoeuhi:ed will) it,, especially during the month which fallowed the first injection.

In short, Laveran and Mesnil consider *mat de caderas* very closely rel•ted to *surra* and *nagana.*

Continuing the discussion with reference to *nagana.* Laveran and Mc-nil say:

> We have already shown * * * that the ***TrypUfUMKmta*** "f *doiirint;* presents morphological differences from that of *nagana.* This Is an important argument in favor of the nonidentity (if the two diseases. * * * The etiology is completely different. Contagion by coition seems to be the only natural mode of infection fur dourine, us *n*>< spnnuu....us eases are known in geldings and mules. Inserts, then, piny no part in the jnopagation of *dourim:*
>
> May *mttjtintt* be extracted by coition? It is not probable, as BO contagion resiilts from depositing the virus on an unbroken mucous membrane. Nevertheless tile c\|u-i iinent should be made, especially in (lie case of the rabbit.
>
> The first symptoms (in the horse) appear ten to twenty days alter the infecting eoition. * * * In the male there is edematous enlargement of the foreskin, then of tin* extremity of the penis, and a slight imieo-purulent oozing from the urethra! mucous membrane, which is Inflanwdi In the female (here i* an enlargement of the two lips, or of one alone, with a nim-o-purulent fiiscl MM tin- Inflamed vagina] mucous membranes.
>
> When thi> h.| per-isted *tot* ii short lime, other phenomena arc manifested, as edema of the limbs and abdominal regionSj progressive anemia, con slant en nutation in spite of good appetite, weakness of the muscles, especially oi the posterior extremities, and often sharp flexions of the joints. Certain symptoms are pathognomonic so tu speak, as the cutaneous patches seen on various parts of the body. There is hardly any fever; the temperature rarely passes 30° C.

The disease generally lasts from four to ten months, ;iiul liu^ uevrr iiic acute character of naguna or surru.

Toward the end of life ocular troubles (**conjunctivitis,** tileerative kcratitis) nre **sometimes** noticed; the pareses are accentuated; there may be pronounced or very nearly complete paraplegia; and at autopsy foci of softening of the medulla may in- observed, **which** U **never** the case in *nagana* or **surra** * * *

The common symptoms of *dourine* and ***nagana*** **then are** striking. As to the **special symptoms <>*f dourine*** (cutaneous plaques, foci of softening of the medulla), **they** are not constant (the cutaneous plaques, for example, generally being absent in the ass) and may be considered in accord with the slower course of the disease. Nocard "has been able to kill horses in four, six, and eight weeks, with a temperature curve identical to that which characterizes *surra* and ***nagana."***

Considering dourine in their animals, they say:

The dog, **the** rabbit, the rat, and the mouse are **soeeeptibta,** but with exceptions and degrees of illness that show variations in the virulence of the infecting agent. • * * Rouget killed white mice in five to ten days **with** a general infection like *nagana* in its **cOtMW,** Only a small number of s«wer rats succumbed, others recovered after **having** a sanguinary infection, while some were absolutely refractory. In the beginning of their studies, Buffard and Schneider had the same experience as Rouget on rats and mice: but Sn<;;ml, who their ***Trypanoaoma*** after passage through a dog, found rats and **mice almost absolutely** refractory, and it was only with the greatest difficulty **thai the** virulence was **sufficiently** increased to make rats sensitiw. In the rabbit and the dog the course of **the** disease ia much the same as in the horse, and contagion may take place by coition.

We wish to call **particular** attent^gn to the lesions in **the** infected rabbit, already well (Irscrihid by **the authors we have** cited. **They are much** Hke those of rabbits infected with ***nagana,*** * * * With *nagana,* **however,** they **never live longer than** two months after inoculation, while in the case of *dourine* they may survive for more than six months with **characteristic** lesions. **Experimental** methods, therefore, do not show a sharp **difference** between *dourine* aud *naff ana.* * * * Cows are scarcely susceptible to *surra* find absolutely refractory to *mal de cadcras,* **the** two diseases which **we have** shown to be so closely related to *nagana.*

Finally, a recent experiment of **Nocard shows that** there is a difference between *dourine* and *nagana,* * * * which corroborates our morphological observations. A number of dogs highly **immunized against** *dourine* were **Inoculated** with a very small quantity of blood taken from one of our mice and rich in *Trypanoaoma* of *nagana* at the same time as ft control. The two immunized dogs died of *nagana* in eleven days, the control in fourteen days.

The statement of Weber and JSTocard and **others thai** dun tine is found 11 :i in rally only in **horsea and** donkeys has been used as an argument, for the indiviiiiinlily of this disease. In looking over the work of these **writers,** however, it **will** be noticed, as has been, pointed out by others, that their **statements** are based upon observations made in localities free from **other** forms o!" **fche** disease, and in at least one case in **a** country free from the known insects of transmission. When don rim- is transferred to a country **fenere** surra is prevalent, it has recently been shown **that transmission fcajces place** just as it dots in this disease; 30 that it appears **that Schilli** ng's r.'mark that coition i> the **natural** mode of transmission only in ilm nlisence of the usual insects and other necessary environments,

is rational and goes a long way toward refuting one of the arguments for the individuality of this disease.

We have studied surra with special reference to the particular points brought out by writers in various other countries and have been unable to find any clinical evidence that it is materially different from the description of any one of the other diseases already described or that they differ sufficiently from each other to justify the continuation of so many names.

A comparative study of the *Trypanosoma* has already been discussed in a chapter devoted to that subject and it is unnecessary to repeat conclusions here.

In summing up the whole matter it appears to us, when we take into consideration the work done by others and add our own results, that we are justified in believing *surm, nagana, mal de cadcras,* and probably *dourine* the same disease, and that all are caused by *Tr. evansii.*

We recently received from Java a cow suffering with surra when it arrived. Einderpest also developed in this animal shortly after landing, and the surra not yet having been discovered, the blood of this animal was used by Dr. Jobling, Director of the Serum Laboratory, in the immunization of three other cattle, two of which promptly developed Trypanosomiasis. We have studied the parasites in these animals and the course of the infection in different animals, and have satisfied ourselves that it is the same disease with which we are working in Manila. Jf the transfer of surra from Java to this country causes such a change in the nature of the infection in cattle, it is not at all surprising that similar ones may be brought about by transferring it in other countries.

Laveran and Mesnil found that the parasite of nagana is not so virulent for their cattle in France as it is usually reported to be for those of Africa.

The immunization of animals against one form of the disease with attempts to prove them susceptible to another has been undertaken by several authors, and most flattering results have been reported; but on going over the work it does not appear that the presence of the first disease was disapproved by animal experiment in some of the so-called immune animals before the second one was administered.

A discussion of the very interesting and important question of the identity or difference of these various diseases, to be of any great value, must take into consideration two factors: (1) The morphology of the parasites and (2) their pathogenesis in full.

It is the old story of parasitic infections over again, the zoölogist paying particular attention to the first of these considerations without full investigation of the second, and the strictly medical men doing the opposite.

In this case both points deserve careful consideration, but as the value of conclusions in sanitation and therapeutics are enhanced more by what

he parade does than by what it is, we acknowledge the pathogen,,, to be nt £he ,,,,;lhT Importance and shall *so* apply it in our discussion

Anumber if not all, of these diseases show a special tendency to lesions '><!-;• P'nita s and if, as asserted, dourine is transmitted only bv coition this tact wouhl serve merely to emphasize a symptom shown as a tendency "' i •• others and therefore doe, not place the diseases so far aparl *M* might appear a, a glance. Competent observers have shown, hmiwer tnat m th., disease as in all others of Trypanosomatic origin the infection' ^ I., ^nsfynv,! by inoculation and the typical disL, reproduced

lie supposed natural transmission of dourine onlv through coition has been explained by a recent writer as probably owing to the absence of ttw asua] transmitting insects in th, .-^i,,,,. affected· Jn any ^^ ft does no, appear to have been demonstrated that insects are not ,apable ot. tetnsmitting the infection. The other described characteristic manfestal ions of the disease—the peculiar skin lesions-are found bv , .•urefnl r.,i.,(of [iterate not to be confined entirely to dourine and not to be constant „ tbis disease, especially when produced by inoculate.. So far unfortunately, hut little work appears to have been done with a vmv to determining the probability of transmission (,f th, other Forms through coition and the study of the disease so produced

In the early reports on *surra* by Bvans and others it was stated that the disease w,,. rery fatal for cattle as *wf* as for horses. lmt in iate vears most of th. tmters say that these animals are somewhat more resistant and that man; of them recover. So, too, with *nugana*f in certain parts of Africa the disease is reported to be very fatal for cattle, but in other sections of that country and in other countries a greater resistance has been shown, and, as unl, *sum,* a certain number recover. 'When we look over carefully the literature relating to those disease in cattle we fail to find »!"• marked diligences so strongly emphasized by some authors as beinc diagnostic pointe in differentiating the u-o diseases; and indeed there are as greal rariations reported Cor th, action of either of th.-., diseases'in cattle as there are reported for any iuo „r the diseases in them so th,, we are justified in concluding that there LS nothing in the- course of the various forms of trypanosomiasis in th, same or different animals to warrant considering them distinct pathologic entities; in fact th, contrary would appear reasonable.'

Absolute proof of the identity or individuality of these infections a, ih,v exist in various countries can be obtained only by importing infected animals Eor each individual disease into one place and carrying on the ir study under Ijke environment. Until this is done we are iin-lined a> we M,»t,d, to regard *»urra*l *hagana, mal de caderas,* and probably *doitr* r,,,r i]< fl te same disea Be_ This is fl rery interesting question and one which - should be settled; hut as far as providing means to combat the infection \s concerned, a solution of this problem would not he likely to

add anything of value. Means which prove efficacious Eoi one Eorm *>r the disease will probably do so for all.

XIII. SUSCEPTIBILITY AND NATURAL IMMUNITY.

A i'ull discussion of this subject would involve a greai deal of repetition, bat owing to its importance in dealing with epidemics it will be briefly reviewed.

On the whole then: is a most remarkable similarity in ihe degree of susceptibility and immunity of various animals to surra, aagana, :iml mal fie caderas. Thm- are imli\iilual differences, Imt it must be remembered that many factors contribute to such differences, since experimentation is carlied on in various parts of the world.

Schilling mentions pigs as the only animals refractory to African surra: others, however, have shown that they may contract this di»ease, find they are considered to be susceptible to the other forms of Trypanosomiasis sis well. Penning says that the cattle of Java do not contract surra, white Bchat considers them susceptible. The chronic course of surra and nagana in cattle and the reported natural immunity of these animals to mal de caderas are not sufficiently at variance to justify the statement that the difference is diagnostic.

Lingnrd considers buffaloes susceptible, but Bays they may recover fi om the infection. These results do not differ from those reported in relation to the same animals in other countries. He also cites the case of a horse «Inch he cured of surra with arsenic, iodide of arsenic."and mercury : Imt twelve months a Tier the cure the animal died <>I the disease I'nnn the inoculation of one drop of virulent blood.

Sivori and Lecler were unable to find *Trypanosoma* in carpinchos, tapirs, peccaries, stags, small deer, pumas, tigers, and the *Lutra brasilim*.

Birds, according to Foa, are absolutely refractory to largo il oses injected subcutaneous]y, abdominally, or through the eye. Voges, on the other hand, claims that chickens, ducks, and turkeys are susceptible I>\ inoculation to mal de caderas, Later reports state thai tin' birds of South America are immune.

Vuges believes thai the cow is die only animal naturally imnrani to mal de caderas. ffe proved horses, mule-;, donkeys, sheep, goats, rabbits, dogs, guinea pigs, white and grey rats, MMI white and grey mice to be isceptible,

Kouget determined binls, bats, and guinea pigs to be reeistani to *Tr. uiperdum.* Sewer rats also showed a pariiiil immunity. Kantluick, Durham, and Blandiord consider the sheep and deei of Africa -•esistant i» *nagana,* and Koch says that the asses of Massai and the erosses of these asses with those of ftfosket arc immune to the same di-ease.

Salmon and Stiles mention horses, asses, mules, camels, elephant, cats, ogs, cattle, buffaloes, sheep, goats, rabbits, guinea pigs, rats (*Mm decu-"mis* and *Nesohia qrovidem),* and monkeys as Buseeptib le to surra.

They say that birds, reptiles, amphibia, and fish are immune to the *Trypanosoma* of mammals. The gaur (Indian bison) and the tsaing, according to Evans, have never been observed to have surra.

Ducks, roosters, doves, sucking pigs, and kids (a short-legged variety of goat found in Togo) were inoculated by Ziemann and recovered permanently from the disease.

Curry considers chickens immune by inoculation. He found horses, cows, carabaos, monkeys, dogs, cats, and rats susceptible to infection with *Tr. evansii* of the Philippines.

The only animals naturally susceptible to *Tr. lewisii* are wild and grey rats and mice; white rats and mice and tachetes may acquire the disease by inoculation. Laveran and Mesnil and others have shown that guinea pigs inoculated in the abdominal cavity are temporarily infected in a certain percentage of cases. To these may be added monkeys and puppies.

Eouget showed that white and grey rats and mice, rabbits, and dogs inoculated subcutaneously, intraperitoneally, in the abdominal cavity or by dropping infected blood into the conjunctiva), are susceptible to *Tr. equiperdum.* Wasielewski and Senn found *Tr. equiperdum* in horses and asses, and successfully inoculated horses and dogs with it.

Voges mentions dogs, horses, rabbits, rats, mice, and guinea pigs as susceptible by inoculation to dourine. Weber and Nocard say that this disease may be inoculated subcutaneously, abdominally, or in the serotum or vagina in the case of the dog, the horse, the donkey, the rabbit, and the mouse.

Bruce proved the horse, mule, ass, cow, dog, cat, buffalo, hyena, bobale, and several other animals susceptible to nagana.

Lavcran and Mesnil mention among the animals which may contract mal de caderas horses, asses, mules, cattle, sheep, goats, rabbits, guinea pigs, dogs, cats, rats, camels, elephants, and monkeys. Brumpt found the chamois susceptible.

There is no doubt that cattle have a relative natural immunity, which seems to vary somewhat in different countries; but this variation is not great enough to be of especial diagnostic significance.

The value of keeping in view the relative immunity of certain animals, in addition to its scientific interest, lies in its practical significance in providing measures for the suppression of an epidemic. The animals showing this tendency in the greatest degree are those which also give the least physical evidence of infection, and consequently are dangerous in that they provide hosts **for** its perpetuation. It is in these animals that parasites are often present only in small numbers in the peripheral circulation, necessitating animal experiment fully to establish a diagnosis.

XIV. PROPHYLAXIS.

The question of prophylaxis constitutes the next important part of this subject. All efforts to cure the disease having failed and there

l>eing but slight prospect of working out methods which will be successful in the treatment of an animal once infected, our highest hope lies in being able to bring about a practical and at the same time efficient condition of prevention.

A curative treatment of animals suffering with this disease is not at all necessary to the welfare of the community which has the infection in its midst. It is a disease belonging to the class readily controlled by preventive measures, just as the case with many of the infectious diseases of man for which we have no cure. Practical rules for the control and even for the suppression of an epidemic may be prepared and enforced with no great difficulty; and the failure to do so shows a lack of progress in proportion to that evidenced in the control of the less important diseases.

With the aggregate of the findings on the nature and mode of transmission of this disease before us and considering the practicable manner in which this knowledge may be applied efficiently to control the infection, one can not help wondering that the annual loss of millions? of animals from this scourge is permitted.

With the possible exception of rinderpest, it is the most important disease of animals with which a large part of the tropical world is infected. From an economic standpoint, measures looking to its control are of greater importance to the public welfare than are many of the diseases of man on which annually are spent millions of dollars.

Quarantine regulations governing the importation of animals are obviously the first point to consider in the discussion of preventive measures. Very few countries have efficient quarantine laws. Prance prohibits the importation of animals from infected countries and the United States does not allow animals to be imported from the Philippines. Kecently a few other countries have been considering similar steps.

Leveran and Mesnil state that "the importation of animals from infected countries should be prohibited or greatly restricted. All animals arriving at a port should be examined, and if any are found to be infected, these should be killed and the others isolated. If the disease gains entrance to a new country, preventive measures, if established early, should prove efficient."

In a preliminary report, Bulletin No. 3, Bureau of Government Laboratories, Musgrave and Williamson in part say as follows:

1. Prevention of reinfection of the country by proper quarantine laws.

2. Eradication of the present infection by enforcing efficient sanitary regulations.

It is believed that the methods to be described are practicable and, if adopted, will prove sufficient to control the epidemic and eventually to eradicate it from the country, but to give the best results work should be begun at once, during the dry season, while the cases are comparatively rare and before the wet season comes with its great increase in the number of biting flies and the consequent spread of infection.

Had vigorous methods been adopted when the disease first appeared in this country in 1901, there would not have been an epidemic, and even now, were proper procedure followed persistently, the disease should be eradicated from the Islands. If, however, no more efficient course is adopted than the one in use now, the disease will go on spreading until the whole country is involved and the epidemic becomes perpetuated, as it has been in Africa, South America, India, and other countries.

The subject is an all-important one to the country, and it is imperative that facts and suggestions as to remedies be placed before our legislators. Without legal authority, municipal sanitation (as history so well demonstrates) must always be a failure, but with the authority given by proper ordinances, a disease such as Trypanosomiasis of horses should be controlled from the start and finally eradicated from any country in which it has obtained a foothold.

In considering quarantine regulations against the introduction of Trypanosomiasis into a noninfected country, a safe but hardly justifiable procedure would be to forbid the entrance of any animals from an infected port, as was so promptly done by the United States against the Philippine Islands when the disease was first reported here. Whether our home country enforces the same stringent laws against all others infected with Trypanosomiasis and against all animals which have been in infected countries but are shipped to America from noninfected ports, can not, without full knowledge of the quarantine laws, be stated, but, granting this to be so, there still remain reasons for stating that there must be forces other than quarantine laws which prevent the introduction of Trypanosomiasis into the United States. Wild animals for circuses and other purposes are certainly admitted in considerable numbers from infected countries,, and when we consider the fact that many of these animals harbor the parasite without inconvenience, the introduction of the infecting agent into America at some time or other seems very probable. Not alone quarantine laws, but other factors, such as possibly conditions of temperature, moisture, and carrying agents, probably play a part in preventing the spread of the disease.

However, Trypanosomiasis has gained admission to the Philippine Islands, and so far as we are concerned, there is no need of discussing the quarantine laws necessary to prevent infection in a virgin country. It would have been entirely feasible, as is shown by accumulated experience, to have prevented the introduction of the disease into the Philippine Islands with its subsequent disastrous results by the enforcement of proper quarantine regulations without actually prohibiting the importation of animals. That this was not done is owing to the fact that the disease Was not recognized until after its introduction and to our inexperience in dealing with tropical conditions, but it would appear in place to sound a note of warning to other countries, especially those within the geographically infected zone, and which are as yet without the disease. It is a question of economic importance second to none in a large area of the world, and deserves the closest attention and prompt action of the sanitary guardians of the public welfare.

In framing quarantine laws particular attention should be paid to circus animals and to wild animals in general.

It has already been shown in discussing the etiology and modes of transmission of the disease, that every case of infection is entirely dependent upon exposure to biting insects, and that this brings us in the outset face to face with the necessity of (1) *destroying all infected animals,* (2) *destroying biting insects,* (3) *employing a combination of these methods, or* (4) *rendering susceptible animals immune.*

Before beginning a discussion of these points, we shall review somewhat fully the recommendations of Voges, of South America, and Schat, of Java, who have written in detail upon this subject.

Voges considers preventive measures under two headings—general means and specific means. The burning of cadavers need no longer be recommended, since we know that twenty-four hours after death the tissues and fluids are no longer infectious. It is sufficient to protect the bodies from biting insects during twenty-four hours. When the disease breaks out in pastures, the animals should be transferred to high dry grounds, and those already infected should be killed. Animals should not be allowed to run at large, but should be kept in stalls; and especially valuable ones may be protected from biting flies by screens.

Voges compares mal de caderas to malaria in the manner of its spread; etc., and suggests preventive measures along the lines used for the latter. He states that there are two methods of preventing malaria, that of the Italian school, which bases its work upon the destruction of the intermediate host, and the other, that of the German school, as recommended by Koch. Continuing, he writes as follows:

Quite different is Koch's system, which strikes the evil at its roots. Koch fights the cause of the disease, the plasmodium; he seeks to remove it, and in effecting his purpose does essentially nothing different from what has been done with considerable success in other infectious diseases.

If I am working in the laboratory with a culture and wish to transmit it, I use a platinum point. If the platinum point is taken away from me, for the time being I can make no inoculations, for I must first make a new point. If, on the other hand, my cultures are taken away from me and every crack and corner where these might be is ransacked and I am deprived of every possible opportunity to make a new culture, then my inoculations are at an end and I can not proceed with them even with the best of points.

I always use this illustration when I wish to explain Koch's malaria theory. In malaria the mosquito serves as the point; and I no sooner kill thousands of them, than hundreds of thousands again appear.

The reagent glass, the holder of the culture, is the person; the nourishment (agar, bouillon., etc.*) is the blood. R. Koch puts into the reagent glass—the human being—a disinfectant, quinine, and the culture is destroyed. If, then, I disinfect everybody who has been inoculated with the virus of malaria, all the cultures are destroyed, and no matter how much virus (blood) the point (mosquito) takes from the reagent glass (human being), the transmission of the disease is no longer possible. Could anything be simpler and at the same time more effective? Is it not, therefore, an outrage and a shame that even in our day civilized nations place their hands in their laps, at the most raising themselves to a few efforts, while they allow their subjects to die before their eyes?

Should not Koch's results, then, be applicable to mal de caderas? • We know that the bloodyof horses suffering with mal de caderas harbors parasites. We know further that the infection is transmitted only through the bite of a blood-sucking insect. We also know that the infection occurs during times of rain and flood. And finally, we know that the virus maintains its vitality in horses for from two to five months and in donkeys and mules as long as one year, and can nearly always be detected during this time.

In malaria the conditions are such that we must seek the proper host in the human being, and in the mosquito the intermediate host. In the human being the virus maintains its vitality for years, but in the mosquito only a short time. Evidently the conditions are veiy similar in mal de caderas. We have not yet discovered the intermediate host, but we presume that it is a blood-sucking insect, while the horse is the proper host. I draw this conclusion from the fact that in the case of the horse, and especially in that of the donkey and mule, sick animals are found throughout the year. Virus can be obtained at all seasons, although the disease occurs periodically, a fact which can be attributed only to the periodical appearance of the intermediate host (insect). With a knowledge of the intermediate host this would be still more evident, but for our object we really do not need this. Its periodical appearance is one of the most favorable preliminary conditions possible for a successful fight against the epidemic.

We shall next state that there are certain periods, dependent upon the rains, during which the transmission of the disease through the intermediate host does not occur. The virus exists then only in the proper host. * * * The rainless reason is the period of which we should take advantage to destroy the *Trypanosoma,* for it is then that their distribution is most confined.

For our purpose we need only two things—first, a means of detecting the presence of the *Tmjpanosoma,* and, secondly, a disinfectant with which to destroy them. The second thing we do not yet possess, at least not one that will work in the same manner as quinine does in malaria. There remains only one possible solution, that is to destroy the *Trypanosoma* cultures; in other words, to kill the diseased horses.

This measure is radical and yet very practicable, for such horses are of no value, and this is almost universally true with native horses, for when once sick a horse may as well be considered lost, and it is useless to continue feeding him. Thus, if we have killed all the diseased horses, mules, and donkeys during the season which is free from the epidemic, when, with the beginning of the rainy -season, the intermediate hosts return, there will be no more *Trypano&oma,* and the disease will at once have been stamped out. just as Koch exterminated malaria by poisoning the plasmodia with quinine. This is not only possible but absolutely certain. It depends on searching out all the animals having *Trypanosoma.* If the rainy season were longer, most of the animals affected with mal de caderas, at least horses, would die. Donkeys and mules, however, would continue to live; but they show signs of weakness so early that it would be easy to pick them out and render them harmless.

Kimmerich, according to Voges, successfully combated the disease *on* his estate by converting the marshy regions into open ponds. He considered running water harmless. A South American company using a large number of horses lost annually the larger part of them for two years, the animals being kept in the fields, as is the custom there. Stalls were then built and the horses were kept and fed in them, as a result of which the epidemic disappeared. If infected herds are removed to high, dry grounds, the disease generally ceases. Horses quartered in stalls seldom contract it. The influence of stalling animals on the suppression of the infection is mentioned also by writers in India and Africa.

So far as we have been able to determine, Java is the only country which has adopted and enforced regulations for the suppression of the

infection, and as a result the disease is well under control in that country.

Referring to the statement that it is impossible to destroy biting insects, Schat (Java) says:

It is the opinion of Voges that blood-sucking insects are the carriers of the infection, but he has not proved it, probably because he considers the destruction of the insects as impracticable. Contrary to his opinion, we think it both desirable and possible to do so, nor is the measure to be left out of consideration. To search out all the hosts, that is the animals suffering with chronic surra, is, in the Tropics, where sufficient expert assistance is lacking, not yet entirely feasible; the more so, since Dr. Bruce, of South Africa, has found that the tsetse" fly may become infected by sucking the blood of wild animals. The detection and destruction of all infected animals is therefore under the circumstances almost impossible in the Tropics. We should look for other measures, such as to insure the coöperation of the owners of cattle and in general of all laymen; we should make warfare on all flies found on horses and cattle.

In the prevention of an epidemic of surra by veterinary means, the three following measures should, in our opinion, be particularly observed.

1. Limit the extent of influence of the flies which carry the infection.

2. Protect the sick as well as the healthy animals from the bites of flies in places infected with the disease.

3. Destroy the hosts, that is the diseased animals, or else render them harmless.

These measures alone should have a good chance of success, if the following rule of preventing the spread of an infectious disease at its first appearance is observed. The rule may be given as follows: Whenever an infectious disease appears, the cases of sicknes sand death should be reported as soon as possible. This applies to all infectious diseases in general, but it is particularly necessary in the case of surra, because its detection is often difficult and requires a great deal of time.

Let us now, with special reference to surra, discuss the three above-mentioned measures one by one and with more detail.

***First measure.*—To limit the extent of influence of the flies'which carry the infection. Whenever a case of surra is determined by the clinical symptoms or by the discovery of *Trypanosoma* in an examination of the blood, or by animal experiment, the sick animal should first of all be isolated, or killed and buried. The animals which are kept on the same ground, as suspects, should not be transferred to any other place. In this way a spread of the disease as well as of the flies found on the animals will be prevented; for, as is known, flies swarm with horses and cattle when they are quickly removed.**

For the purpose of making it as certain as possible that no infected flies shall be transferred to other places in this manner, the transfer of cattle from grounds bordering on those where surra has been discovered should be forbidden. This measure may,'according to the circumstances, be extended to the entire inhabited part of a district or to a portion of it. In short we would recommend the prohibition of the importation, exportation, and transference of cattle, etc., in the inhabited part of a whole district or in portions of it.

***Second measure.*—To try to protect the sick as well as the sound animals against the bits of flies.**

The sick and the healthy animals should be separated as quickly as possible and transferred to dark, spacious, well-ventilated stalls, since experience proves that in dark places few, if any, flies are found.

This precaution the inland cattle owner can take without great trouble.

Furthermore, the greatest cleanliness should be observed in the stalls, although this would appear to be very difficult in the villages here, even with the greatest perseverance. The fecal matter should immediately be removed and collected in one place, not too close to the cattle stalls, in order to combat not only the flies but also the larva; we know that the larvae of the *Stomoxys* live mostly in manure, where they develop into a light reddish-brown chrysalis, from which after from four to six weeks the young fly appears.

It might perhaps be recommended that the leaves, pieces of wood, etc., found on the spot where a case has occurred be collected and burned. This should be done in the morning, on the wind side of the kraal, so that the smoke will drive away the flies, which appear on the animals just at this time of the day, in order to suck themselves full of blood.

Whenever, in the rainy season, the smoking of the stalls in this manner becomes difficult or impossible, the same purpose may be accomplished by placing earthen or iron pans in them, burning damp wood, leaves, etc., in the containers; the cattle owner may also easily make use of ash-water, with which he will be able to keep the flies from his cattle. In catching flies the inlander can without much trouble make use of sticky twigs, there will always be found on his ground a plant which produces one or another kind of gum or other viscous substance (getah). Getah, mixed with some kind of a treacle (t€te*s), smeared on a piece of paper or stick of wood and hung up in the cattle stall, serves the purpose very well.

Third measure.—To destroy or render harmless the hosts of the infection, i. e., the sick animals. * * *

Thus far we are obliged to resort to * * * a very radical measure, that of destroying the infectious material in as short a time as possible, i. e., killing the sick animals.

On the outbreak of an epidemic of surra, so long as another and less costly measure is wanting, authority should be requested from the head of the provincial government to take possession of animals sick with the disease and to kill them, in the hope of checking its spread from the very beginning. If, however, too large a proportion of the animals have become infected, so harsh a measure could hardly be carried out; but we would suggest in that event that the spread of the infection may to a large extent be prevented by a strict isolation of animals in spacious, dark stalls, where great cleanliness is observed.

I wish also to call attention to the following point. In the blood of emaciated animals we repeatedly found *Trypanosoma,* while clinically individuals suffer with emaciation for a considerable time, without showing, however, any other single definite* symptom. It is just these animals from which a spread of the disease through flies should be feared, since we have been able to determine that whenever such chronic sufferers from surra die their blood contains lar^c quantities of parasites. In the eradication as well as in the prevention of surra it is therefore of great importance to know this fact, in order that the emaciated animals in the district may be looked after. Since this is so and since in the examination of the blood of these animals surra parasites appear to be present, these hosts of the infection should first of all be rendered harmless.

Our purpose is only to put these rules in such a form that they may best be applied to the purpose in view, that is the prevention of surra.

Some of the earlier recommendations for the suppression of the epidemic in the Philippine Islands were not only unsatisfactory but dangerous. Smith recommended isolation of sick animals at a distance of one-half mile.

Curry, in his original communication, recommended (1) the isolation (at least one-half mole) of infected animals, (2) the protection of infected animals from flies, (3) the protection of healthy animals, and (4) the keeping of flies out of the stables.

However, early in 1902 proper advice in regard to measures for the control of the epidemic were prepared by the Director of the Biological Laboratory and given to the public in a popular article in the Spanish press. In a later publication Curry realized fully the weakness of his first recommendations, and made additional suggestions. Had the directions of both these observers been followed at that time, the saving of millions of dollars to the country would have resulted. In substance these were the destruction of all infected animals and of as many flies as possible, and the protection of healthy animals.

Considerable delay in carrying out rules which will control the infection here has been occasioned by the efforts of some to minimize the importance of the agency which flies constitute in the transmission of the disease and to push forward the untenable *theory* that food and water are the principal transmitting agents.

Misguided local efforts have been made in communities, causing unnecessary expense and trouble and utterly failing to accomplish the purpose for which they were intended. Several municipalities have absolutely forbidden the use of native food for animals and have promulgated long, useless rules for isolation, etc.

A set of rules which was adopted by one of the provincial boards of health and which was sent to us for remarks is as follows:

1. All sick horses must be isolated to a pasture separate from the rest of the herd.
2. Inspections must be made daily and sick horses transferred to **isolated** pastures.
3. The bodies of dead horses must be burned or buried in trenches at **least** ten feet in depth.
4. Those who attend to diseased horses must not take care of other horses.
5. No efforts must be made to preserve the hides of diseased horses, **for thei*** sale **will not** be permitted.
6. The pasture used for diseased horses shall not be **used** for other horses or cattle for a period of two years after the epidemic.
7. Diseased horses shall not be watered in running streams, nor shall they be bathed in streams or rivers used for other horses.

Of course such rules need no comment. They show, on the other hand, that the intelligent element of the country is aroused to the necessity of doing something, and not knowing just what is best, follows out the dangerous suggestions of some of the earlier writers in regard to the epidemic in these Islands. These are, however, in substance, the antiquated ones of literature. In the face of all this, it behooves us to reach the root of this subject for the information of the better classes and to suggest regulations

which will place the execution of efficient measures in the hands of the proper officials.

We have already dealt with the methods for preventing infection in a virgin country and reinfection in countries where the disease is already prevalent, and will now take up the discussion of methods looking to the control and suppression of surra in our own country. To be fully efficient recommendations must, of course, be practicable and of such a nature that the coöperation of the public may be obtained. The necessary considerations are:

1. The destruction of all infected animals; *(a)* animals of economic importance; (6) rats and mice; (c) game and other wild animals.
2. The destruction of biting insects.
3. The protection of contact animals from flies during the incubation period.
4. Miscellaneous measures.

First. The destruction of all infected animals would make other measures unnecessary, but this offers so many difficulties, especially in the provinces and outlying districts, that it will be found advisable to reinforce this measure by the other methods discussed.

***(a) Animals of economic importance.*—In Manila and other cities** with organized sanitary corps, diseased animals should be located without any difficulty. To do this to the best advantage and to make the work systematic necessitates that the whole matter be placed in the hands of a single bureau, and that bureau should, of course, be the Insular Board of Health. Other points in the accomplishment of this task are matters of detail, which may readily be solved by the Board of Health. There can be no question that this matter properly belongs under the control of the sanitary bureau, just as do the infectious diseases of man. In fact, as already shown, there have been many cases of *trypanosomiasis* in man and the chances are that many more will be found.

The work of detecting all diseased animals will necessitate some kind of a systematic inspection, which may easily be carried out in Manila and other cities by those charged with such duties in guarding the public **welfare. In addition to the daily inspection by sanitary inspectors of all** horses found in stables, all other officials, such as medical, veterinary, and police officers, might be required to report all sick animals coming under their cognizance to an official of the board of health.

How best to secure the coöperation of the general public in reporting sick animals is a problem open for discussion. Several officials interested in this work have suggested the advisability of the Government's buying all sick animals, arguing that a reasonable offer would cause all such to be brought in and thus prove economical in the end, whereas, if coercion were attempted, "the more ignorant people would hide their animals for days and probably for weeks before they could be found by the authorities, thus adding materially to the spread of the disease. This argument has

something in its favor, but it seems to us on the whole a dangerous policy—the purchase of good citizenship—which, although it might give immediate results of a temporary nature, would in the end prove unsatisfactory. The purchase of superstitution or malice, whether it be with candy in the case of children or with money in that of adults and whether in the schoolroom or in the municipal office, invariably leads to disaster.

It appears to us that the recommendations made should be just and equible, and such as will be supported by the intelligent part of the community and in the end will result in the elevation of the standard of citizenship of the ignorant. Undoubtedly right *demands* the coöperation of the public in such an undertaking, and we believe that the law should require owners, agents, and custodians of animals to report those sick, and that the failure to do so should be punishable by law.

The manner and time of inspections and the reporting of sick animals in cities are matters of detail which need no discussion here, while rules applicable to the provinces and outlying districts may be drawn up to meet conditions. The methods best adapted for searching out the infected animals may be subject to discussion, but the disposition of them when once found does not admit of argument. *There is only ona thing to do with a horse suffering from trypanosomiasis, and that is to destroy him immediately.* To do this, efficiently and quickly necessitates the placing of authority in such a manner as to avoid the loss of time.

Immediately after the death or destruction of an animal suffering froin this disease, the body should be protected from flies and other insects and disposed of as soon as possible. This may be done in one of several ways. In cities probably the most satisfactory way is to take the body to the crematory in a fly-proof wagon and have it burned at once. Where means for such disposition are not at hand, which is generally the case in rural districts, the body may be buried at a sufficient depth to keep dogs and flies away from the carcass for forty-eight hours, or it may simply be protected by mosquito netting or otherwise for the same length of time, and then disposed of in any sanitary manner.

It is well to call attention to the care which should be exercised in performing necropsies on animals dead of the disease. They should either be done under protection from flies, or, if this is not practicable, all living animals should be removed from the immediate vicinity and kept away for forty-eight hours. In any event, the blood, organs, etc., should be protected from flies and dogs, in the same manner as the whole body, for from twenty-four to forty-eight hours.

(6) *Destruction of rats.*—There is no longer any doubt that a certain number of these pests harbor *Tr. evansii* and that they have a practical significance in the spread of the disease. The annual destruction of thousands of them in Manila on account of the plague, as already mentioned; will no doubt reduce the danger of the spread of surra from this cause to a minimum. In the provinces and other cities, however, where this

wholesale destruction is not carried on, the importance of looking after this work with special reference to surra is more urgent.

Fortunately, whether in the city or in the country, great difficulty is rarely experienced in destroying large numbers of rats by poisoning, and it is recommended that such a procedure be carried out as a matter of routine in methods adopted for the control of the disease under discussion.

(c) *Destruction of game and other wild animals.*—In other countries the spread and perpetuation of the infection is undoubtedly carried on by wild animals, and if our work in stamping out the infection here is not prompt and vigorous it will in all probability become one of the conditions that we shall have to face here later on, if it does not already exist to a limited extent. This is a matter to be kept constantly in mind in dealing with this disease, and our plans might well be broad enough to cover this point. This source of danger will, even under the most favorable conditions, rarely become a great menace in cities, but some precautions are nevertheless necessary.

A law which will prevent the reinfection of the country by such animals is of the highest importance. With the prohibition of the admission of circus and other wild animals, except under certain regulated conditions, there still remain for consideration the public animals of our parks. While the disease is constantly prevalent in Manila there is nothing to prevent some of the animals in the Zoological Garden from contracting it, and, on account of the harmlessness of the infection of these animals, they might become an indefinite focus for the diffusion of the disease. It seems to us that the easiest and most practical way of avoiding this danger would be to inclose all such animals in fly and mosquito proof screened areas, as is now being done in many of the large zoological gardens in other countries. Researches of recent years have shown the necessity of this precaution, since many wild animals act as hosts for other parasitic diseases communicable to man, which need not here be discussed.

2. Destruction of stinging and biting insects.—As has already been stated, if the destruction of infected animals (the hosts) were carried out systematically and with thoroughness, flies and other insects as carriers of the infection would be harmless. While we have sacrificed the ideal in the disposition of infected animals to the practical, as far as possible within the limits of efficiency, we fully realize that conditions may make still further sacrifices necessary. It is principally for this reason that we have taken up the consideration of auxiliary measures to supply what may necessarily be lost in the efficiency of the more desirable ones.

Insects are becoming of so much importance in the propagation of other diseases, both of man and of animals, especially in the Tropics, that we are urged to recommend their partial destruction on account of surra with more assurance, knowing that the fulfillment of our hopes would be a distinct step in advance in preventive medicine in general.

To illustrate what we shall some day be compelled to face here, thu best medical thought of Europe and America is already concerning itself with the effect which fast travel to the Orient is likely to have upon the introduction of yellow fever to this part of the world. The proposed interoceanic canal has brought this subject afresh before the world. The mosquito of yellow fever is one of the most common in the Philippine Islands, and with the shortening of the voyage from fever-infected countries by the proposed canal, and for that matter without the canal by the increased speed of our modem ocean-going vessels, the time required to travel from those countries to the Orient ,will be brought within the limit in which the disease may be transmitted. Without dealing further with present and prospective problems, depending to a certain extent upon the disposition of certain insects for their solution, we shall resume the discussion in hand.

The most important insects to be destroyed because of the part they play in carrying surra are the biting flies. To accomplish this, in the most extensive manner and with the least amount of work, resolves itself into the destruction of their breeding places by the proper disposition of fecal matter. As has been recommended by various writers, this may best be done by burning all offal during the dry season. Methods upon a smaller scale looking to the same end are too well known to need discussion here. Cleanliness around livery stables and large corrals belonging to the Government and to other persons is particularly desirable, because it is naturally in such places that the danger is the greatest on account of the close proximity of the animals and the large number of flies usually found there.

Eecommendations and methods for the destruction of mosquitoes are so recent and so well known that this part of the subject may be omitted.

The destruction of fleas, which are second in importance to flies in the transmission of surra, is so far as we are informed an unsolved problem.

3. *Treatment of contact animals.*—The blood of an infected animal is infectious before the symptons are present or parasites found in the blood by microscopic examination, so that the necessity of protecting contact animals during the incubation period of the disease is evident.

There are several ways of accomplishing this. When surra is found in a stable, contact animals should be quarantined where they are, for at least seven days. The contact horse, after removal, should be protected from flies during the first forty-eight hours, and if several are present they should be protected from each other. Where there are only one or two contact animals, they may be protected by mosquito bars, by smearing with iodoform ointment, washing with solution of creolin, burning smudges in the stables, or by other well-known means. Where there is a large number, as in a livery stable, it will be found easier to destroy or remove the flies by smudges, darkening of the stalls, etc.

All rats around such places should be poisoned and the general sanitation, especially with reference to breeding insects, should be improved.

Temperatures of all such contact animals should of course be taken twice daily during the incubation period, and the animals should be carefully examined for other symptons. It is hardly necessary to repeat here that as soon as an infected animal is found it should be destroyed.

4. *Miscellaneous measures.*—Musgrave and Williamson, in a preliminary report, offered the following suggestions to owners of private stables or individual horses:

> When using the animals in the daytime, as much as possible avoid allowing a horse to stand in a group of other horses. To illustrate: Only a few days ago we observed standing in front of a Government building some thirty or forty horses, and one of them, hitched to a public carromata, had a well-advanced case of Trypanosomiasis. Should such a thing happen during the season of biting flies, the danger of infection to all would be very great.
>
> Stables should be kept scrupulously clean and well ventilated and excreta and waste should be promptly removed.
>
> All sores of whatever character on horses should be kept covered with *n* suitable ointment to keep off the flies.
>
> Especially valuable horses may be provided with screened stalls.
>
> There is no conclusive evidence, so far as Trypanosomiasis is concerned, of any danger from allowing horses to drink the city water or to eat iood supplied in the Manila market.
>
> Upon the appearance of illness in a horse, a competent observer should be asked to examine the animal.

All kinds of sores on animals should be kept covered with tar, iodoform ointment, or some other substance disagreeable to insects. The legs and edges of the hoofs should be carefully looked after. Eats should be kept away from stables by systematic poisoning or should be caught with traps. Other little points worth looking after will suggest themselves to the thoughf ul mind.

That from which the public in general will derive the greatest benefit and which will give results to every stock owner is the moral support of the officials entrusted with the handling of this problem.

XV. SERUM THERAPY.

In this day of scientific advance in medicine, the trained mind naturally turns to the possibility of preparing prophylactic or curative sera for disease, and as all other remedial measures have proved a failure in surra, this seems to be the only hope. Considerable work in this direction has been done during the past few years, and while as yet not successful, the outlook is not altogether discouraging.

Koch professed to have established a successful method of preventive inoculation based upon the attenuation of the parasites by succesive passages through other animals. His experiments are given as follows:

> On the 8th of September, 1897, there were inoculated with the defibrinated blood of an ox. rich in *Trypanosoma,* the following animals: One ass of Massai,

1 cow, 2 calves, 2 monkeys, 2 guinea pigs, 2 rats, and 1 dog. The ass of Massai, the monkeys, and the guinea pigs remained in good health; no sign of infection was observed in them. The cow died at the end of thirty-nine days, the calves at the end of forty-one and forty-nine days, the rats at the end of thirty-four and fifty-two days, and the dog at the end of nineteen days.

On the 15th of October, 1897, the blood of one of the rats inoculated on the 6th of September was injected into 2 rats and 1 dog. One of these rats was found dead six days after inoculation, showing the appearance of *Trypanosoma* in the blood; the second rat showed *Trypanosoma* thirteen days after inoculation, but did not die until sixty-eight days thereafter. The dog died at the end of forty-two days, and its blood was utilized for the third passage.

On the 30th of October there were inoculated with the blood of the dog 2 dogs, 2 oxen, 4 asses of Massai, and 3 rats. The dogs died after nineteen and twenty-six days, the rats at the end of sixty-seven, seventy-three, and eighty days, and the asses were not infected.

Laveran and Mesnil criticise Koch's work, stating that a certain percentage of cows are known to recover from both nagana and surra and that the attenuation of *Trypanosoma* by successive passages through different species of animals is very slight.

Nocard immunized a calf that had recovered from nagana with increasing doses of virulent blood until it had received 850 c. c. in all. The animal was then proved free from infection by animal experiment, but its serum had neither preventive nor curative properties in mice, and mixed with infected blood produced the disease with a prolonged incubation. This serum was very agglutinative for *Trypanosoma.*

Host gave a pony sick with surra 10 drops of normal goat blood subcutaneously, and 10 more drops four days afterwards in the same manner. A temporary dimunition of the parasites and a fall of the temperature followed each injection.

Another pony, which had the disease in an advanced form, was given 20 drops of mule's blood by subcutaneous injection. The parasites temporarily disappeared, but returned in greater numbers, and the animal died on the fifth day after inoculation.

Another pony infected with surra and the blood of which was rich in *Trypanosoma* was given subcutaneously 30 drops of the blood of a goat which had recovered from a single injection of surra blood. The parasites temporarily disappeared. Another injection was given on the twenty-third day and a temporary disappearance of the parasites again resulted. On the twenty-eighth the parasites were again numerous; and another dose of goat serum, which had been highly fortified by injections of surra blood, was given, followed by another fall of temperature and the permanent disappearance of the parasites. The animal continued to grow fat, but on the twenty-third day after the last injection the temperature again rose and death finally occurred from tuberculosis.

Sterilized filtered goat serum caused a temporary disappearance of the *Trypanosoma* in a horse sick with surra, but the disease followed

its regular course and the animal was shot before death. Ten mules were treated with serum without encouraging results; in fact, the contrary was true, for Host concluded that the sterilized serum of immunized goats produced exacerbations of the disease in mules.

His best results were obtained from normal or slightly fortified goat's serum, for the more highly he immunized his goats the worse were the results obtained. He immunized a goat with suria blood taken from the same species of animals which he afterwards treated with the serum, and during a period of eight days he sterilized it daily for four hours at 57° C. He says that the immunized goat's serum killed surra parasites under the microscope.

Voges inoculated a cow for eighteen successive months with virulent blood, but the serum obtained from the animal was worthless either as a preventive or curative measure.

In Schat's work the serum obtained from cows which had recovered from surra was injected into other cattle and into rabbits, and in some cases it seemed to exercise certain preventive and curative influences on the disease.

He immunized a cow against *Trypanosoma* by increasing doses of defibrinated blood during a period of two months. The serum obtained from this cow waS injected in doses of 10 c. c. into two calves known to be nonimmune. Twenty-four hours after the last injection of serum the animals were inoculated with surra blood; a control was inoculated at the same time. On the sixth day parasites appeared in the blood of all the three animals, disappearing from that of the immunized calves at the end of four days and from the control at the end of five days. The protected calves returned to health, but parasites again appeared in the case of the control and the latter went through the regular course of the disease.

A rabbit was protected by 5 c. c. of the same serum, with only a temporary appearance of the parasites. Three rabbits were inoculated with mixtures of cow's serum and blood containing *Trypanosoma.* One of them developed the disease, while the other two, where the mixture was kept from five to fifteen minutes before injection, did not contract the disease.

Laveran and Mesnil, experimenting with mice and rats and a few dogs, state that human serum injected in sufficient quantities shows manifest action on the disease. *Trypanosoma* disappear from the blood at least temporarily, the evolution of the disease is retarded, and sometimes a complete cure results in the case of mice and rats. The scrum of adults is more active than that of children, and maintains its activity for a considerable time when preserved aseptically. Pleural effusions are less active than the serum from the blood, while the activity of ascetic fluid is still loss. Tn infected mice they used doses of 0.5 to 1 c. c. and

in rats doses of 1 to 2 c. c, which caused a disappearance of the parasites in eighteen to twenty-four hours after infection.

They had four successful cures out of a very large number of rats and mice so treated) and in all of these cases it was obtained after one or two injections. In those animals from the blood of which the parasites disappeared only temporarily, they were caused to disappear time after time by repeating the injection, and if they recurred after the first injection a complete cure was never produced.

By alternating the injections of human serum with arsenic the influence exercised on the longevity of animals was still more favorable, but there were no complete cures. One rat so treated lived for one hundred and twenty-seven days and a mouse for one hundred and three days.

Human serum was determined to be just as active for mal de caderas as for nagana, but *Tr. lewisii* were unaffected by the treatment. The sera of birds, chickens, and geese highly fortified with *Trypanosoma* blood had no curative power. Large numbers of sheep, cows, and deer recover from nagana, but their sera fail to show either preventive or curative properties, and do not acquire them when immune animals are further protected by large doses of virulent blood.

According to these authors, sheep, deer, and cattle which have recovered from nagana possess an active immunity to this disease.

Human serum has a very weak preventive power. Mice given 1 c. c. of blood mixed with 4 c. c. of human serum show no infection. Sometimes this result may be obtained by injecting serum and blood simultaneously in different parts of the body. If, however, the serum is given twenty-four hours after the virulent blood, the disease appears, the only result noticed being an increase of from five to nine days in the length of the incubation period. If human serum is injected first and infected blood twenty-four hours later, the infection, as before, takes place with a prolonged incubation. In those mammals which do not contract the disease by the injection of human serum and infected blood an active immunity is established.

The sera of dogs, sheep, deer, horses, geese, and chickens, when mixed with Trypanosomatic blood, are still infectious and the disease runs the regular course with a normal incubation. The sera of animals that have recovered from nagana are without value as either preventive or curative agents in the disease. The serum of sheep which have recovered from nagana and have afterwards been further immunized shows neither preventive nor curative properties. Fortified sera from the chicken and the goose are worthless as a means of prevention. Chicken's serum mixed with equal parts of infected blood killed a mouse in fifteen days, while a control lived seven days.

Strong, commenting on Laveran and MesniPs earlier work, writes:

> We had already previously tried injections of human blood into monkeys suffering from experimentally produced Trypanosomiasis from injections of *Tr.*

cvan8ii, but found, while the parasites disappeared temporarily, after a few days they were always again present in the circulating blood. Goat's blood and bile from monkeys that had died of the disease were also tried, but with like results. Goat's serum was used, as these animals are relatively immune to the parasite. Experiments with the intravenous injection of benzoyl-acetyl peroxide will be performed as soon as the animals for experimental purposes can be secured.

Laveran and Mesnil also showed that infected blood kept on ice or at the temperature of the room until the death of the parasites has almost resulted is still infectious, producing no change in the course or the duration of the disease excepting a prolongation of the incubation period. Similar results were obtained with blood heated to different temperatures for different periods of time. The addition of toluidin blue to infectious blood, in the proportion of 1 to 100 parts, did not modify the virulence, except to prolong the incubation.

They passed *Trypanosoma* through sheep six times and then through a dog, but the blood remained just as virulent for rats and mice as the original control. They failed to confirm Schilling's and Koch's work. The difference in action between their *Tr. brucei* and that of South Africa may be owing to the difference in species of the cattle or to an attenuation of their virus. They suggest the possibility of obtaining practical good by infecting the South African cattle with the milder *Tr. brucei,* from which a large percentage of Paris cattle recover.

Laveran and Mesnil come to the conclusion that all attempts at prevention or cure have, for practical purposes, been negative, and that prophylactic measures which may be found of service in one form of Trypanosomiasis will probably prove equally efficacious for all.

Schilling states that he had attempted to attenuante the parasites by passing them through different animals. He inoculated three horses with *Trypanosoma* which had passed through five dogs; they all contracted the disease and died. He then inoculated two horses with *Trypanosoma* after eight passages through dogs, as a result of which they both contracted the disease and died. Parasites which had been passed through four cows were still virulent for the horse.

In a second paper Schilling writes that he immunized a bull which had recovered from surra. Parasites were found in the blood from nine to twelve days after the first injection of 10 c. c, but none were found after the second of 19 c. c, which was given in the abdominal cavity a month later. A month after this injection the serum in thirty-one minutes killed the parasites in the hanging drop. Further immunization for two and one-half months did not make it more effective in vitro, and when employed in treatment it was useless. After about eight months the animal died of hemorrhagic enterocolitis, but *Trypanosoma* were not present.,

Schilling simultaneously inoculated three calves with the peritoneal exudate of a dog which had been infected by an abdominal inoculation of

Trypanosoma after they had been passed through the peritoneum of other dogs. After twenty-one, twelve, and fifteen days, respectively, parasites were no longer found in these calves. The serum showed no reaction with *Trypanosoma.* These animals were then transferred to an infected region, one dying during transportation, while the other two were well at the end of three months.

The same author immunized a steer in a similar manner, except that as a first inoculation the peritoneal exudate of a dog inoculated directly from a horse was used, and a like injection was given sixteen days after the first. Five days after the first injection the serum showed no reaction with the *Trypanosoma,* but four days aftfer the second one it agglutinated them, only a few motile ones being left at the end of thirty minutes.

Two young steers were immunized with doses consisting of from 3 to 10 c. c. of the peritoneal exudate of dogs, which seven days before had been inoculated in the abdominal cavity with virulent blood. On tho fourteenth and fifteenth days after the last injection the serum of both these steers showed marked antiparasitic action on the *Trypanosoma,* killing them in thirteen to twenty-five minutes. Parasites were absent in both of these animals.

Schilling later immunized thirty-six cattle with the peritoneal exudate of dogs which had been given intraperitoneal inoculations of *Trypanosoma* attenuated by passing them through seven dogs and rats and then through eighteen to twenty-one dogs. The peritoneal exudate of dogs used-on cattle always showed numerous *Trypanosoma.*

Of twenty-four cattle twelve showed parasites in the blood on the tenth day after inoculation. The number in all of these cases, however, was very small, and in ten animals they disappeared in from one to two days. In one out of nine cows one *Trypanosoma* was found in a preparation made on the ninth day after the second inoculation, while the others were negative. The temperature rose to 40.3° C. on the fifth day after the first injection in the case of one of these animals, but it fell to normal within three days. On the same day a single parasite was seen, but after that none were to be found; indeed, following the second injection of large numbers of *Trypanosoma* the temperature remained normal and parasites were constantly absent from the blood.

Eight of the animals previously used were examined (subsequently to the last injection) to determine the parasiticidal power of the blood serum. In five cases the parasites were killed in twenty minutes, in one the reaction was very weak, while in two there was no reaction whatever. What the factors in the production of such differences were he could not then say, because of the limited time and the small amount of material at his disposal. He believed, however, that the cause lay neither in the quantity of injected parasites nor in the time which had elapsed between the first and second inoculations.

Of the animals used 19 remained in Sokode, 9 were taken to the station of Ataxpane, and 8 to Mishche and the experimental station of the cotton expedition of the Colonial Scientific Committee in Tove—all places at which, during the year before, animals had died of surra. According to reports, at the beginning of October the inoculated animals were well and in Tove five oxen were doing their usual work in the fields. The time had not been sufficiently extended for him to come to any definite conclusions.

In Sokode Schilling found a naturally infected ass, which he watched for twenty-five days. It has already been stated that the ass of Soudan is susceptible to surra. Attention should here be called to the fact that there are some racial differences between these asses and those of east Africa, with which *Koch worked and which he did not succeed in infecting. In one of his experiments, however, the inoculation of surra blood into a small wound in the skin of the ear proved negative. Passages of blood taken from the naturally infected animals mentioned above were made through several asses by the subcutaneous injection of large doses. Altogether five animals died between the eleventh and fifteenth days after inoculation, with all the symptoms of a severe general infection (fever of remittent type.) Post-mortem showed nothing that might be called typical. The parasites increased very rapidly (incubation about four days), reaching enormous numbers. From this we may conclude that the Soudan ass is even more susceptible than the horse.

This writer inoculated the parasites obtained after passages through five asses into a small, healthy horse. The animal suffered an acute attack of surra, but the course was somewhat unusual. According to a letter received from Dr. Kersting, the animal was fairly well on the twenty-first day after inoculation. On the eighteenth day no parasites could be found.

He believed that the principle of successfully immunizing animals against the African tsétsé-fly disease (nagana) had been discovered. The peculiarities of the nagana parasite with reference to its ever-present host were utilized in weakening its virulence for certain kinds of animals.

In looking over literature carefully one is struck by the relative immunity to surra of certain animals that are susceptible to other diseases.

Mr. Harford, British consul to the Philippine Islands, informs us that when he was stationed in Africa it was a recognized fact that "salted" animals were less susceptible to the bite of the tsétsé fly than others and that the Government paid increased prices for such animals for the African service. By "salted" horses are meant those that have recovered from a peculiar disease of horses prevalent in Africa and by "salted" cattle those that had recovered from rinderpest.

G. H. Evans, quoted by Lingard, says:

> The gaur (Indian bison) and tsaing suffer from rinderpest and foot-and-mouth disease, yet these animals have not up to the present time been observed with surra, although a careful search for the disease has been made. They live in

a jungle where the flies are so annoying to them that they have to go into the open to escape their attacks.

In India a large percentage of cattle are "salted"; that is, they have recovered from rinderpest or from the "serum simultaneous-inoculation method" against rinderpest, which, when successful, results in a mild attack of the disease.

These points and the fact that the injection of rinderpest blood into dogs prolongs the incubation period somewhat suggest a possible antipathy between surra and rinderpest. We have performed a number of experiments fully to determine this matter and have come to the conclusion that animals suffering from rinderpest or recovered from it are just as susceptible to surra as others.

The attempts of Schilling, Koch, and others to attenuate the parasites by methods already described, in which they believe they have succeeded, have been repeated by us, but we have been unable to verify their conclusions. In fact, we have failed to attenuate *Trypanosoma* by any of the methods employed. Attempts of all conceivable kinds have been made to immunize animals, but usually without success.

In the beginning of our work, when we were less familiar with our subject, we believed that we had immunized a goat, because parasites could not be found in the blood, but it was later discovered that the blood was infectious by inoculation.

We have succeeded in bringing a cow up to the point where the injection of 3,000 c. c. of blood produced but little effect, although it contained large numbers of *Trypanosoma*. This animal was infected and ran a chronic course after the first injection of 10 c. c, and the blood remained infectious until about one month after the last injection of 3,000 c. c.; but since that time, now three months, the blood of this animal has not been infectious by inoculation, and it has fattened and appears to be in perfect health. Serum taken from this cow at different times has been absolutely valueless either as preventive or curative in several species of animals.

Similar negative results have attended all our extensive work. We have followed the suggestions of others and have conducted many original experiments, but we have had no results which seem to offer hope for either a preventive or a curative serum.

XVI. TREATMENT.

Many drugs have been used in attempts to cure this disease, but so far without results offering any hope for future work along this line.

Braid, in a letter written in 1858 to the British Medical Journal, suggested the use of one to two grains of arsenic daily in cattle suffering

from the bite of the ts6tsé fly. This letter was called to the attention of Dr. Livingstone and he agreed to follow out the suggestion at the next opportunity.

In a letter to the British Medical Journal, published March 13, 1858, Balfour indorses Btaid's suggestion as to the use of arsenic but recommends Fowler's solution as a more desirable preparation, provided it is used in large doses.

Eeferring to the letters mentioned, Livingstone himself writes in the British Medical Journal, May 1, 1858, as follows:

> The very same idea with respect to the employment of arsenic in the disease which follows the bite of the tsetse* occurred to my own mind about the year 1847 or 1848. A mare belonging to Mr. Gordon dimming was brought to Kolobong, after prolonged exposure to the bite of the insect; and, as it was unable to proceed on the journey southward, its owner left it to die. I gave it 2 grains of arsenic in a little barley daily for about a week, when an eruption resembling smallpox occurred. This induced me to discontinue the medicine, and when the eruption disappeared the animal's coat became so smooth and glossy that I imagined that I had cured the complaint; for, after the bite is inflicted, the coat stares as if the animal were cold.
>
> The mare, though apparently cured, continued lean. This I was rather glad of, as it is well known between the latitudes of 20° to 27° south that, when a horse becomes fat, he is almost sure to be cut off by a species of pnetlmonia commonly called "horse sickness." About two months after this apparent cure, the coat began to stare again; but this time it had remarkable harshness and dryness. I tried the arsenic again; but the mare became like a skeleton, and refused to touch the barley. When I tried to coax her, she turned her mild eye so imploringly, and so evidently meaning, "My dear fellow, I would rather die of the disease than of the doctor," that I could not force her. I got her lifted every morning to feed, and saw her at last perish through sheer exhaustion; and this was nearly six months after the bite was inflicted.

Since that time the treatment of Trypanosomiasis by arsenic has frequently been mentioned in literature. It has been given in various ways and in all reasonably sized doses, by mouth, subcutaneously, and intravenously. The pure acid as well as many of the salts have been used. Some writers mention its previous use in the treatment of the disease, while others, judging from their writings, thought that they were trying something new.

In a circular letter from the headquarters of the Division of the Philippines, as late as January 11, 1902, we read as follows:

> The board ordered to inquire into and to investigate the disease of animals called surra have found Fowler's solution of arsenic, given intravenously, to destroy the parasite in nearly every case, and animals so treated are doing well, but such treatment is not as yet conclusive as to cure.

Lingard has given minute directions for the use of arsenic to accomplish the best results. Some writers assert that arsenic delays the course of the disease and a few that cures may result, but the concensus of opinion is against this, and without doubt justly so. The statement that

arsenic destroys the parasite in circulation is without "a particle of evidence to support it. That the parasite may not be found by microscopical examination after such an injection is true, but the same results are just as likely to happen after the injection of any other substance; or for that matter, it is occasionally difficult or even impossible to find the parasite for days at the time, when no treatment whatever has been given. However, it has been shown by others, and the observations have been confirmed by us, that the blood at this time is infectious when injected into susceptible animals, and that in such cases the parasites always reappear.

Laveran and Mesnil conclude that human serum and arsenic are the only substances that have shown any definite activity, and that under certain conditions arsenic may be used to prolong life.

They treated animals sick from nagana with arsenious acid, arsenite of soda, arrhenal, corrosive sublimate, Donovan's solution of arsenic and mercury, potassium iodide, quinine, a solution of arsenious acid, toluidan blue, methylene blue, and several of the newer silver salts, as silver lactate, fluoride, or trachiol, and carseinatc of silver, or argonin, without curative results.

They quote Edington as having caused a disappearance of the parasites in animals by injecting one part of the bile of animals dead of the disease mixed with two parts of glycerine, and state that he obtained immunity in healthy ones. Laveran and Mesnil used this treatment on dogs with negative results. In rats and mice it did not influence the course or duration of the disease.

Bruce used arsenite of sodium intravenously in large doses. He concluded that this treatment would cause a temporary disappearance of the parasites and somewhat prolong life, but that it would not cure the disease.

Lesur employed subcutaneous and intravenous injections of Fowler's solution, cacodylate of sodium, and arrhenal without definite results.

Deixome made use of arsenic, cacodylate of sodium, arrhenal, and corrosive sublimate, but to no purpose.

Curry tried quinine subcutaneously and intravenously, methylene blue and salt solution intravenously, arsenic subcutaneously and by mouth, as well as various tonics, iron, cinchona, etc., but the animals died with the usual regularity in spite of treatment.

Schilling determined quinine, corrosive sublimate, and bile to be useless.

Voges used intravenous injections of large doses of quinine and methylene blue with negative results. He also employed the following (without any benefit: Enteral, sodium salicytate, turpentine, potassium permanganate, potassium iodide, and corrosive sublimate. He observed, as have so many others, a temporary improvement under the treatment of arsenic, life being prolonged, but no cures effected.

Three native ponies were treated with daily intravenous injections of large quantities of 1-1,000 solution of acetozone. A temporary drop of the temperature often followed treatment, and, as in the case of almost any kind of an injection, the parasites sometimes disappeared for a short time from the circulation, but definite or permanent results were not obtained, although the course of the disease was somewhat shortened.

As has already been shown, several substances have a destructive action for *Trypanosoma* in the hanging drop, but no such favorable action was obtained from any of them in treatment, whether by mouth, subcutaneously, or intravenously. The following have been used by us in the treatment of animals ill of the disease, but in none of them with hopeful results:

Lysol, creolin, infusion of pepo granatum, santonin in the form of freshly prepared santonate of soda, strychnine arsenate, Fowler's solution, spigellia, copper arsenite, pelleterine, eucalyptus, quinine hydrochlorate and urea, and combinations of several other salts and quinine, thymol, chloral hydrate, glycerine, methyl alcohol, acetic alcohol, barium chloride, calcium chloride, magnesium chloride, picric acid, oxalic acid, and various strengths of salt solutions alone and in combination with other drugs, carbolic acid, formalin, potassium permanganate, cyanide of potassium, urotropin, turpentine, cuprous sulphate, cupric sulphate, eosin water soluble, eosin alcohol soluble, potassium acetate, potassium chlorate, corrosive sublimate, arsenious acid, methylene blue, and several other aniline dyes.

The following serums have also been used: Antidiptheritic, antistreptococcic, antirinderpestic, antiplague, antidysenteric, antitetanic, and all available prophylactic preparations.

Toxins, toxic cultures, and fresh cultures of numerous organisms have been used, including plague, dysentery, typhoid, paracolon, malta fever, streptococcus cholera, and several strains of colon bacilli.

Blood parasites have been inoculated, including malaria and two varieties of filaria.

Extensive use has been made of human blood taken from fresh necropsies and in the following diseases: Cholera, dysentery, plague, malaria, typhoid, Bright's disease, leprosy, and malignant neoplasms.

Blood from the lower animals, both in health and in disease, has been employed; from healthy cows, as well as those suffering from rinderpest and foot-and-mouth disease; from sheep, goats, deer, rabbits, guinea pigs, frogs, chickens, ducks, pigeons, and several other species of animals.

Bile and other excretions and secretions, including urine from both healthy and diseased animals as well as from those dead of surra, have been used.

Use has been made of the extracts from the lymphatics, the adrenal,

and the thymus, as well as from organs of animals affected with surra and other diseases.

Recourse has been had to X-ray and other light treatments, various emulsions and preparations of blood, and attempted attenuations of parasites.

As already mentioned under serum therapy, considerable time has been devoted to the preparation of specific sera; and numerous injections of aspirated serous fluids and the contents of collodion sacs have been kept in the abdominal cavity of susceptible animals for varying lengths of time.

In all this work we have not obtained a single recovery, nor have we been able to bring about conditions that would indicate the slightest hope of effecting a cure in animals when once they have contracted the disease.

In conclusion, we see no hope whatever for curative treatment along lines so far investigated, and the outlook for preventive treatment is hardly more encouraging.

From a casual observation the conditions seem unfavorable, but if we go more deeply into the matter we find that they are not so bad after all. The disease is one which can certainly be prevented in a country not yet infected and can as surely be eradicated from one where it is already epidemic by means which are thoroughly practicable. There is presented to us in the Philippine Islands to-day an opportunity to accomplish results which will be gratifying to the scientific world and which should save the country from the annual loss of thousands of dollars.

XVII. SUMMARY AND CONCLUSIONS.

Trypanosomiasis is considered to be a general infection caused by *Trypanosoma.* The term *Trypanosomiasis* in a general sense is used to designate all varieties of the infection as found in different animals. The long list of vernacular names now in use, except *surra,* should be discarded or else allowed to fall merely as synonyms, save in those cases where the infecting parasite is shown to be a species distinct **from that of *Tr. evansii.***

A study of the history of the disease shows it to be of remote origin, records of it in some countries dating back for centuries.

It is distributed over large areas of the tropical and subtropical world, corresponding closely in its dissemination to the malarial zones.

Trypanosoma in general are discussed with reference to history; methods of study; general characteristics, including modes of multiplication, agglutination and involution forms; distribution in the body and outside the body; life cycle.

The life cycle is as yet unknown, but is believed to be acted out entirely within the animal economy.

A *tentative* classification has been adopted for purposes of study, and each *Trypanosoma* of importance has been discussed with reference to its principal characteristics, habitat, and pathogenesis.

The differential diagnosis of *Trypanosoma* of mammals, like the life cycle, is left an open question, but the weight of evidence in literature and our own observations tend to the conclusion that at least three of the species to which separate names have been given are in reality identical with *Tr. evansii.*

Under the discussion of modes of transmission and infection, the only point upon which emphasis need be placed is the conveyance of the disease through wounded surfaces, in which biting insects, particularly flies and fleas, serve as the principal agencies. It is clear that the prevalence of the disease is dependent upon the presence of a host for the *Trypanosoma* and of insects for their transmission. The animals which serve as hosts for the perpetuation of the disease through the dry season vary in different countries. In Manila sick horses exist in sufficient numbers to carry the infection from one rainy season to another. Cows and rats may also aid in its perpetuation.

Statements concerning the infection of pastures and water and the transmission of the *Trypanosoma* through sound mucouslnembranes have nothing to support them.

After describing the general pathologic anatomy and symptomatology we have taken up the discussion of the infection in various species of animals, paying particular attention to the disease in those of economic importance. The manner in which the symptoms vary in different animals has made this necessary, in order to enable us to make satisfactory diagnoses and intelligently to control the epidemic.

The course, the duration, the prognosis, the complications, and the diagnosis have all received a general consideration.

A chapter has been devoted to the consideration of the identity or individuality of surra, nagana, dourine, and mal de caderas. This is an important subject from a scientific standpoint, but as an aid to the evolution of means of prevention or cure it is of little consequence. As in the case of the parasite, we have with most other writers left the subject open, but we are strongly inclined to believe them the same disease, in which case *surra* would be the only vernacular name allowable. There is certainly nothing in the clinical study of these diseases to differentiate them. The only real arguments in favor of their individuality are based upon morphologic differences in the parasites, and, as has already been said, these appear to us to be so slight that a positive classification can not be founded on them.

The study of prophylaxis has included the consideration of quarantine laws intended to prevent the infection or reinfection of a country, as the case may be, and of methods for the control and eradication of the disease in territories where it already has a foothold. In discussing this matter

we have limited ourselves almost entirely to the consideration of means adapted for destroying the hosts and supplemented by those suitable for combating the carrying agents. It has been thought necessary to go into this subject with considerable detail, and miscellaneous conditions have been given full consideration.

Prophylactic and curative serum therapy have thus far failed to give successful results, but if recent reports from Africa are to be trusted, preventive inoculation is not *wholly* without promise of success.

All methods tried for the treatment of the disease have been without results of practical importance or significance.

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1903.-No\ 6.

DEPARTMENT OF THE INTERIOR.

BUREAU OF GOVERNMENT LABORATORIES,

I. NEW OR NOTEWORTHY PHILIPPINE PLANTS.
II. THE AMERICAN ELEMENT IN THE PHILIPPINE FLORA,

BY ELMER D. MERRILL, BOTANIST,

ISSUED JANUARY 20, 1904.

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LETTEE OF TEANSMITTAL.

DEPARTMENT OP THE INTERIOR,
BUBEAU OF GOVERNMENT LABORATORIES,
OFFICE OF THE SUPEBINTENDENT OF LABOBATOBIES,
Manila, P. I, August 81,190S.

SIB: I have the honor to transmit herewith two papers, the first entitled "New or Noteworthy Philippine Plants," and the second "The American Element in the Philippine Flora," by Elmer D. Merrill, botanist

I am, very respectfully,

PAUL C. FEEEB,
Superintendent of Government Laboratories.

Hon. LUKE E. WEIGHT,
Acting Secretary of the Interior.

I. NEW OR NOTEWORTHY PHILIPPINE PLANTS.

By ELMER D. MEBRILL.

The material upon which the present paper is based has been collected during the past year and is deposited in the herbarium of the Bureau of Government Laboratories, Manila. The numbers cited, unless otherwise stated, are those of the author's distribution. Duplicates have been distributed to the United States National Herbarium, Washington; the K. K. Botanische Garten, Berlin; the Royal Gardens, Kew; the New York Botanical Gardens, and other institutions. As yet there has been little opportunity to critically study the many interesting species in the collection, and the present paper records only a few notes on some of the most "characteristic species.

ANACARDIAOEiE.

SEMECABPUS GIGANTIKOLIA F. Villar, Nov. App. PI. Klip. August. Add. et Corrig. 350. 1883; Vidal, Sinopsis, Atlas, XXII. *t. 36. f. A.* 1883.

This most distinct and interesting species is not noted in Index Kewensis, and is represented in our herbarium by No. 2491, Lamao River, Mount Mariveles, Province of Bataan, Luzon, June 11, 1903, also by No. 511 (Ahem), Tetuan, Province of Zamboanga, Mindanao, 1901. The specimens observed at Lamao River were trees 10 m. high and about 20 cm. in diameter, unbranched or with very few (three or four) ascending branches, the leaves, which exceed 1 m. in length, being crowded at the apices of the branches, giving the plant a striking, almost palm-like appearance. The fruit is borne in great abundance on panicles 10 to 20 cm. long, the entire length of the trunk. The hypocarp is very fleshy, deep purple when ripe, 3 to 4 cm. long, and edible, although somewhat puckery. Known by the Tagalops as *Tocud langit* and by the Viscayans as *Manalu.*

BORRAGINACEiE.

EHRETIA MOLLIS (Blanco). (*Menais mollis* Blanco, PI. Pilip. 139. 1837; *Ehrctia virgata* Naves. Fl. Filip. August, *t.* 70. 1880, excel, syn.; *E. onava* F. Vill. Nov. App. Fl. Filip. 138. 1883, p. p., non A. DC; *E. navesii* Vidal, Rev. PI. Vase. Filip. 194. 1886.)

COMPOSITE.

VERNONIA VIDALII Merrill, sp. nov. *(Vernonia arborea,* Ham. var. *vestita* Vidal, Rev. PI. Vase. Filip. 160. 1886, non *V. vestita* Baker.)

This is evidently a distinct species, being represented in our herbarium by No. 153, a small tree, 8 to 10 m. high, with pale purple flowers, collected in the mountains between Bagabag and Quiangan, Province of Nueva Viscaya, Luzon, June 7, 1902, also No. 2291, Tanay, Province of Rizal, Luzon, May, 1902. Tagalog, *Malasambong.*

CONIFERE^E.

PINUS INSULARIS Endl., and P. MERCUSII Jungh. and De Vriese.

Species of the genus *Pinus* are found in the mountains of northern Luzon, in the Province of Nueva Ecija, Nueva Viscaya, Zambales, Benguet, and Lepanto-Bontoc, the most widely distributed species being *Pinus insularis* Endl., which is apparently very closely related to *Pinus khasya* Royle, from Burma. Specimens from Benguet have been identified as the latter species. *Pinus mercusii* Jungh. and De Vriese, has been found only in the Province of Zambales, and from material recently received, distributed as No. 2116, it appears doubtful if the Philippine specimens so referred are really this species. *Pinus mercusii* Jungh. and De Vriese, has only two leaves in a fascicle, while *Pinus insularis* Endl., has three leaves in a fascicle. In No. 21 Ki, on the same branch about one-half of the fascicles contain two leaves and the other half contain three leaves. Other specimens, No. 1158 (Merrill) and No. 829 (Ahern) from Zambales invariably contain two leaves in a fascicle, while the specimens Nos. 1161, 1162, 1163, 1164, 1165 (Merrill), Nos. 830, 852 (Ahern), and Nos. 121, 122, 123, 124 (Topping), from Benguet, always contain three leaves in a fascicle. It is very diflicult to separate *Pinus insularis* Endl. and *Pinus mercusii* Jungh. and De Vriese on any characters other than the number of leaves in a fascicle, and it is suggested that the Philippine material identified as *Pinus mercusii* Jungh and De Vriese, may be only a form of *Pinus insularis* Endl. The specimens of *Pinus* in our herbarium are extremely variable, and may represent one variable species, or several closely related ones. The Ieorrofps «„ u distinctive names for different forms of *Pinus LuTis* "E n d l ' T t have names are, I believe, based upon the amount of resin in the trPP '. --t their upon any vegetative or floral characters. The native ----, rather than A£ ɔg,f* *ng*or « , , Z™b.k» *Tapulao;* Ilocano, *Parua;* Igorrote, names for *Pinus* are: *Al*

GRAMINE.^.

EREMOCHLOA LEERSIODES (Munro) Hack. in DP P ^ 1889.

This speck„ previously known only f*rom* southern £ „; ; oo3 , f ?4–65.) introduced h, the latter place, was found *g n* ^ ^ *t* ^ *P* ^rnia, (m[188] lands near Echague, Province of Twhdi* Tu™, T[1u] ---- tly m Op™ • ^uzon, j*une* 11, 1902, dis-

tributed as No. 138. No species of this genus has been previously reported from the Philippines.

ORYZA GRANULATA Nees et Arn. in Wall. Cat. No. 8634. 1828. (0. *filiformis* Herb.; 0. *meyeriana* Zoll. et Mor.)

This species was found sparingly along trails in dense damp forests in the hill country near Quiangan, Province of Nueva Vizcaya, Luzon, June 6, 1902, No. 116. This number differs from *Oryza granularis,* as described, in its somewhat larger spikelets, but is manifestly this species, which is distributed from the Himalayan region to Malabar, Macuira, Java, and Celebes.

POLYTRIAS PBAEMORSA (Nees) Hack, in DC. Monog. Phanerog. 6: 189. 1889. *(Pollinia praemorsa* Nees.)

This species, previously known only from Java, was found growing abundantly in dry, open, waste places, Manila, December 6, 1902, distributed as No. 386. It is quite evident that this species is not a native of the Philippine Islands, but has been introduced from Java or from Singapore; it is very common at Singapore and may be also a native of that region or may have been introduced from Java. It is one of the most common and widely distributed species of the *Graminece* in the Island of Java.

LEGUMINOSEiE.

PTEBOCARPUS BLANCOI Merrill, sp. nov. (P. *s<mtaUnus* Blanco, Fl. Filip. ed. 1, 561. 1837, non Linn, f.)

This species is very different from *Pterocarpus santalinus* Linn, f., being distinguished by its acuminate, not obtuse, leaflets and much larger pods. The wing of the pod is much broader in this species than in *Pterocarpus indicus* Willd., while P. *santalinus* Linn, f., is described as having a pod with a narrower wing than that species. It is distinguished from P. *indicus* by its longer, acuminate leaves and larger pods. According to Hooker P. *santalinus* Linn, f., does not extend to the Malayan region.

This species is known to the natives as *Narra* or *Asana,* both names also being applied to *Pterocarpus indicus* and P. *echinatus,* but P. *blancoi* has also a distinctive name *Apalit,* probably on account of its odorous wood. It is believed that the wood of the other two species noted above is without this distinctive odor.

This species is represented in the herbarium by No. 2881, Tarlac, Province of Tarlac, Luzon, July, 1903.

MEZOXEIRUM RUBRUM Merrill, sp. nov.

A robust prickly climber 6 to 10 m. long, with large obtuse, glabrous leaflets and oblong long-pcdicelled red pods. Leaf-rachis 5 to 6 dm. long, glabrous, with stout retrorse prickles on the under side; pinnae 6, ldm. long, 6-jugate; leaflets firm ovate or obovate, glabrous, obtuse or emarginate at the apex, the bdte obtuse, inequalateral, 5 to 6 cm. long, 2.5 to 3 cm. wide, the nerves not prominent, freely anastomosing; petiolules 3 mm. long. Racemes as long as the leaves, pubescent. Flowers unknown.

Pods thin, glabrous, 4 to 5 seeded, 15 cm. long, 4 to 5.5 em. wide including the wing, which is 1 cm. in width; pedicels 2.5 to 3 cm. long.

Type specimen No. 805, growing in thickets. Point Seperation, Paragua, February 18, 1903.

This Bpeeies is probably most closely related to *Mezoneurum sumatranum* Miq., but may possibly not belong to the section *Tubicalyx,* it being impossible to determine this point with the material at hand. It differs from that species in its smaller number of pinna; and leaflets, smaller leaflets, longei#pods and long pedicels.

MELIAUEzU.

SANDORIOUM VTDALII Merrill, sp- nov. *(8. homeense* Vidal, Cat. PI. Prov. Manila; F. Vill. Nov. App. 43, non **MiqueLj**

\ **tree** na.hing a height of 20 m., with **glabrous** ovule, acute or slightly **acuminate** leaves, reflexed petals and glabrous ovaries. Branches glabrous, gray. Leaves 1.5 to 2.5 dm. long, the petioles 5 to 7 cm. long; leaflets ovate, **the** base acute, 6 to 14 cm. long, 4 to 9 cm. wide, the nerves 8 to 10 pairs, petiolules of the lateral leaflets 5 *ram.* long, those of the terminal leaflet 3 cm. long. Panicles glabrous, many **flowered,** 5 to 6 cm. long. Flowers 6 to 7 mm. long, their pedicels about the same length. Calyx glabrous, cup shaped, with 5 obscure, broad, rounded teeth. Petals 0 to 7 mm. long, 2 mm. wide, glabrous, **obtuse,** recurved in antheais. Staminal tube cylindrical, ridged, not ventricose, 5 to 6 mm. long, with 10 obscure teeth. Ovary glabrous. Style 3 to 4 mm. long. Stigmas 5, distinct, erect, 1 mm. long. Fruit **(immature),** globose, somewhat flattened, 2.,'i cm. in diameter, minutely and densely velvety-pubescent.

Type **specimen** No. 1824, Bosoboso, Province of Rizal, Luzon, April, 1903 (ilower). The following specimens are also referred here. No. 2270, Tanay, same province, May, 1903 (fruit) ; No. 2060, Guinayangan. **Province** of Tayabas, Luzon, April, 1903 (fruit.) ; N[T]o. 1923, from Pagbilao, Province of Tayabas (flower), is also doubtfully referred here, differing from the type in some minor characters.

This species is evidently most closely related to *Sandoricum maingayi* llicrn, from **Malacca,** lmt is distinct from that species. It is undoubtedly the species erroneously identified by Vidal as *Sandorioum borneense* Miq. **This** free grows in dry hill forests, reaching a height of 20 meters, and a diameter of R0 cm., the sop wood is white **or pink** and the heart wood is of a violet color, it being used by the natives in the construction of houses. **The watery** sup **has** a **fafnt** odor, similar to **that of** *Sandoricuin indioum.* **Tagalog *italaaontol,*** literally "false snntol," in distinct inn from the true s:nit.ol, *Sarulvrioum indicitm* L.

MOBAOE^E.

Pious LUZONENSIS Merrill, sp. nov. *(Eusyce.).*

As 'ee **with** firm ovate, somewhat pubescent leaves and long-leduncled, globose, densely pubescent receptacles. Leaves 7 to 10 cm.

long, 3 to 4 cm. wide, ovate or ovate-lanceolate, apex acute, or obtuse, base acute, margins entire, rather strongly revolute, glaucous and harsh above, with few scattered, striate hairs, beneath usually densely brown-punctate*, nerves rather prominent, 4 to 6 pairs, which with reticulations are rather densely pubescent; petioles 2 to 2.5 cm. long, densely pubescent; stipules lanceolate, acute, densely pubescent, nearly 1 cm. long. Receptacles, long-pcduncled, solitary, or in pairs from the axils of the leaves, globose, densely tomentose, 6 to 7 mm. in diameter, abruptly constricted at the base into a slender stalk 3 mm. long, at the juncture^ this stalk with the pedicel are three broad, obtuse bracts 1.5 mm. long; peduncle proper pubescent, 1.5 to 2 cm. long; umbilicus, rather prominent, 3 mm. in diameter. Male flowers long-pedicellate, mixed with gall flowers all over the interior of the receptacle, evidently the same as in *Ficus macropoda* Miq.

Type specimen collected at Baler, Province of Principe, Luzon, No. 1059, September, 1902. Tagalog, *Malananca.*

A species of the section *Eusyce,* related to *Ficus macropoda* Miq., and *F. peduncutosa* Miq., both species being found in the Philippines, the former endemic, the latter being also known from Beroe and Celebes. It is, tiowver, more closely related to the former, from which it is distinguished by its smaller leaves, which are acute, not emarginate at the base, much longer petioles, punctate under the surface of the leaves, and very much longer peduncles. See King, Ann. Bot. Gard. Calcutta, 1: 144, 145, *pi 182, 183.*

Ficus PSEUDOPALMA Blanco, Fl. Filip. ed. 2, 473. 1845, ed. 3, 3: 84. 1879.

This specks, not listed in "Index Kewensis," is most distinct, and possibly should represent the type of a new section of the genus *Ficus,* although it is placed by F. Villar,[1] in the section *Covellea.* Naves, in identifying the plates for the third edition of Blanco's Flora de Filipinas, reduces *Ficus pseudopalma* Blanco to *F. difformis* Lam., but in this error he is not followed by F. Villar in the Novissime Appendix. The figure of this species, plate 356, Fl. Filip. Aug. does not well represent the species.

Ficus pseudopalma Blanco is a very characteristic and well-marked species, especially in its habit of growth, and is evidently widely distributed in the Philippines. It is probably endemic to the Archipelago, but an excellent example is in cultivation in the Botanical Gardens at Singapore, which was received from Manila. This species has a straight unbranched stem, from 3 to G m. in height, and from 4 to 6 cm. in diameter, the leaves which are from 5 to 8 dm. long, being all crowded at the apex of the stem, giving the plant a palm-like appearance. The leaf scars are very large and prominent, as are the lanceolate, acute, slipules, which are from 5 to 7 cm. long. The receptacles are dark green, ovate, usually more or less angular, 3 to 4 cm. long, usually in pairs, on short peduncles in the axils of the leaves.

This species is represented in our herbarium by No. 983, Calapan, Mindoro, April, 1903, and No. 1958, Pagbilao, Province of Tayabas, Luzon, April, 1903. It is known by the Tagalogs as *Niog-niogan,* and by the Visayans as *Sulamiog.*

[1] Nov. App. Fl. Filip. 201. 1883.

MYRTACEiE.

XANTIIOSTEMON SPECIOSUM Merrill, sp. nov.

A small tree, about 10 m. high, with ovate or obovate leaves and terminal cymes, bearing from 2 to 4 showy crimson flowers. Bark gray, ultimate twigs with scattered hairs. Leaves alternate, ovate, or obovate, obtuse or rounded at the apex, tapering to the cuneate base, 6 to 8 cm. long, 3 to 4.5 cm. wide, entire, coriaceous, nearly glabrous except for a few scattered striate hairs on Wh surfaces, beneath black-punctate, nerves 9 or 10 pairs, not prominent, anastomosing near the margin; petioles, 1 cm. long or less, with few appressed hairs. Inflorescence terminal, 4 to 5 cm. long, 2 to 4 flowered; peduncles pubescent; pedicels 2 to 3 mm. long;"bracteoles linear, 5 mm. long, pubescent. Calyx tube 0.5 mm. long, 1.5 cm. in diameter, somewhat pubescent, the lobes five, triangular, spreading, acute, sparingly pubescent, 3 to 4 mm. long, alternating with the calyx lobes are five prominent depressions in the calyx tube. Corolla spreading, the petals crimson, orbicular, 6 mm. long, 8 mm. wide, slightly ciliate on the margins. Stamens about 20, exserted, crimson, arranged in a single series; filaments about 2 cm. long; anthers 2.5 mm. long. Ovary 3-celled. Style 2 cm. long; stigma unknown. Fruit unknown.

Type specimen No. 682, collected in a dry, open, grassy valley near Halsey Harbor, Island of Culion, February 12, 1903. A tree about 10 m. high and 3 dm. in diameter, with exceedingly hard, dark-colored wood.

This species is quite distinct from *Xanthostemon verdugonianus* Naves, the only other species of this genus found in the Philippines. Its distinguishing characters are its much larger flowers, very short but broad calyx tube, larger petals, crimson filaments, etc.

XANTHOSTEMON VEBDUGONIANUS Naves, in F. Vill. Nov. App. Fl. Filip. 82. 1883; Fl. Filip. ed. 3, *t. 300;* Vidal, Sinopsis, Atlas, *t J,9. f. K.* 1883.

This species is represented in our herbarium by No. 428 (Ahem), Island of Tinago, 1901 (in fruit), and by No. 34 (Howard Long), Placer, Province of Surigao, Mindanao, May 20, 1903 (in flower). This species grows to a much larger size than *Xantiiostemon speciosum,* reaching a height of 50 m. It is known by the Visayans as *Magcono* and *Mancono.* Is much prized for its exceedingly hard durable wood, and is said to be abundant in the Province of Surigao. It is well represented by the figures of Naves nnd Vidal cited above.

So far as is known, with one exception, the two Philippine species here noted are the only ones of this genus that have been discovered outside of Australia and New Caledonia, and up on the present time no species of this genus has been discovered in New Guinea although one species has been described from Celebes. Both of the Philippine species differ from the other species in the genus by their smaller number of stamens.

OLEACEAE.

AlAYEI'KA ClMk\(ilAJsA [Vidal).

Linociera cumingiana Vidal, Phnnerog. Cuining. Philip. 185. 1885.

MAYEPEA CORIACEA (Vidal).

Linociera coriacea Vidal, Rev. PL Vase. Filip. 181. 1880: *L. purpurea* F. Vill. Nov. App. 128. 1883, non Vahl.

RHAMNAOEiE.

ZIZYPHUS ARBOBEA Merrill, sp. nov.

A large tree, reaching the height of 40 m., with a diameter of GO cm. above the buttresses, which extend to a height of about 3 m. on the trunk, with broad, ovate, often subcordate leaves, which are glabrous on both surfaces, and globular, minutely rufous-tomentose drupes about 2 cm. in diameter. Branches unarmed, the younger ones more or less rufous-pubescent. Leaves broadly ovate, acute, the base often somewhat oblique, acute or subcordate, 8 to 12 cm. long, 4 to 7 cm. wide, entirely glabrous, with three strong unbranched, vertical nerves, the secondary nerves leading from the lateral vertical nerves, 10 or 12,- prominent, margins entire or sub-crenate; petioles about 1 cm. long, often slightly pubescent. Inflorescence of axillary peduncled cymes, usually forming a terminal cymose, leafy, panicle; peduncle 3 to 4 cm. long. Flowers unknown. Drupe globose 2 cm. in diameter, minutely rufous-tomentose, 2-seeded, the pulp scanty, the endocarp bony.

The following specimens represent this species, all from the Province of Tayabas, Luzon. Pagbilao, No. 1929 (type), Feb. 11, 1903; No. 1983, March 14, 1903; Guinayangan, No. 2017, April 13, 1903. A frequent tree on the hills and table lands, the timber being used for the construction of Imncas (native canoes) and houses. It is not, however, durable when exposed to the weather. Tagalog, *Ligaa* and *Danlic.*

A species distinguished by its large size, well developed buttresses, spineless branches, and glabrous leaves.

RHIZOPHORACE^.

BBUOUIEBA RITCHIEI Merrill, sp. nov.

A shrub or small tree 12 m. high or less, with lanceolate leaves, oblong, cylindrical striate calyx, and very short erect calyx lobes. Trunk 25 cm. in diameter or less; bark rough. Leaves ovate-lanceolate, somewhat coriaceous, 6 to 11 cm. long, 2 to 3.5 cm. wide, acute, tapering to the base, glabrous, slightly pale, and densely punctate beneath, nerves about 16 pairs, not prominent, anastamosing near the margin; petioles 2 cm. long. Inflorsecence axillary; peduncles solitary, 1.5 to 2 cm. long, bearing several flowers, of which usually only one develops. Flowers unknown; fruiting calyx, cylindrical, somewhat channeled, 1 to 1.5 cm. long, 5mm. in diameter, abruptly tapering to the pedicel, which is 1 to 1.5 cm. long; calyx lobes, 8 very short, acute, erect, 3 mm. long. Fruit in the fundus of the calyx, with the growing radicle protruding 10 cm. or more.

This interesting and well-marked species was first collected at Pola, Mindoro, in mangrove swamps, by Mr. J. W. Ritchie, while making some investigations on tan barks and dye woods fox the Forestry Bureau, in May, 1903, distributed as number 2463 (type), No. 2487, from Guinayangan, Province of Tayabas, Luzon, May, 1903, also represents this species. It is known by the Tagalogs in Mindoro as *Hangaray* and *Hagalay,* while the Tagalogs in Tayabas call it *Pototan.*

A species at once distinguished from others in the genus by its elongated, cylindrical calyic, and very short calyx lobes.

RUTACE^E.

AEOLE GLUTINOSA (Blanco). *(Limonia glutinosa* Blanco, Fl. Filip. ed. 1, 358. 1837; *Feronia ternata* Blanco, 1. c, ed. 2, 252. 1845; 1. c, ed. 3, 2: 104. 1878; *Aegle decandra* Naves in Blanco, Fl. Filip. ed. 3, *t. W,* F. Vill. Nov. App. 38. 1880.)

SAPINDACEiE.

TRISTIRA PUBKSCENS Merrill, sp. nov.

A small or medium sized tree, 10 to 12 m. high with densely rusty pubescent leaves, inflorescence, and young branches. Leaves pinnate, the densely rusty pubescent rachis 10 to 12 cm. long; leaflets 4 to 5 pairs, lanceolate-ovate, 6 to 8 cm. long, 1.5 to 2.5 cm. wide, densely rusty pubescent beneath, and sparingly so above, the apex blunt or obscurely acute, the margins entire, nerves about 15 pairs, petiolules 2 to 3 mm. long. Fruiting panicles about 15 cm. long, the rachis and branches densely rusty pubescent. Calyx lobes five, pubescent. Fruit triangular, ovate, 2 to 3 cm. long, rusty pubescent, woody, the wings narrow near the base of the fruit, about 5 mm. wide above, the three joining and terminating in a short point at the apex of the fruit, the three cells lined with a dense, white woolly tomentum.

Type specimen No. 2842, Bosoboso, Province of Rizal, Luzon, July 19, 1903. Tagalog *Arupay.*

A very distinct species, at once distinguished from the other two species in the genus by its dense rusty pubescence. *Tristera triptera* Radlk., the only other species of the genus from the Philippines, is almost glabrous, with much larger leaves and larger fruits than in *Tristira pubescens.* The flnwoix of no species of this genus are known at present.

SAPOTACE^E.

Although tla' genus *1'alaquium* was based on Philippine material, very little definite information has been available regarding the several species found in the Archipelago. Blanco in establishing the genus described three species, all of which are known to us today. Fernandez-Villar credits seven species to the Archipelago, of which one is described as new and two of which *mrv* erroneously credited to the Archipelago. Vidal notes but

three species, while in the present enumeration 11 species are considered. All the material on which the present enumeration is based has been collected since the American occupation, and as more thorough collections arp made we may expect that this list will be considerably extended.

Key to the species of Palaquium at present known from the Philippine Islands.

Leaves rusty-tomentose or pubescent beneath.
- Leaves obovate, obtuse.
  - Leaves 15 cpi. long or less; nerves, 12 to 13 pairs.....P. *barnesii*
  - Leaves 20 to 30 cm. long; nerves, about 16 pairs'.....*P. latifolium*
- Leaves acute or acuminate.
  - Leaves acute, 15 to 18 cm. long.....P. *ahernianum*
  - Leaves acuminate, 20 to 30 cm. long.....P. *oleifei*

Leaves glabrous beneath.
- Leaves 40 to 50 cm. long.....*P. gigantifolium*
- Leaves 20 cm. long or less.
  - Nerves, 8 or 9 pairs.....P. *lanceolatum*
  - Nerves, 12 to 17 pairs.
    - Leaves acute or acuminate.
      - Nerves, 12 pairs.....P. *celebicum*
      - Nerves, 14 pairs:.....P. *mindancense*
      - Nerves, 17 pairs.....P. *sp. indet.*
    - Leaves obtuse.
      - Nerves distinct; leaves 12 cm. long or more; petioles 3 to 4 cm. long.....P. *luzoniense*
      - Nerves obscure; leaves 6 to 8 cm. long;* petioles 1 to 1.5 cm. long.....P. *cuneatum,*

PALAQUIUM BABNESII Merrill, sp. nov.

A tree 35 to 40 m. high, with obovate pubescent leaves, numerous flowers and long peduncled fruits. Ultimate branches densely fulvous-pubescent. Leaves membranaceous, 8 to 10 cm. long, 6 to 8 cm. wide, obtuse or rounded at the apex, gradually tapering to the cuneate or abruptly acute base, both surfaces beset with numerous brownish hairs, the upper surface becoming nearly smooth with age, nerves about 12 pairs, rather prominent beneath, and densely .brown-tomentose; petioles 1 to 1.5 cm. long, densely brown-tomentose. Flowers with brown-tomentose pedicels and sepals, the sepals triangular, acute, 3 to 4 mm. long. Petals unknown. Fruit ovate or ovate-oblong, glabrous, 3.5 cm. long, the calyx persistent. Peduncles 4 cm. long, brown-tomentose.

Type specimen No. 2757, Marintoc Kiver, Inland of Masbate, June 27, 1903, growing on the river bank, at an elevation of about 20 m. above the level of the sea. The trunk reaches a diameter of 70 cm. and the buttresses are not well developed. This species yields but a small amount of latex, which is not utilized by the natives. It is named in honor of Mr. P. T. Barnes, collector for the Forestry Bureau, who first secured specimens. Visayan, *Wato.*

PALAQUIUM LATIFOLIUM Blanco, Fl. Filip. ed. 1, 404. 1837; *Bassia blancoi* A. DC. in DC. Prodr. 8: 199. 1844; *Dichopsis latifolia* F. Vill. Nov. App. 124. 1883.

This characteristic species is represented in the herbarium by No. 1675, Antipolo, Province of Rizal, Luzon, and Nos. 1941 and 1919, Pagbilao, Province of Tayabas, Luzon. It is readily distinguished by its obovate, obtuse leaves, which are 2 or 3 dm. long and densely rusty-tomentose and shining beneath. Tagalog *Alacap*; Palac palac.*

PALAQUIUM OLEIFERUM Blanco, 1. c, 405. (*Bassia oleifera* A. DC, 1. c, 198; *Dichopsis oleifera* V. Vill., 1. c, 125.)

This species is apparently closely related to the preceding, but is distinguished by its narrower leaves, which are acute, not obtuse, and which are oblanceolate in form. The seeds of this species yield an oil which is utilized by the natives. It is represented in the herbarium by the following specimens, all without fruit or flowers: No. 1402, Arayat, Province of Pampanga, Luzon, and a specimen from the same province without locality, collected by M. Martines. A specimen from Mindanao, No. 21 (Sherman), appears to belong here. When more complete material is secured we shall be better able to judge the validity of this species. Tagalog, *Palac palac, Alacap;* Pampangan, *Malasapuli;* Ilocano, *Daracan.*

PALAQUIUM AHERNIANUM Merrill, Forest. Bu. Bull. 1: 46. 1903.

A species related to *Palaquium lobbianum* Burck, but quite distinct. Mindanao, Province of Zamboanga, 608, 842 (Ahem), Moro, *Calapia.*

PALAQUIUM GIGANTIFOLIUM Merrill, sp. nov.

A tree 18 m. high, with very large, glabrous, obovate-lanceolate leaves 5 dm. long. Ultimate branches 1 to 1.5 cm. in diameter. Leaves glabrous on both surfaces 4.5 to 5.5 dm. long, 20 to 22 cm. wide, the apex obtuse or acute, gradually narrowing to the abruptly rounded base, nerves prominent, 22 pairs; petioles 4 cm. long, 1 cm. in diameter. Flowers very numerous 5 to 8 in fascicles on the branches below the leaves; pedicels thick, 1 cm. long, rusty-tomentose. Calyx 8 to 10 mm. long, the lobes obtuse, the outer ones firm* rusty-tomentose, the inner ones membranaceous. Corolla 3 cm. in diameter, the lobes lanceolate acute 1.5 cm. long, 5 cm. wide. Stamens, 18; filaments, 7-8 mm. long. Anthers 4 mm. long. Fruit unknown.

Type specimen No. 2845, Pagbilao, Province of Tayabas, Luzon, March, 1903. Growing in forests on hillsides about 50 m. above the sea level. A tree reaching a diameter of 25 cm. with very small or no buttresses and a nearly smooth dark gray bark that yields a small amount of latex, not utilized by the natives.

This very distinct species differs from all others in the genus in its very large leaves and flowers.

PALAQUIUM CUNEATUM Vidal, Sinopsis, Atlas, *t. 62. f. K.* 1883, non *Bassia cuneata* Blmn<\ Hijdr. 675: *Dichopsis cuneata* F. Vill. Nov. App. 124, excj. SNII

This species was confused with *Bassia vunvata* Blume by both Fernandez-Villar and Vidal, that species, however, being a true *Bassia,* and moreover

is confined to the Island of Java. *Palaquium cuncatum,* is well figured by Vidal. It is represented in the herbarium by No. 2993, Botolan, Province of Zambales, Luzon, June, 1903. Zambales, *Malicmic.*

PALAQUIUM CELEBICUM Burck, Ann. Jard. Bot. Buitenz. 5: 32. 1886.

Sterile specimens of what is undoubtedly this species have been found in Mindanao—No. 839 (Ahern)^ and No. 19 (Sherman). This species yields much of the gutta-percha produced in Mindanao, and is known to the Moros as *Galapia.*

PALAQUIUM sp. indet.

This species, which is certainly undescribed, is represented in the herbarium by a single sterile specimen, collected at Iligan, District of Misamis, Mindanao by A. Alga. The leaves are glabrous, narrowly lanceolate and long-acuminate, 15 to 20 cm. long and 4 to 6 cm. wide, the nerves 16 to 18 pairs. Moro, *Buruan.*

PALAQUIUM MINDANAENSE Merrill, sp. nov.

A tree with ovate, acute, entirely glabrous leaves. Branches glabrous. Leaves 11 to 13 cm. long, 5 to 6 cm, wide, acute at both ends, shining above, pale beneath, nerves not prominent above, 13 to 14 pairs; petioles 3 to 3.5 cm. long. Flowers, numerous, three or four in a fascicle, on the branches below the leaves. Peduncles 1 cm. long. Calyx lobes triangular, acute, brown-tomentose. Petals unknown. Fruit (immature) small, ovoid, 6 mm. in diameter.

Type specimen, No. 837 (Ahern), district of Cottabato, Mindanao, 1901.

A species is probably most closely related to *Palaquium celebicum* Burck, being distinguished by its smaller leaves, longer petioles, and other characters. Moro, *Calapia.*

PALAQUIUM LUZONIENSE (F. Vill.) Vidal, Rev. PL Vase. Filip. 176. 1886. *(Dichopsis luzoniensis* F. Vill. Nov. App. 125. 1883; *Palaquium latifolium* Naves in Blanco, Fl. Filip. ed 3, *t. 173,* non Blanco.)

This distinct species is represented in the herbarium by No. 1761, Subig, Province of Zambales, Luzon, and Nos. 1927, 1944, and 1982, Pagbilao, Province of Tayabas, Luzon. Tagalog, *Dolitan, Tagatoy* and *Bagalangit.*

PALAQUIUM LANCEOLATUM Blanco, Fl. Filip. ed. 1, 403. 1837. *(Bassia lanceolata* A. DC. 1. c, 199; *Dichopsis lanceolata* F. Vill. 1. c. 124.)

This species, which must be considered as the type of the genus, has been imperfectly known, and previously no specimens have been collected representing the species sinte it was described by Blanco. It is represented in the herbarium by the following specimens: No. 42 Ahern, Dalupaon, Province of Camarines, Luzon, February, 1901. *Dulitan;* No. 2136, Pitoga, Province of Tayabas, Luzon, April, 1903. *Dolitan;* No. 2042, Guinayangan, Province of Tayabas, Luzon, April, 1903. No. 1096, Baler, Province of Principe, September, 1902. *Halibis;* No. 1991, Pagbilao, Tayabas, locally known as *Betis,* is also referred here, but the petioles of this specimen are much longer than in the other numbers referred to this species. The name *Betis* is usually applied to *Illipe betis.* The only native name Blanco gives for *Palaquium lanceolatum* is *Bagalangit.*

PALAQUIUM GUTTA Burek. and PALAQUILTM FOLYANTHUM (Benth. et Hook)

These species **reported** from **Luzon bj** ***W.*** Vil !:„•.' arc manifestly based on misinterpretation of species and should he excluded from the Philippine flora, as **neither** species extends **to this** region. Just what species F. Villar **had** in **mind** it will bo impossible to determine, a_H no herbarium **material** has **been preserved sad BO descriptions** are **given.**

STEMONACEJ:.

SIIMONA piiiui'piNKNNiK **Merrill, sp.** nov.

A slender glabrous twining vine 1 to 2 *m.* **high,** or more, with alternate, **deeply** cordate, 9 to 11 nerved leaves, and small purplish-red axillary flowers. Leaves ovate-cordate, tapering to the slender acuminate apex, 7 to 10 cm. long. **3.6 to S** cm. **wide,** shining, the sinus at the base nearly 1 cm. deep; petioles 1.5 to 2 cm. long. **Peduncles** 2 to 6 cm. long, solitary; bracts' small, lanceolate, flowers **purplish red,** 1 cm. long, the segment* of the perianth **lanceolate, acuminate,** 7 to 9 nerved. Stamens erect, 0 to 10 mm long.

Type **specimen** \$_0$. 30GI, Island of Masbate, August, 1903. Visayan, *Sigid.*

A species perhaps most closely related to *Stemona 'minor* Hook, *t,* a species of **Ceylon and Malabar, but,differing** from that species in its larger leaves, which **have** more numerous nerves, smaller flowers and other characters.

STEMONA TLBEKOSA Lour.

This species was found at Point Separation, **Paragua, February** 18, 1003, **distributed** as No, 792. No species of this family has previously been **reported** from the Philippines.

TILIACE^.

COLONA LONGIPETIOLATA Merrill, ip. nov.

A **small** tree with nearly glabrous, long-petioled **leave* ind glabrous** fruits. **Young braaehes** pubescent, becoming **glabrous. Leaves** m ate- lanceolate, 10 to 15 cm. long, 6 to 7 em. wide, rounded ox somewhat acute at the equilateral base, **abruptly** tapering to the **long-acuminate** apex, the upper surfaee scabrous and with few hairs on **the midnerve** and veins', glabrous beneath, the nerves **prominent, 6 pairs;** petioles 2 to 3 cm. long) beset with brown, stellate hairs; stipules lanceolate, **acominate,** about 12 mm. long. Panicles terminal, 18 cm. long, the lower **branches** 8'to 10 cm. long. Flowers unknown. Fruit obovate, 2 cm. long, 1.5 to 2 cm. broad' the wings about 0.5 cm. broad; pedicels about 1 cm. long.

Type **specimen** \->. 479 G. P. Ahern. **Mariveles, province ef Bataaa,** Luzon, January 4, 1902.

A very di stinct pecies, perhaps most closely related to *Colona blancoi,* but with **smaller** fruit which **has much** narrower wings than in **that**

[1] Nov. App. 124, 1883.

species. It is distinguished from all described species in the genus by its long petioles. Tagalog, *Anilao lalaqui.*

COLONA BLANCOI (Rolfe). *(Columbia blancoi* Rolfe, Journ. Linn. Soc. Bot. 21: 308. 1884; *C. floribundus* Naves in Blanco, Fl. Filip. ed. 3, *t. 312;* F. Vill. Nov. App. 30. 1880; *Colona serratifolia* Cav. var. *blancoi* 0. Kuntze, Rev. Gen. PI. 1: 82. 1891.)

This form is in all respects worthy of specific rank, differing from *Colona serratifolia* in its much larger, broader leaves, longer petioles and larger fruits. It is represented in the herbarium by No. 1703, Antipolo. Province of Rizal, Luzon, March, 1903, and is known to the Tagalogs as *Manned.*

COLONA SERRATIFOLIA Cav. Ic. 4: 47. *t. 870.* 1797. *(Columbia americana* Pers. Syn. PI. 2: 66. 1807; *C. serratifolia* DC. Prodr. 1: 512. 1824; *C. inequalerata* Turcz. Bull. Soc. Nat. Mosc. 31: 233. 1858; *C. anilao* Blanco, Fl. Filip. ed. 1, 654, 1837.)

This variable species is at present represented in the herbarium by no less than sixteen specimens, representing a distribution from northern Luzon to Zamboanga and Davao in Mindanao. The vegetative characters of this species are exceedingly variable and it is probable that some authors would consider that the material here referred to *Colona serratifolia,* represents several species; however, no valid characters can be found by which to separate the several forms. *Columbia anilao,* considered as a distinct species by F. Villar, is undoubtedly identical with *Colona serratifolia. Columbia serratifolia* Blanco, non DC, is a species of *Greicia. Colona serratifolia* is known to the natives of the Philippines as *Anilao.*

TRIUMFETTA PROCUMBEXS Forst.

This species is found along the seacoast from Madagascar to Australia and Polynesia, but previously has not been found in the Philippines. It is at present represented in the herbarium by No. 2387, Pola, Mindoro, May, 1903, and No. 3373, Pasacao, Province of Camarines, Luzon. It is apparently a rather common constituent of the strand vegetation in the Philippine.

VERBENACE^E.

VITEX OVATA Thunb. Fl. Japon. 257. 1784. *(V. repens* Blanco, Fl. Filip. ed. 1, 513, 1837; *V. trifoliata* Linn. f. var. *unifoliata* Schauer in DC. Prodr. 11: 683, 1847.)

This widely distributed species is apparently distinct from *V. trifoliata* L. f., to which it has been reduced by various authors. It is represented in our herbarium by No. 323, Aparri, Province of Cagayan, Luzon, June 22, 1902, and No. 898, Calapan, Mindoro, 1903. At both of these localities the trailing form only was found. On Lubang Island, however, in April, 1903, this form was found associated with *Vitex trifoliata* L. f., and no intergrading forms were observed. *V. trifoliata* L. f., was always an erect shrub, 2 to 3 m. high, with trifoliate leaves; while *V. ovata* Thunb., was

always trailing, and with simple ovate or obovate leaves. *Vitex ovata* Thunb., is found on sandy sea beaches, where it is a valuable sand-binder, trailing 3 to 4 m., the stem rarely exceeding 1 cm. in diameter, and sending lip numerous erect branches 1 to 6 dm. in length. No one seeing the two forms growing together would confuse them, as they appear very distinct. Tagalog, *Lagunding gapang*.

VITEX AHEENIANA Merrill, sp. nov.

A tree with coriaceous, glabrous, 3 to 5 digits Le leaves, and few flowered axillary panicles. Leaves mostly 5-digitate; pedicels 3 to 4 cm. long, glabrous, or with few scattered hairs, and (in young leaves) with numerous fulvous-tomentose hairs at the apex; petiolules 4 to 10 mm. long, channeled above; leaflets glabrous and shining, coriaceous, ovate or lanceolate-ovate, acute at both ends, 5 to 7 cm. long, 2 to 2.5 cm. wide, nerves, 8 to 10 pairs, very obscure. Panicles axillary, few flowered, 12 cm. long, about equaling the leaves, more or less pubescent with usually appressed, fulvous hairs, branches few, the longer ones 3 to 5 cm. long; pedicles densely fulvous-pubescent, 2 to 4 mm. long. Calyx 4 mm. long, densely fulvous-pubescent, campanulate, 5-toothed, the teeth triangular, very short. Corolla purple, appressed fulvous-tomentose, deeply cleft, the tube about 4 mm. long, the lobes 6 to 8 mm. long. Drupe unknown.

This apparently very distinct species was collected by one of the employees of the Forestry Bureau, at Baler, Province of Principe, Luzon, August, 1902, and has been distributed as No. 1007. It has been dedicated to Capt. G. P. Ahern, Chief of the Forestry Bureau. This species is said to be abundant in the vicinity of Baler, and its timber is very valuable, being exceedingly hard and taking an excellent finish. Tagalog, *Igang*.

II. THE AMERICAN ELEMENT IN THE PHILIPPINE FLORA.

By ELMER D. MERRILL.

INTRODUCTION.

For a period of nearly three hundred years, from the establishment of Spanish authority in the Philippines up to the year 1815, the Archipelago was ruled as a dependency of Mexico, and throughout this period direct communication at first between Manila and Navidad, but later Acapulco, on the Pacific coast.of Mexico, was maintained by means of the state galleons. With this long continued civil and commercial intercourse between the Philippines and Mexico it is not surprising that we find to-day many plants of American origin in the Philippines, most of them spontaneous, so widely distributed and so thoroughly naturalized as to appear truly indigenous.

The plants of American origin now found in the Philippines can be classified in two groups—those of economic or ornamental value purposely introduced and those the seeds of which have been accidentally introduced in packing material or by other methods.

Among the prominent species of the first group may be mentioned Tobacco *(Nicotiana tobacum,* and other species), Corn *(Zea mays),* Maguey *(Agave americana),* Achuete *(Bixa orellana),* Guava *(Psidium guayava),* Tomatoes *(Lycopersicum esculcixtum)*, Potatoes *(Solatium tuberosum),* Papaya *(Carica papaya),* Cashew nuts *(Anacuu'dium occidentale),* Cassava *(Manihot utUissima),* Cacao *(Theobroma cacao),* Pineapple *(Ananassa satwa),* and otheT species. Among those species introduced for ornamental purposes may be mentioned *Oestrum nocturnum, Bougainvillia spectabilis, Pithecolobium saman, Euphorbia pulclicrrima, Quamoclit vulgaris, Petrdea volubilis, 'Cosmos sulphureus,* and other species.

Of the second group, or those species, the seeds of which may have been accidentally introduced in packing material and which are now for the most part generally distributed as weeds in culti-

vated fields, may be mentioned *Asrh'puis* ***curas&avica, Atgemone mc-xicana, Mimosa pvdica> Dalea nigricans, Prosopis*** *juli flora,* ***Lantana cdmara, Ageratum conyzotdes,*** **and** ***SynedreUa nodiflora.***

The **date** nl' **the introduetKffl** of many of the American **species** is **obscure, tori for** the larger per **cent of those of econdmic** importance it **waa** in very **early** times. The first, **recorded** notices **of Philippine** plants are found in **the** works of **Mercado and** CanielL The former autlmr **wrote** some time .luring **the** last third **of** the sixteenth **century, and** after many **ritiss&ttdes** his manuscript, entitled **"Libro de medicinas** de esta tierra y **dedaracioneB de** his **verbides de Los arbolea** y **plantas** que **estan en eatafl ifllas filipinag," was** edited **and** puhlishe.l liy **Padre Celestino Pemandez-Villar, in** tin- **fourth** vol- **mneof the third editiou of Blaaoco'a Flora de Filipinaa,** in the year issfi. **Mereado elaasified** his **epeciea under their native names,** and prepared water color **drawings of** the **greater** part **of them,** and **accordingly** *F.* Villar was **enabled** to determine the **scientific** mimes **of** ;i **large number. MeTcado's** work **eontaina references of** many plants **of American origin.** Ai **aboul the Bame** date Padre **Camel! wrote** iiis **treatise on** Philippine plants entitled **"Herbarinm** alia- runiipie siirpium in **[nsala Duzone Philippinaruin pranaria** Inaceiiiium," etc., which was **published in 1704, as an appendix to** the third **volume** of MayV **Bistaria Plantarum. This** work **also** en **nnwrates many species of American origiiL In** thr **year** 1892 **there** was **published** in Manila **a** work entitled **"Historia graieral** sac **ro-profano, polftica y** natural de **las islae poniente llamadaa** lilipin,i>." **written in the** years **1751** to 1754 by a Jesuit **priest,** Juan .1. **Ddgado,** Over 100 pages of this work are occupied with a disi-ussinri **of** the plants of **the** An-hipelago. and main spe<-i<>* of American origin are noted. Blanco in his Flora <]r Filipinas, the **first** edition of **which** was **published** in **1837,** the second in **LB45, dotefi** mam Aineriean **species,** and **frequently** gives the exact or **approximate** date of the introduction of **American** species of economic **value.** In **Borne caaea he** erroneously considered species of Aiuerie;ni **origin** as **endemic** and **described them** as new OP es, **while on the other hand he identified** some truly **endemic** fnrms with **Americas** species. **Eernandez-Yillar,** in his **^"ovissima** Appendix t0 **the** third edition **of** Hlanco's Flora de Filipinas **(-1883),** also i$_{i(}$,i$_{(S}$ uiunv species of **American origin, especially** those which were introduced i. inn n the years 1845 and 18s:;.

All *U the species which have been accidentally introduced, and which were adapted to the eKmatic conditions here existing, are now found jondly distributed throughout the Archipelago, or at least extending over very large areas while a very large number jof^ihose which were introduced for economic or ornamental pnrpjo&s have become spontaneous and some species such as *Psidium guayava,* ***PUhecolobium*** *dulce,* and *Cosmos sulphureus,* are among the most common and widely distributed plants found in the Archipelago to-day, the former according to Delgado having become widely distributed in the Philippines as early as 1754.

It *is* not the ***object*** of the present paper to go into the details of the discussion regarding the country of origin of such widely cultivated species as the sweet potato *(Ipomoea batatas),* Gabi *(Colocasia antiquarum),* and the Cocoanut palm (Cocos *nucifera).* \\ ia believed, however, that to-<la\ these species are generally conceded to be of American origin. However, the) were introduced into, the East and in general cultivation throughout the tropical regions centuries before the advent of the European.- in the Philippines,

Noaxly all of the American species of economic importance and a \try large percentage of those accidentally introduced and now found in the Philip]pines have been generally distributed throughoni the tropics of the East by the same agencies by which tbey wire introduced into this Archipelago, and at the present time o:ne Rude in other countries in the East comparatively few of the tropica] Americau species which are not also found in the Philippines, The Philippines must be considered as the early distributing point of the American species in the Orient.

It is *very* probable that other species of American origin not noted in this paper will be found in the Philippines when thorough collections are made. Such species as *Cleome aculeatum, Tridax procttniihnis,* ***Erig&roii canadense,*** and others already noted from British India and the Malayan peninsula are almost certain to lie found sooner or later in the Philippine?. Alread; since the American occupation at Leas! four BpecieB of economic importance have been introduced into the Philippines from tropical America. These are tfexican forage grass, "teoarate," *Euckla&na luxurio•us.* and the India rubber trees, //<<<>' *brasHUnsis, Martihot glaztziovti,* and *CastUloa elastiea.* It is possible thai all these species

may have been introduced previous to the American occupation, but if such is the case we have no record of it and no specimens have been §gen*in cultivation other than those of very recent introduction

ENUMERATION OP THE SPECIES.

ACANTHACEiE.

BLECHUM BROWNEI Nees.

This herbaceous plant was evidently introduced long previous to the year 1837, as it is considered by Blanco in the first edition of his Flora de Filigkias. It is known to the natives as *Calaboa, Dyang,* and *Sapinsapin. B. haenkei* Nees is also enumerated, by F. Villar.

AMARANTACEiE.

GOMPHBENA GLOBOSA Linn.

This species was originally introduced for ornamental purposes, but is now spontaneous and widely distributed in the Archipelago, and is still much cultivated for ornament. The first reference to this species as a Philippine plant is in the first edition of Blanco's Flora de Filipinas in 1837.

ANACARDIACE.E.

SPONDIAS FURPUBEA Linn., and S. LUTE A Linn.

Both natives of tropical America are commonly cultivated in the Philippines for their edible fruits, having been introduced in the eighteenth century, according to F. Villar. Both species are known to the natives as *Siriuelas,* a corruption of the Spanish name *Ciruelas.*

ANAGABDIUM OCCIDENTALE L.

The "cashew nut" was probably one of the earlier of the American plants of economic importance introduced into the Philippines, and is now found widely distributed, not only in this Archipelago, but throughout the tropics of the East. It is universally known to the natives of the Philippines as *Casoy* or *Casuy,* and by them it is prized for its fruits, which are not only edible but also the source of a valuable oil.

APOCINACE^E.

PLUJIIEBA ACUTIFOLIA Poir.

A tree with very fragrant white or yellowish flowers extensively planted in the Philippines for ornamental purposes. It was introduced from Mexico at a very early date and is now generally found throughout the tropics of the East. Jt is known to the natives of the Philippines as *Calachuche.*

ALLAMANDA CATHABTICA Linn.

This species is first recorded from the Philippines by Blanco in 1845. It is a native of T$oiith America, and is cultivated for ornament in the Philip-

pines. It has not as yet been found growing here Spontaneously. It is known by the Spanish name *Gampanero.*

AMARYLLIDAOEiE.

AGAVE AMERICANA L.

This species was introduced from Mexico at an early date, and is now extensively cultivated for its valuable fiber; large plantations being found in certain provinces. The identification of this species as *Agave americana* by Philippine authors is probably erroneous, the plant commonly cultivated being perhaps some other species. Several other species of this genus are reported by Naves, but little dependence can be placed on his identifications. The commonly cultivated species of *Agave* are known to the natives as *Maguey.*

ANONACEJE.

ANONA MUBICATA L., A. SQUAMOSA L., and A. RETICULATA L.

These three species were introduced into the Philippines at an early date and are all natives of tropical America. They arc at present time found throughout the Archipelago in cultivation and spontaneous. The first is generally known to the natives as *Guanabanos,* the second as *Ates,* and the third as *Anonas,* being known to English-speaking people as "custard apples," "sweet sop," "sour sop," etc. The last two species at least are generally distributed in tropics of the East.

ASCLEPIACE^E.

ASCLEPIAS CURASSAVICA Linn.

An erect perennial herb with milky sap and terminal umbels of orange-red flowers. This species is ,very abundant and widely distributed in the Philippines, but the date of its introduction is unknown, although it was described by Blanco in 1837; however, neither Mercado nor Camell consider it. It is a native of the West Indies, but is now widely distributed throughout the tropics of the world. It is used somewhat by the natives of the Philippines in the practice of medicine and is known by them as *Bubuyan, Bulac damo, Calalauan, Bulac castila,* and other names.

BIGNONIAOEJE.

CRESCENTIA ALATA H. B. K.

This species must have been introduced from America many years anterior to the year 1837, as Blanco[1] states that he saw specimens in Manila and vicinity and described the plant as a new species, *Crescentia trifolia.* Later, in 1845, Blanco[2] states that the species was spontaneous in the central part of the Archipelago. This species is known to the natives by the name of *Hoya cruz,* from the peculiar shape of its leaves.

[1] Fl. Filip. ed. 1, 490. [2] 1- c. ed. 2. 343.

BIXACE^E.

BIXA OBELLANA L.

A shrub or small tree with white or purple flowers and prickly capsules containing many rather small red seeds. This plant was introduced from tropical America at a very early date and is now universally distributed throughout the Philippines, being generally found in and about towns. The seeds yield a red dye, used by the natives for coloring certain kinds of food. The bark also yields a yellow dye. It is universally known to the natives as *Achuete,* a word of Spanish-American origin.

BROMELIACE^E.

ANANASSA SATIVA Lindl.

The "pine-apple" is found in general cultivation throughout the Philippines and in the tropics of the East, having been introduced from America at an early date. In southern Paragua it was found in abundance apparently growing spontaneously in the forests of the foothills, several miles from the nearest native settlement. This species is prized not only for its fruit but also for the valuable fiber which is secured from the leaves and which is extensively used in the Philippines in the manufacture of the so-called pifia cloth. This plant is universally known to the natives as *Piña.*

CACTACE^E.

NOPALEA COCCINELLIFERA Salm-Dyck., MELOCACTUS COMMUNIS Link, CEREUS TETRAGONUS Mill.

These and other species are reported by F. Villar as being cultivated in Manila and other localities in the Archipelago. None of the cacti are spontaneous here and can not be considered as elements of the Philippine flora.

CAPPARIDACE^E.

GYNANDROPSIS SPECIOSA DC.

This American species, according to F. Villar, is cultivated in Manila, but no specimens have been seen.

CHENOPODIACE^J.

ANREDERA SPICATA Pers.

This American species was evidently introduced long before the middle of the last century, as in 1837 it was so well established that Blanco considered it a native of the Archipelago and described it as a new species *(Gomphrena volubilis).* It is, however, not especially common, nor is it widely distributed in the Archipelago.

B'JUSSIXGAULTIA BASSELLOIDES H. B. K

This tropical American species is commonly cultivated in Manila and is spontaneous in waste places in the suburbs of the city. It was introduced at a recenVdate, being first mentioned as a constituent of the Philippine flora by P; Viilar in 1883. So far as knWn this species has no native n.ime.

CHENOPODIUM AMBBOSIOIDES Linn.

This common and widely distributed species was introduced from America at a very early date and is now abundant in the Philippines. It is first recorded from the Philippines by Mercado. This plant is somewhat utilized by the natives in the practice of medicine, and is known by the names *Aposotis, Pasotis, Alposotis,* etc., of Spanish origin.

COMPOSITE.

AOEBATUM CONYZOIDES L.

An annual herbaceous plant, 1 to 2 feet high, with numerous small heads of white or pale blue flowers in dense terminal corymbs. This species is undoubtedly of American origin, but is at the present time found throughout the tropics of the world. It is very abundant in the Philippines, not only in waste places in the vicinity of towns, but also in the mountains, being especially abundant along shaded trails in regions where there is abundant rainfall. So far as known this plant has no uses and the natives have no names for it.

COREOPSIS TINCTOBIA Nutt.

F. Villar[1] states sub *"Coreopsis elegans* L.," that he saw this species in cultivation in Manila. It is a native of North America, and if cultivated in the Philippines at the present time it is certainly not common.

COSMOS CAUDATUS H. B. K., and COSMOS SULPHUREUS Cav.

Herbaceous plants with pinnatifid leaves, the former with pink and the latter with yellow flowers. These two species were introduced from Mexico, probably some time in the first half of the nineteenth century, for ornamental purposes, as Blanco mentions neither in the first edition of his Flora dc Filipinas 1837, but describes the latter under the name of *Coreopsis graoilis* in the second edition of the same work in 1845. At this time, however, according to Blanco, the plant in question was only cultivated in Manila. At present both species are found not only in cultivation but also spontaneous in most parts of the Archipelago, especially in the vicinity of towns. The former species is also found in Imlin. Miuiritiiw. and othor places in the East.

ELEPHANTOPUS SPICATUS JUSS., and E. SCABEB Linn.

These two species, now cosmopolitan in the tropics of the world, are doubtless both of American origin, having been distributed as weeds at an early date. Both species are very common in the Philippines, and were found here previous to the year 1837 as they are both mentioned by Blanco. The natives know these species under such names as *Dilang-aso, Tabatabacuhan, Diladila,* etc.

SYXEDRELLA KODIFLOBA Gaertn.

An annual, erect herb with sessile heads of yellow flowers. This species is a native of Mexico and was probably introduced into the Philippines in packing material, at present time being very common about Manila

[x]Nov. App. Fl. Filip. 118, 1883.

and also about other towns in the Archipelago. It has been generally distributed tlftoughout the tropics of the East.

CONVOLVULACE^E.

IPOMOEA ĎLANCOI Choisy.

This species is described by Blanco under the name of *Convolvulus dentatus,* and is the species figured in the third edition of the Flora de Filipinas as *Ipomoea commutata.* Dr. H. Hal Her is of the opinion that this species is not a native of the Philippines, but has been introduced from America. At the present time the species is very common about towns in the Philippines, and if-introduced, the intiocliution must, have been at a comparatively early date.

IPOMOEA BONA-NOX Linn.

This species is spontaneous and widely distributed in the Philippines at the present time, although it was undoubtedly introduced primarily for ornamental purposes. It is first noted from the Philippines by Blanco in 1837. It is known to the natives as *Malaoamote* and *Calacamote,* literally "false sweet potato."

[POMOEA HEDERAGEA Jacq.

A twining, herbaceous vine, 6 to 10 feet long, with very hirsute sepals and a showy funnel-shaped corolla, at first pale blue but gradually changing to rose color. This species is spontaneous and common in waste places about Manila and other portions of the Archipelago. It is undoubtedly a native of tropical America, but is now cultivated for ornament and naturalized throughout the Tropics. It was introduced in early times, as it is considered by Mercado. It is known by the Tagalogs as *Bulacan,* a name applied generally to species of the *ConvolvulacecB.*

IPOMOEA PUBPUREA Roth.

This species is somewhat cultivated in Manila for ornamental purposes, but has not been observed growing spontaneously. *Rivea corymbosa* Hallier *(Ipomoea sidaefolia* Choisy) is also frequently found in cultivation. Neither species is common, and so far as known have no distinctive native names.

QUAMOCLIT viiLGARis Choisy, and QUAMOCLIT COCCINEA Linn.

Slender, glabrous, herbaceous vines with crimson or sometimes white or yellow flowers, the former species with pinnate leaves and the latter with entire leaves. Both species are natives of tropical America, and are now commonly found in cultivation and occassionally spontaneous in the Philippines and also throughout British India and other tropical countries in the East. *Quamoclit vulgaris* was introduced at an early date, but y. *coccinea* was probably not brought here before the middle of the nineteenth oentury as it is not considered by Blanco. The former is known to the natives as *Agoho* and *Malabohoc,* but the latter has no native name as far as & known.

EUPHORBIACEiE.

EUPHORBIA PULCHERRIMA Willd. and E. SPLENDENS Bojer.

These are reported by *F.* Villar as being cultivated for ornamental purposes; however, neither species is spontaneous. The former is common in Manila and is known as *Pascuas.*

MANIHOT UTILISSIMA Pohl.

"Cassava" or "tapioca/[1] a tall, herbaceous plant with tuberous roots, introduced from tropical America at an early date and now found in general cultivation throughout the Archipelago. A valuable food plant, known to the natives as *Camoting-cahoy.*

EUPATORIUM[1] ATAPANA-Vent.

This aromatic herbaceous plant, a native of Brazil, was introduced into the Philippines previous to the year 1837, probably for the reason that it possesses medicinal qualities. It is known to the natives as *Ayapana* or *Apana,* names of American origin, and is much used by them in the practice of medicine. *Eupatorium odoratum* Linn., a West Indian species, now found in British India, has not as yet been reported from the Philippines.

JATROPHA CURCAS Linn.

This American species was introduced into the Philippines previous to the year 1750, as it is mentioned by Delgado; however, Mercado writing over half a century previous to this date does not mention it. This species is now one of the most widely distributed plants of American origin in the Philippines, but is usually found in and near towns. It is now generally cultivated throughout the tropics of the world. In the Philippines it is most commonly found in cultivation as a hedge plant, its easy propagation and its rapid growth making it especially adaptable to this purpose. The milky sap of the stem and leaves, and the seeds are drastic purgatives, and the seeds yield an oil considerably used in the Philippines for illuminating purposes. It is known to the natives as *Casla, Tuba* and *Tawitawi.*

JATROPHA MULTIFIDA Linn.

This species was probably introduced at a much later date than the preceding, the first reference to it as a constituent of the Philippine flora being by Blanco in the year 1837. It possesses the same qualities as the preceding species, but is by no means as common in the Archipelago. It is known to the natives as *Mana. Jatropha gossypifolia* Linn., another American species, found in Burma and Singapore, has not as yet been reported from the Philippines.

FILIGEB.

ADIANTUM TKNERU1C Sw.

This species is somewhat cultivated in Manila for ornamental purposes, but is not spontaneous. It is a native of South America.

GEBANIA0E-3E.

AVKKKHOA itii.iMtu Linn., **and** A. CAUAMKOLA Linn.

Tlifse two species are found in cultivation **throughout** the tropics of the world, hut are undoubtedly **of** American **origin,** si 1 though this point **is** not **dear.** Hooker[1] is of tl. . . . **pinion** tbat both species wure introduced into hnli;i by **the** Portuguese. Both **species were** recorded from the Philippine by **MerOfado,** *Averroha bUuitln* **has** pubescent leaves and its fruit b;i> rounded lobes, and ia known to the natives **aa** ***Batimbing,*** *liilimbines.* etc. *Averrhoa carambola* has glabrous 1 wives ;UJI1 it-, t'ruit has acute lobes, **being** known to the natives a.s *Camias, I'ia.v, Ibn.* ;m<l **other names.**

GRAMINE.E.

PASPAXUU CONJUUATUM **Berg.**

This M'iv **common** grass is said **by** Hooker- to have **been introduced** into **Ceylon from** America. It is **possible thai** tbi> was **originally** an **American** [ilunt. but at the present time it U **found** throughout the tropical and **sub-tropical regions of the world** li *is* now one of the most common and most widely **distributed species in the Philippines,** but is usually found onlv in ibc vicinity **of towns,** From its **babitai** and **distribution** it is evident that it is not **a** native of tin? Philippines, but it is impossible to **determine** the **original** home of the species **at this** time

ZEA MAYS L.

Imlian corn is too **well knows to need much discussion,** but was **probably** one of the earliest of the **American** plants introduced into the Philippines. It is now generally cultivated throughout the **tropical** and **temperate** region- **of** the world. It is extensively **cultivated** in the **Philippines and is** universally **known** t<> tin- natives as *Maiz.*

LAIUATEJ:.

Hrras *pp.

SK **species of** ***Syptia,*** nil **presumably of** American **origin,** are **enumerated** by **F.** Villar as **being** found in **the Philippines, and** :ii **least tour of** III<M> species are common and widely distributed in the Archipelago. ***Byptia*** *spicigera* Lam., *H.* ***oapitata*** Jactj., *H.* ***hrevipes*** **Poir.,** //. *nuaveolens* Poir., //. *.spin/hi* **Poir.,** and **//.** ***peotinata*** **Poir.,** ate tli<- **Bpeciea credited** to **the Archipelago by P.** Villnr. The Jir.st four .of these **species are eommon and widerj distributed** in tbe **Philippines, //.** ***spicigera*** **and //.** ***tuaveolens*** **beins** ii- uilly tunnel in **waste** places in **the vicinity** of towns, **while //.** ***hn->*** ami **//.** ***capitate*** **are** found not only in tbe **vicinity** of towns, but **also distributed along trails** in **the mountains and** in open lands **generally.** Tbe lust two sped es are unknown to *nw* at pr<sent. Probablv all **these** s|»<-if- **were** introduced into the **Philippines accidentally** in packing **mi** terial or by other **methods.** **Qtoe ifleeiea** is **noted by** Mercado, //, ***capitata*** in

[1]Fl, **Brit.** Ind. **5: 430.**

[2]Trimen i **Hooker, Fl.** Ceylon 5: 122. 1300.

the last third of the sixteenth century, while Blanco in 1837 notes four species. The various species are known to the natives by such names as *Combarcombaran, Lingalingahan, Palapasagui, Locoloco, Pansipansihan,* etc.

MALPHIGIACEiE.

GALPIIIMIA GLAUCA Cav.

This ornamental shrub is somewhat cultivated in Manila, but is not spontaneous. This species has not previously been recorded from the Philippines, and is probably of very recent introduction.

MALVACEAE.

MALACHRA BRACTEATA Cav.

F. Villar credits this species to the Philippines, but the plant he identifies as this species is *Malachra lincariloba* Turcz., a species described from Philippine material. We have at present no available description of *Malachra bracteata,* and it is possible that F. Villar was correct in his identification of the Philippine plant with this American species. The plant in question is common and widely distributed in the Philippines.

MARANTACE.E.

MARAXTA AKINDINACEA Linn.

The well-known arrowroot plant is at the present time rather common in the Philippines, where it is cultivated both for ornamental purposes and for its edible roots. It is frequently subspontaneous about towns. This species is noted by Blanco in the second edition of his Flora de Filipinas, but when the plant was introduced is unknown. It is known to the natives as *Aroro, Aroru,* and *Arrou-rou,* evidently corruptions of the common English name of this plant.

LEGUMINOSEiE.

AKACHIS II\TOG.I;A Linn.

The "peanut" is frequently found in cultivation in the Philippines and generally throughout the East. It is, however, undoubtedly of American origin, having been introduced into the East at an early date. So far as is observed this species is nowhere spontaneous in the Philippines. It is known to the natives by the Mexican name *Cacuate,* but more commonly by the name *Mani.*

C-ESALPINIA PULCHERRIMA Swartz.

A small shrub, with showy racemes of red flowers, widely distributed in the Archipelago, but usually found in the vicinity of towns. The natives have no name for this species other than,the Spanish, word *caballero* from which it is very evident that this species has b^en introduced into the Philippines since the Spanish occupation. The native country of this plant is not clearly known, but is probably tropical America. At the present time it is found in cultivation throughout India and Ceylon and elsewhere in the

tropics. The other species of this genus most closely related to *Cwsalpinia pulcherrima* are, it is believed, all natives of tropical America. According to F. Villar[1] this plant was figured but not described by Mercado in his Libro de Medicinas, written in the last third of the seventeenth century, evidence that it was introduced early in the Spanish occupation.

CASSIA ALATA L.

A small shrub with yellow flowers and winged pods, common about towns throughout the Archipelago, but certainly not a native of the Philippines. This species is said to be cosmopolitan in the tropics, but the Mexican name *Acapulco,* commonly used by the natives in designating this plant, would indicate an American origin, at least for the plant as found in the Philippines. It is extensively used by the natives in the practice of medicine.

CASSIA OBTUSIFOLIA Linn., C. HIRSUTA Linn., C. OCCIDENTALIS Linn., and C. SOPHERA Linn.

All these species are of American origin, but are now generally distributed throughout the tropics of the East. They are all herbaceous plants or undershrubs, and are usually found in waste places in the vicinity of towns. Like the preceding species they all belong to the section *Senna,* and several of the species are utilized by the natives in the practice of medicine.

DALEA NIGRA Mart, et Gall.

An erect herbaceous plant 1 to 2 feet in height, with pinnate leaves and capitate heads of purple flowers, common and widely distributed in the Archipelago, growing in open grass lands and in cultivated places. It is not known when or how this Mexican species was introduced, but its introduction was probably accidental and at an early date. It is now spontaneous and thoroughly naturalized in the Philippines. Blanco described this plant in 1837 as *Amorpha alopecuroides* Willd. It is known by the natives under several names, such as *Durang parang, A go go, Sampaloc-sampalocan, Camangi,* etc.

MIMOSA PUDICA L.

A low prostrate herbaceous plant with numerous globose heads of pink flowers and sensitive leaflets. The native country of this species is not clearly known, but it is probably tropical America. It is now spontaneous throughout the tropics of the East and is one of the most pernicious weeds with which the tropical agriculturist has to deal. In the last third of the seventeenth century it was evidently known in the Philippines only by the Spanish name *Hierba mimosa,* as it is classified under this name by Mercado. To-day it is known by the Tagalogs as *Damohia* and *Macahiya,* and by the Visayans as *Huya huya.* It is to-day one of the most common and widely distributed species in the Philippines.

GLIRICIDIA MACULATA H. B. K.

A small tree with pinnate leaves and white or pinkish flowers, introduced from tropical America, according to F. Villar[2] in the eighteenth century. It was described by Blanco in the first edition of his Flora de Filipinas as

[1] Not. App. Fl. Filip. 69, 1883. [2] L. c, 59, 1883.

ii new species *Galedupa pungam.* This tree is one of very rapid growth and was introduced for the purpose of furnishing shade for cacao trees, for which purpose it is still used. It is universally known by the natives by the Spanish name of *Madre cacao.* This species is at present cultivated in many cacao plantations and is also spontaneous in many localities. It is generally distributed throughout the Archipelago.

INDIGOFERA ANIL Linn.

This species, known locally as *Anil,* was introduced from America, and with *Indigofera tinctoria* is somewhat cultivated for indigo, and spontaneous. It is frequently known by the name *Tagum,* which is also applied to other species of the genus.

LEUOENA GLAUCA Benth.

A shrub with dense globose heads of white flowers, common in waste places about Manila and other towns in the Philippines. This species is undoubtedly of American origin, but is now generally distributed throughout the tropics. It is evidently of comparatively recent introduction in the Philippines, as it is not considered by Blanco as late as the year 1845. Some Tagalogs know this plant by the name of *Agho,* but most natives have no name for the species.

PITHECOLOBIUM SAMAN Benth.

This species is very abundant in Manila, being extensively planted for shade purposes and is apparently entirely adapted to the climatic conditions existing here. It was introduced from the West Indies by Don Zoilo Espejo, the first director of the Botanical Garden in Manila, in about the year I860. Without exception it is the most valuable shade tree we have today in the city, and is being more extensively used for this purpose every year. A large portion of the Botanical Garden is occupied almost exclusively by this species, which is one of the very few trees that seems to thrive under the conditions *there existing. It does not fruit freely in Manila, although it produces an abundance of flowers. So far as is known the natives have no name for it. In the West Indies it is known as the "rain tree" from the fact that at the approach of a storm the sensitive leaves droop, the leaflets becoming closed and remaining in this position throughout the duration of the storm. The leaflets also close at night.

PITHECOLOBIUM DtJLCE Benth.

A medium-sized tree now very common throughout the Philippines, introduced from tropical America in early times by the Spaniards. It is considered by both Mercado and Camell, and known by the natives, as *Camanchiles.* It is much prized by the natives for its white or pink, pulpy, fleshy, edible aril, which half surrounds the seeds. From the Philippines it has been generally distributed throughout the tropics of the East, and is commonly cultivated. In India it is known as the "Manila tamarind," probably from the similarity of its fleshy aril to the fleshy mesocarp of the true tamarind *{Tamarindus indica).* The natives of the Philippines use the bark of this species extensively for the purpose of tanning leather.

PHASEOLUS LUXATUS Linn.

This universally cultivated bean is probably of American origin, but is now found throughout the tropics of the world. It is common in the Philippines in cultivation, and is known to the natives as *Haba, Zabache,* and *Patini,* the two former words being of Spanish origin, evidence that the plant was introduced into the Philippines by the Spaniards.

L'ROSOPIS JULIFLOBA DC.

A shrub with spiny branches and cylindrical spikes of yellowish flowers, common about Manila and widely distributed along the shores of Manila Bay, in many places exclusively occupying large areas. This species is a native of tropical America and has evidently been introduced into the Philippines at a comparatively recent date, as it is not considered by Blanco or the earlier authors. It is entirely adapted to conditions here and grows as though it were a native rather than an introduced plant. Naves considered it as a native plant and described it as a new species *Prosopis vidaliana,* first in a periodical published in Manila and later during the same year (1877) in a pamphlet entitled "Prosopis vidaliana," giving a very full description with two plates. It is known by the Tagalogs as *Aroma,* a name also applied to *Acacia farncsiana* Willd.

LILIACE.E.

YUCCA ALOIFOLIA Linn.

This and two other species of this genus of American origin^are notea oy F. Villar as being cultivated in Manila. Xone of the species are spontaneous.

MYRTACE.E.

PSIDIUM*GUAYAVA L.

A shrub or small tree with white flowers and edible fruits, introduced from tropical America at a very early date and now one of the most common and widely distributed species in the Archipelago, being found not only in and about towns and villages, where it is cultivated for its edible fruit, but also in the wilder and more inaccessible portions of the Archipelago, its wide distribution being due to the fact that the numerous small seeds have been disseminated by birds and monkeys. This species is found generally throughout the tropics of the East. In the Philippines it is known by the natives as *Guayabas* and *Bayabas,* names of Spanish origin. Several varieties of this species are also found in the Philippines.

NYCTAGINACEiE.

BOUGAIXVILLEA' SPECTABILIS Willll.

This striking ornamental plant, now found in general cultivation in tropical and subtropical regions was introduced from tropical America some time between the years 1845 and 1880, as it is considered by F. Villar, but not by Blanco, ft is commonly cultivated for nrimmontal purpose? in Manila, but is not spontaneous.

OLACACEJE.

XIMEN I A AMI-liifW \ Wilkl.

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reporte ' •*--tte Island of Panay, b, *I.* ViZ, but ,,,, ,,,,, , til ', mens are available ai present

PAPAVEBACEJ3.

ARi MKXIC ANA L.

This i. the only Hpede. of the i^po fouwi ia the PhiU.....
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nor Can^ although it ta (i(w,,l,,l ,, Blanco in the v J
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, , kmmnl,-r t'''1 H- *fmba.* By the T
called IM/iwrio, but both these names an- als

PASSIFLORACEJE.

CAR U-A PAPAYA L.

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aewrd^g to R ViUar, and is no,- fmm.| in cultivation in aJl ,,n.
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PASSIFLORA SE BKULAXA Jaoq.

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highly ... ated in Manila, but is
t introduction, and the
due *es de Singapur* would indicate that the plant was intro-
ippines from Singapore, and not directly from America.

SAPOTACEJE.

ACHRAS BAPOTA L,

ida tree is ... r its fruit and was
America it is culti-
u extensively, not only for its edible fruit, but for the gum known as
"gum chicle," which is secured by slashing the bark and collecting the gum
as it is deposited in the wounds. It is in constant demand, as it is the
basis of mo « oi the ehewing gmn » , xtensively oaed in tke United States.

[illegible] use is made of it in the Philippines. This species is generally cultivated in the tropics of the East. It is known to the natives of the Philippines as *Chicos* and *Sico*.

LUCUMA MAMMOSA Gaertn.

This tree, like *Achras sapota*, is generally cultivated in the Philippines [illegible] probably introduced [illegible] about [illegible] in 1837, stated that it app[illegible] from [illegible] that [illegible] common in the Archipelago at that time, and consequently must have been introduced [illegible] derail, distributed in the East, as Hodar does not mention it in his Ki[illegible] of British [illegible] known to [illegible] Philippines as [illegible]

SIMARUBACEÆ.

QUASSA AMARA Linn.

This American spe[illegible] [illegible]ratively recent introduction, but cultivated specimens only have been observed.

SOLANACEÆ.

[illegible] NOCTURNUM Murray.

This species was introduced from America in [illegible] and is now [illegible] cultivated [illegible] purposes in Manila, and in other large towns in the Archipelago. Its flowers are exceedingly fragrant at night, and it is commonly known as *Dama [illegible]*.

LYCOPERSICUM ESCULENTUM Mill.

The tomato is too well known to need much discussion. It was introduced from America at a very early date and is now extensively cultivated, and also spontaneous, throughout the Archipelago. The spontaneous form has evidently reverted to the original form of the species, [illegible] of a very small size. It is universally known to the natives by the Spanish name *Tomates*.

NICOTIANA TABACUM Linn.

This and several other species of this genus are extensively cultivated throughout the Archipelago, tobacco being one of the most important crops [illegible] in the Philippines, [illegible] of tobacco and cigars [illegible] [illegible] only by hemp, sugar, and copra. The best grades of tobacco are raised in the valley of the Cagayan River, in Northern Luzon. Tobacco was [illegible] at an early date, and its cultivation here has [illegible] attended [illegible] abuses, especially during the period of the Government monopoly. It is universally known to the natives as *Tobaco*.

PHYSALIS PERUVIANA Linn.

This species is somewhat cultivated for its edible fruit, but is apparently not common [illegible]

found [illegible] in the Philippine Islands; some of these may prove to have been [illegible]

„i i \ m 11 BBBOSUU Linn.

The potato **was probably introduced at** an early **period,** and is HOW **generally cultivated, especially** in **the mountainous region* of the Archipelago. The tubera are, however, usually rery Bmall and <f an** iiinrini **quality,**

TILIACEJE.

M i \ riM;l \ i \i.\m *u*\ L.

A small **tree of rapid growth** witli white flower- **and small purplixh edible fruit,** commoB in **and** about **Manila and the larger towns** in the **Archipelago,** known **by the natives** as ***DatUes* or *Rattles.*** This **species i> evidently <f comparatively recent introduction, as Blanco •\m-*** ?mt *run* **aider** it in his **Flora de Filipinas,** either in **the** lir*i **or Becond edition. It is** u **native of the** V\ **si** Indies and is **now spontaneous here** in **many regions, especially** in **Luzon.**

BTEKCTJLIACELSI.

THKOHIIOMA CACAO L.

Cacao, known uUn **to** the **natives of** tlte **Philippines! by thia name, i- \u>\\ found** in **general cultivation** as **one of the staple crops throughout the Archipelago. According t<> Blanco,'** it was iir>i **introduced from Mexico** in **the year** li>70 by a pilot tiium-il IViln* Uravo de **Laguna. The quality of cacao produced** in the **Archipelago i> very goad, but** the **cultivation of** the **tree i> carried on** in **a mosi primitive manner, little *>r no attention being** paid to **insed peata or** fmijfits **diseases, to the attacks of** l)c»tli of whicli **the trees are rary susceptible.**

URTICACEJE.

I'II.KA MI'SCOSA **LindL**

This -iu,iII **species,** u **native** cf .Suuili **America, i» one of** tin- **most conm..... plants** about **Manila** ;ii **the** present time, **being especially abundant on and** iilioni **damp** walls. **When** it was **introduced we have no record, as** it lias iiui **previously been recorded from the Philippines. ThU species i- I(IHO** found in Java and **British India. No native** name i-. **recorded (or** thi- **specie*, which,** jiidjjiHjr **from** its **abundance and wide distribution, musl** have **been introduced** into the **Philippines many yeara *ago.***

]) | K A N T \ I'l.l MIKli] JflCij.

This shrnl). **like *Petraea volttbilis,* ia somewhai cultivated in** Manila **foi ornaniental purposes,** am! **was probably introduced** ;it **about the same time** as **the latter. According to Hooker** it is **also eouunonly cultivated in** l i n t i-li I tnlisi.

LAS I .N \ i \\i M;\ Linn.

This >|tc(\v \> **abundant and spontaneous** in **waste places** ahum **Manila and other t<'\Mi-** in **the Archipelago. It bi a shrub S to** n **feel high** with

numerous heads of pink, yellow, or red flowers, and aromatic leaves. The date of its introduction is unknown, although it is considered by Blanco in 1845 but not in 1837. *Lantana camara* is now widely distributed in the Hast, and is known in the Philippines as *Coronitas*. Two other species of *Lantana* reported from the Philippines by F. Villar, are probably but forms of the above.

I'KTRAEA VOLUWLJS Linn.

This American plant is occasionally found in cultivation for ornamental purposes in Manila. It is a vine with terminal racemes of small blue (lowers, and must have been introduced sometime between 1845 and 1880.

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1903.-NO. 8.

DEPAETMENT OF THE INTE1UOR.

BUREAU OF GOVERNMENT LABORATORIES.

A DICTIONARY OF THE PUNT M I S

OF THE

PHILIPPINE ISLANDS.

By ELMER D. MERRILL, BOTANIST.

MANILA:
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LETTEE OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF GOVERNMENT LABORATORIES,
OFFICE OF THE SUPERINTENDENT OF LABORATORIES,
Manila, P. /., September 22, 1908.

SIR: I have the honor to submit herewith manuscript of a paper entitled [U]A dictionary of the plant names of the Philippine Islands," by Elmer D. Merrill, Botanist.

I am, very respectfully.

PAUL C. FREER,
Superintendent of Government Laboratories.

Hon. JAMES F. SMITH,
Acting Secretary of the Interior, Manila, P. L

A DICTIONARY OF THE NATIVE PLANT NAMES OF THE PHILIPPINE ISLANDS.

By ELMER D. MERRILL, *Botanist.*

INTRODUCTION.

The preparation of the present work was undertaken at tho request of Capt. G. P. Ahern, Chief of the Forestry Bureau, the object being to facilitate the work of the various employees of that Bureau in identifying the tree species of economic importance found in the Archipelago.

For the interests of the Forestry Bureau the names of the various tree species only are of importance, but in compiling this list all plant names available have been included in order to make the present work more generally useful to those Americans resident in the Archipelago who are interested in the vegetation about them.

In the preparation of this paper the double arrangement alphabetically, both under the native and scientific names, has been deemed essential, the latter arrangement especially, because it is often very important to have all the synonyms of the native names together in one place, and, moreover, the notes regarding the species are best given under the scientific name in order to prevent repetition of the same information under each of the native names given for the same species. The family of each-genus and short notes regarding species of economic importance have been given in order to aid in the identification of the species.

The native names usod to designate species of economic importance, those which produce edible fruits, medicinal plants, trees valuable for timber, etc., are silmost invariably applied to the same species, although in critical genera some variation and confusion of names are found, which is to be expected. The names applied to plants of little or no economic importance are frequently very unreliable, and accordingly, in using this dictionary, whenever

possible the plant should be compared with at least the generic description before accepting the scientific name to which the native name refers.

Most of the names in the present work not compiled from data on the specimens now in the herbarium have been taken from the following works: Blanco, "Flora de Filipinas," first edition, 1837, and second edition, 1845; Fernandez-Villar and Naves, "Novissima Appendix ad Floram Philippinarum," 1880-1883; Vigil, "Diccionario de los nombres vulgares que se dan en filipinas (\ muchas plantas usuales y notables," 1879; Vidal, S., "Sinopsis de familias y generos de plantas leiiosas de filipinas," 1883; "Reseiia de la flora del archipielago filipino," 1883; "Revisión de plantas vasculares de filipinas," 1886; Ceron, "Catálogo de las plantas del herbario," 1892; Puigdulles, "Apuntes para el mejor conocimiento, clasificación, y valuaci&n de las principales especiales arboreo-forestalesde filipinas," 1895; Tavera, "Plantas medicinalcs de filipinas," 1892; Espejo, "CartiUa de agricultura filipina," 1892; "Catálogo de la expositión general de las islas filipinas," Madrid, 1887; "Gufa oficial de las islas filipinas," 1898.

In many instances much difficulty was experienced in properly referring many of the native names recorded in some of these works to the accepted scientific names of to-day, due to the present chaotic state of Philippine botany. The greatest difficulty was met with in attempting to properly refer the many names given by Blanco, for, in spite of all the work done on the Philippine flora since the publication of Blanco's "Flora de Filipinas," his species are to-day very imperfectly known. In most cases in referring the native names given by Blanco to their scientific names I have followed F.-Villar in his generic identifications, as given in the Novissima Appendix, but, except in the case of widely distributed and well-known species, his specific identifications have been discarded. In identifying Blanco's species F.-Villar made few errors in his generic identifications, but his specific identifications of a large per cent of the species can not be accepted.

The present paper enumerates about 5,000 plant names used by natives of the Philippines, and has been compiled chiefly from the publications of the various Spanish botanists who have worked on the flora of the Archipelago. So far as possible those names have been compared with the names on specimens in the herbarium of this Bureau for jrerifieation. It seems that in the past there was

never any serious attempt made to carefully compile the various native plant names, and therefore the present list, though drawn from many sources, is comparatively incomplete. By far thr greater number of names in the present enumeration are those of the Tagalog language, while of many of the dialects spoken in the Archipelago not a single plant name has ever been recorded.

It is probable that the people of the mountain tribes, the Negritos, the Igorrotes, the Mangyanes, etc., employ even a greater variety of names in specifying the various species of plants than do the more civilized tribes of the lands at lower elevations, but little or no attention has ever been *given to the names used by these peoples. The limitations of the present, enumeration can best be realized from the fact that most of the names here recorded are from perhaps 12 or 15 of the 70 or 80 dialects spoken by the various peoples of the Archipelago. With the great variation of the names in the same dialect, and the great number of dialects spoken in the Archipelago, the task of compiling a complete or nearly complete dictionary of the native plant names of the Archipelago is an unending one, and one that could be completed only with great difficulty even if the subject were of sufficient importance to warrant it.

Previously but two attempts have been made to compile any extensive lists of the plant names used by the natives of the Archipelago. The first was Vigil's "Diccionario," a pamphlet of 50 pages published in the year 1879, which enumerates about 2,400 names, the identifications being largely based on Blanco's "Flora de Filipinas." The second list is that given by Vidal in Appendix II to his "Sinopsis," where he enumerates about 1,800 names of tree species, giving tne generic identifications only. Blanco, in his index to the native names given in his "Flora," gives but a small per cent of the total number enumerated in his text, while F.-Villar gives no index to the native names in his "Novissimn Appendix."

The words "puti" or "maputi" (white) and "pula" or "mapula" (red) are frequently used in combination with other words to designate certain species, as are also the words "lalaqui" (man), "babaye" (woman), "dagat" (ocean), "Him" (black), "us&" (deer), "áso" (dog), "bundoc" or "gubat" (forest), and other words. The prefix "mala" is used in the sense that we use the word "false"—"malaacle" is "false acle," "malabanaba" is "fnlse

banaba," etc. Frequently combinations of native and Spanish words are used to designate certain species, such as "matang diablo" *(Evodm),* "thedevil's eye"; "malacafé"(G/oc/)/d;<w, *Ramlia),* [1] 'false coffee." Sometimes some of the words introduced by the Spaniards have persisted without change, such as tabaco, maiz, cacao, pifia, and others, while on the other hand some have become greatly corrupted—for example, see the word "camanchiles" under ***Pithecolobium dulce*** **(p. 176), or "achuete," under** ***Bixa orellana*** (p. 129).

Some of the introduced species are known only by their Spanish names, while for other species native names have been adapted. Of the names of Spanish origin we find two classes—those of pure Spanish origin and those of American origin adopted by the Spaniards and transmitted by them with the plants* to the Philippines. Of the former we have such names as coronitas *(Lantana camara))* **manzanitas** ***(Zizyphw jujuba);*** **madre cacao** ***(Gliricidia maculata);*** **daniade noche** ***(Oestrum, norturnwn);*** **hoya** ***cn\z(Cres~centia alata);*** **caballero, or rosas de caballero** ***(Caeaalpinia pulcherriina).*** Of the second class we have such names as chicos *(Achras mpota);* mamey or chico mamey *(Lucuma mammosa);* tabaco ***(Nicotiana tabaco);*** **acheute** ***(Bixa orellana);*** **maiz** ***(Zea mays);*** **cacuate** ***(Arachishypogaea);*** **maguey** ***(Agave americana);*** **casuy(.k>ia-*** ***cardinm occidentale)*****; guayabas** ***(Psidium guayaba).*** **Among the** species that have been introduced into the Archipelago since the Spanish occupation and to which the natives have adapted names may be mentioned duraiig parang *(Daka nigra);* macahiya, or damohia, literally, "ashamed," suggested no doubt by the sensitive **leaves of the plant** ***(Mirrwsa pudlca);*** **diluario** ***(Argemone mexicana),*** **etc.**

Many of the native plant names are also the names of towns **such as Iba** ***(Phylianthus distichus),*** **Quiapo** ***(Pidiastratiotes),*** **Paco** ***(Aspkrdum esculentum),*** **Sampaloc or Salomague** ***(Tamarindus indka),*** **Calumpit** ***(Terminalia edulis),*** **Iloilo** ***(Aglaia argentea),*** **and** others.

% During the past two hundred years there has been considerable change in many of the native plant names, as is proved by an examination of the earlier publications on Philippine botany, such as the works of Camell, Mercaclo, and Delgado. In all these works, but especially in the first, arc found a very large number of names which are unknown to us to-day, and many of the one? of

well-known species are spelled quite differently from their accepted form to-day. One example from Camell's work, published in the year 1704, is sufficient to illustrate this point: Camell's "Conyza Helenitis odoris salviae" is undoubtedly the plant known to-day as *Blumea balxamtfera* DC, and Camell gives the following native names for his species, which should be compared with those given **under *Blumea balsamifera* on page 129: *Sambon, Lacarbulan, Lagdanbidan, Anacadbulan, Olacdanbulan, Guitingguitan, Gabuen, Lalaedan, AyoUui, Alibm, Hantilibun.***

None of the names of these earlier authors, not found in later publications, are included in the present publication, for the reason that we can not accurately identify many of the species.

So far as the dialects of the various names were determinabie they have been specified by the following abbreviations: B., Bicol; Cag., Cagayan; Ig., Igorrote; II., Ilocano; Mang., Mangyane; Pamp., Pampangan; Pang., Pangasinan; Sp., Spanish; Sp.-Fil., Spanish-Filipino; T., Tagalog; V., Visayan; Z., Zambales. Frequently, where the dialect of the name is not specified, the name of the island or province where the name is used has been given in parentheses. It has been impossible to identify the dialects of a large number of the names for the reason that many of the Spanish investigators did not consider such data, of sufficient value to warrant recording the same. With the exception of the data compiled from the herbarium of this Bureau, the authority for the dialects of the various names is that of the several Spanish investigators, and certain allowance must be made for errors.

Most of the Spanish authors gave little or no attention to accentuation, and frequently where accent marks were given they were erroneously placed. In the present paper an attempt has been made to properly accent the various words, and with this end in view all the names have been carefully checked over with various native employees of the office familiar with many of the dialects.

As the names have been compiled from different works of Spanish authors, it is to be presumed that the latter recorded the native names by the phonetic system of spelling, giving the different letters the same values as in the Spanish language. A cursory examination of the following work will show at once that there is a great variation in the spelling of the same word, *e* and *i, o* and *u,* and frequently *i* and *y* have the same values and are interchangeable. With the exception of ng, which is pronounced like *ng* in sing, bring,

etc., the letters in the various words have the same values as in the Spanish language.

The only Philippine author who has used any other method of spelling the native names is Tavera in his "Plantas Medicinales." In this work the consonants are pronounced as follows: *g* always as in get; *h* a gutturalized aspirate; *k* as in English; *w* always as the initial *w* in English, as win, won; *g̃* as *ng* in sing, hung, etc. While this method of spelling the native names has much to commend it, it has not been adopted in the present work, for the reason that no attempt has been made by the Americans so far to change the spelling of the words of the native dialects, and accordingly it was deemed advisable to retain the plant names under the spelling recorded.

PART I

A .

AAGAO, T. Premna vestita Schauer.
ABACÁ, T., V. Musa textilis Ne£.
ABALONG, V. Colocasia antiquorum Schott.
ABANG-AHANG, T., V. Oroxylum indicum L.
ABANG-ABANG, T. Leea rubra Blunie.
ABAR, T. Santiria?.
ABEGASTE, V. Morinda bracteata Roxb.
ABIAB, V. Cyclea peltata H. f. & Th.
ABIAN, Pang. Livinstonia rotundifolia Mart.
ABILAO, T. Garuga floribunda Decne.
AitfLO, T. Garuga floribunda Decne.
ABIBLING, B. Artocarpus.
AB6KO, B. Planchonia.
ABOD, V. Eurycles amboinensis Herb.
AB6NG-ABÓNG, V. Oroxylum indicum L.
ABSIC, T. Eleocharis.
ABUi), V. Eurycles amboinenaift Herb.
ÁBLR, V. Eurycles sylvestris Salisb.
AbÚTAB. Lopliopetalum toxicum Loher.
AfltiTRA, Sp.-Fil. Anamirta cocculus W. 4; A.
ACANA. Sideroxylon.
ACAP6LCO, Sp.-Fil. Cassia alata L.
ACDAN, T. Cryptocarya densiilora Bluine.
AcufoTE, Sp.-Fil. Bixa orellana Linn.
ACIIIJETE, Sp.-Fil. Bixa orellana L.
AcHtiTE, Sp.-Fil. Bixa orellana L,
ACL£, T. Pithecolobium acle Vidal.
ACL^NG-PARANG, Pamp. Albizzia.
ACTOLIGAN. Clerodendron macrostegium Schauer.
AUAAN, T., II. Albizzia procera Benth.
ADADINCO (Benguet). Sageretia.
ADAMIIAGU^N, 11. Adenanthera.
ADGAO, V. Premna vestita Schauer.
A i)i A VAN, T. Cocos nucifera L.
Anfo (Tayabas). Premna.
ADLAY, V. Coix lachrynia-jobi Linn.
.AbÚAS, T. Canarium.

ADYÁNGAO, T. Albizzia procera Benth.
AETAX, T. Aristolochia tagala Cham.
AFAPtJYAN (Cagayan). Musa paradisiaca L.
AF^YAN (Cagayan). Musa paradisiaca L.
AGA (N. Ecija). Ficus.
AGAC-AC, V. Amoora rohituka W. et A.
AGALANGA, V. Chisocheton sp.
AGANA. Pterocarpus indicus Willd.
AGAO. Ipomoea quamoclit L.
AGAPAI^&A, II. Aglaia? sp.
AGAKO, Z. Lagerstroemia speciosa Per*.
AGAS-ÁS. Scolopia roxburghii Clos.
AGAY, T. Phyllanthus.
AGAY-OX (Cebu). Abrus precatorius L.
AGBO, Cag. Saccharum officinarum L.
AGBOLfGAN, II. Clerodendron macrostegium Schauer.
AGB6Y, V. Mussaenda grandiflora Rolfe.
AGDA, Ig. Coix lachryma-jobi Linn.
AGDAO, T. Premna.
AGIN, T. Dysoxylum blancoi Vidal.
AGIIO, V. Leucaena glauca Benth.
AGIYANGYIANG, V. Abrus precatorius L.
AGNAYA, T. Lumnitzera purpurea Presl.
AGNAYA. Poly podium.
AGXIYAXG-YIANG, V. Abrus precatorius L.
AGNOCASTO, Sp.-Fil. Vitex negundo L.—Vitex obovata Thunb.
AG6GO, T. Dalea nigra Mart, and Gal.
AG6HO, T., V., Pamp. Casuarina equisetifolia Forst.
AG6HO, T., V. Ipomoea quamoclit L.
AG6IOI. Homonoia riparia Lour.
AG6NOY, V. Spilanthes acmella L.
AG6O, T., II. Casuarina equisetifolia Forst.
AGOPAXGA (Marinduque). Chisocheton.
AGOR, T. Fimbristylis miliacea Vahl.
AG6SO, T. Casuarina equisetifolia Forst.
AG6SOC, T. Ficus hispida Blanco.
AGÓS-OS, T. Ficus hispida Blanco.
AG6TAI, V. Heliconia.
AGÓY-OY, T. Homonoia riparia Lour.
AGPOY, Pamp. Bauhinea.
AGUASOX, V. Strychnos ignatii Berg.
AGUE´AH AN, V. Crinum asiaticum Linn.
AGUBABAO, V- Vitex obovata Thunb.
AGITJCUC, T. Homonoia riparia Lour.
AGtJiio, T. Casuarina equisetifolia Forst.
AGCHO, V. Oldenlandia diffusa Roxb.
AGUIBAGAN (Cagayan). Hypoestes.
AGI[T]1NGAI, T. Eennisetum nigricans Miq.

AGUIO, T. Dysoxylum blancoi Vidal.
AGUIU, Pamp. Dysoxylum blancoi Vidal.
AGUIS, V. Eugenia.
AGUPANGA (Mindoro). Chisocheton.
AGCPIT. Ficus quercifolia Roxb.
AGI5SIP, V. Melastoma imbricatum Wall.
AGtJSO, Z. Casuarina equisetifolia Forst.
AGtfs-us (Tayabas). Dysoxylum.
AG^TAI, V. Heliconia.
AGUTAY, V. Musa.
AGtfT-UT, V. Cordia subcordata Lam.
AGUYAJN&YAN, V. Abrus precatorius L.
AiniifRO, V. Bauhinea tomentosa L.
An LING, T. Mallotus moluccanus Muell. Arg.
AfMiT, V. Ficus glomerata Roxb.
AJOS-AJOS NGA MAPOTI, V. Hymenocallis.
AJOS-AJOS fi&A MAPOTI, V. Panceratum zeylanicum Linn.
AJOS-AJOS *$&A* MAPOTI, V. Habranthus.
ALACAAC, T. Palaquium latifolium Blanco.
ALACAO, Pamp. Palaquium latifolium Blanco.
ALACAP, T. Palaquium latifolium Blanco. P. oleifera Blanco.
ALAGA, T. Premna.
ALAG-ALAG SONSON, T. Artabotrys odoratissimus R. Br.
ALAGAO, T. Premna vestita Schauer.
ALAGAO DÁGAT, T. Premna.
ALAGAS, V. Semecarpus perrotettii March.
ALAGATLI, T. Canarium cumingii Eng.
ALOGBAGtJNiT, T. Premna.
ALANGASI, V. Leucosyke capitellata Wedd.
ALAGtJNG-UNG, V. Cai^paris micrantha DC.
ALAHAN, T. Diospyros sp.
ALAL, Ig. Pinus insularis Endl.
ALALANGAT. Adcnanthera pavonina Linn?
ALAM, T. Dactyloctenium aegyptium Pers.
ALAM (Mindoro). Toona.
ALAMAG. Parinarium.
ALAMAG, T. Aporosa.
ALAMANG. Villebrunnea frutescens Blume.
ALAMDIHOR, V. Baiilunia tomentosa L.
ALANGASI, V. Leucosyke capitellata Wedd.
ALANGHIDAN IT BANUG, V. Canthium mite Bartl.
ALANG-ILAXG, T. Cananga odorata Hook. f. et Th.
ALANQ-ILANG S6NSOX, T. Artabotrys odoratissimus R. Br.
ALANGINGI, V. Vitis carnosa Wall.
ALANGISI, V. Pipturus asper Wedd.
ALANSITN^IT, T., V. Ehretia buxifolia Roxb.
ALANG-LAN5AL. Adenanthera.
ALANGUIT. Ehretia buxifolia Roxb.

ALANIGNI (Zamboanga). Myristica.
ALAN6TI. Wrightia ovata A. DC.
ALANTAG, T. Diospyros.
ALARO, V. Maranta arundinacea L.
ALÁSAS, Pamp. Ficiw aspera Blanco.
ALÁSAS, T. Freycinetia.
ALASAS, T. Pandanus oxaltatus Blanco.
ALÁSLS. Streblus asper Lour.
ALATAXAY (Cagayan). Musa.
ALAITI. T. Vernonia.
ALAUIIIAO. Dracontomelon cuiningiaiuini Baill.
ALAYAX, T. Quercus llanosii A. DC.
ALAYAN (Angat). Unona odorata? DC.
ALRAIIACA. Ocimuni sanctum Linn.
ALBAITACA MORADO, T. Coleus acuminatus Benth.
ALiifiTHA, Sp.-Fil. Anamirta cocculus W. and A.
ALCANFOR, Sp.-Fil. Cinnanionum camphoratum Blunic.
ALKM, II. Mallotus ricinoides Muell. Arg.
ALG6A, T. Premna vestita Scliauer.
ALI, Ig. Excoecaria agallocha Linn.
AIJAMA. Morinda bracteata Roxb.
ALIBACTA, B. Clerodendron.
ALIBANBAN, P., T. Bauhinia blancoi Baker.
ALIBANBAN, T. Bauhinia purpurea L.
ALIBANBAN, T., V., Pamp. Bauhinia tomentosa L.
ALIBIIIIL. Bauhinia binnata Blanco.
ALIBAXGBANG, T., V., Pamp. Bauhinia malabarica Roxb., and other species.
ALIBANGDAN, Ig. Alsophila ghiuca Bluiiie.
ALIBHON, V. Blumea balsamifera DC.
ALIBIHIL, V. Bauhinia tomentosa L.
ALIBÚBLT, V. Tabernaemontana pandacaqui Poir.
ALÍBUN, V. Blumea balsamifera DC.
ALICBANGON, T. Commelina benghalensis L.
ALICBANSON, T. Cyanotis cristata R. and S.
ALIHIZO. Bauhinia binnata Blanco.
AUM, T. Mallotus ricinoides Muell. Arg.
AUM, ,T. Mallotus moluccanus Muell. Arg.
ALIMIQUEN, II. Musa paradisiaca L.
Ar.fxAO, II.? Calamus rhomboideus Blunic.
AIJXAO, T. Callicarpa.
ALINAO, B. Columbia serratifolia DC.
AUXG, B. Mallotus moluccanus Muell. Arg.
ALLXGAD, Pang. Shorea.
AUSGARO, T. Elaeagnus latifolia L.
AUNG IIOT{JNGAS. Callicarpa.
ALINTATAO, T. Diospyros pilosanthera lilanco.
ALIXTUTCXAS. Astronia rolfei Vidal.
\LU'ACHAO, 11. Oarfcinia.

ALIPAI, T. Nephelium longana Camb.
AiJi'.vi, T. Neplu'lium glahruin Noronh.
AUPARO, T. Simibavia rottleroides Baill.
ALIPASIAO, B. Villebrunea.
ALJPATA, V. Excoecaria agallocha L.
ALIPATA, T. Dodonaca viscosa Linn.
ALIPAYO, V. Homalomena.
ALJPAY. Nephelium glabrum Noronh.
AIJPAYONG, V. Homalomena.
AUF6ONG, V. Pavetta angustifolia R. and S.
ALIP6ONC, V. Ixora lanceolaria Coleb.
ALfpuNG, T. Gmelina.
ALITAPTAP, B. Planchonia.
ALM£NDRO, Sp.-Fil. Terminalia catappa L.
ALM£Z. Celtis philippinensis Blanco.
ALOBAHAI, T. Pithecolobium lobatum Benth.
AL6CAN, 11. Allaeanthus luzonicus Bentli et Hook.
ALOCASOC, V. Clerodendron intermedium Cham.
Ar.6Dio, II., T. Streblus asper Lour.
AIJ6PAG. Euphorbia litchi DC.
ALPAY, T. Nephelium glabrum Noronh.
ALPOS6TES, Sp.-Fil. Chenopodium ambrosioides L.
ALUBfiiOD, V. Spondias mangifera Wall.
Ar-UBfHON, T. Spondius mangifera Willd.
ALUGBATI, V. Basel la rubra L.
AIAIIAJAN, Cag. Pistia stratiotes Linn.
ALUM, V. Mallotus ricinoides Muell. Arg.
ALUNG-CAGAY, V. Decaspermum paniculatum Kurz.
ALUNG-CAGAY, V. Nelitris.
ALI'TPAG, T. Nephelium longana Camb.
Ai-tJPAG, T. Nephelium glabrum Noronh.
ALCPAI, T. Nephelium longana Camb.
AT-UPIDAN, V. Vitis lanceolaria Roxb.
ALUPIIIAN, T. Muehlenbeckia.
Ai-tfSANG, T. Cyperus.
ALUSIMANG, V. Trianthema.
AI*Y6PYOP, V. Erianthemum bicolor Schrank.
AMA£T, V. Xylosma cumingii Clos.
AMAGA. Diospyros blancoi DC.
AMAGA, V., T. Diospyroa pilosanthera Blanco.
AMAGA, V., T. Diospyros discolor Willd.
AMAMÁLE, V. Leea sambucina Willd.
AMAMÁNGPANG (Albay). Gironniera eeltidifolia Gaud.
AMARG6SO, Sp.-Fil. Momordica balsa in in a L.
AMARG6RO BABI, Pamp. Mollugo.
AMBÁLOD, T., V. Nauclea obtusa Blume.
AMBABALI:D, V. Nauclea obtusa Blume.
AMBOGUÉS. Koordersiodcndron pinnaiinii Merrill.

AMB6LONG, V. Metroxylon.
AMIRAY, T. Boehmeria nivea H. and A.
AMISON. Ficus glomerata Roxb.
AMLANG, T. Sterculia.
AMLfs, T. Calamus pisicarpus Bluine.
AMOGUIS, T. Koordersiodeiidron pinnatuni Merrill.
AMÓLONG, IL Epiprenmum medium Engl.
AMORES SECOS, Sp.-Fil. Chrysopogon aciculatus Trin.
AMPAL, V. Musa sapientum L.
AMPAL£A, T. Momordica balsamina L.
AMPALAYA, T. Momordica balsamina L.
AMPAS, Pamp. Streblus asper Lour.
AMPUPISYOT, V. Homalium panayamum F. Vill.
AMUAUAN. Vitex littoralis Decne.
AMCBLIT, V. Macamnga bicolor Muell. Arg.
AMUGAN, T. Pygeum.
AMUGANAN. Vitex littoralis Decne.
AM^GNI, V. Artocarpus.
AMUGUIS, T., V. Koordersiodendron pinnatum Merrill.
AMtJLUNG, Cag. Rhaphidophora.
AMURAONG, B. Vitex.
AMUYÁON. Vitex littoralis Decne.
AMtJYON, B. Xylopia dehiscens Merrill.
AMtJYON. Melodorum fulgens Hook. f. and Th.
AMt^YON, T. Xylopia.
AMtJYON (Tayabas). Unona.
AM^YONG, Pamp. Melodorum fulgens Hook, and Th.
ANAAO, II. Livistonia rotundifolia Mart.
ANABION, V. Trema aspera Bluine.
ANABA, T. Abroma alata Blanco.
ANAB6, V. Malachia brae teat a Cav.
ANAB6. Abroma angusta L.
ANAB6. Abroma fastuosa H. Br.
ANABONG, V. Abroma alata "Blanco.
ANACtf, T. Cupania.
ANAGÁB. Pithecolobium lobatum Benth.
ANAGAP, T. Pithecolobium lobatum Benth.
ANAGÁP, T. Pithecolobium montanum Benth.
ANAGAS. Semecarpus anacardium L>. f.
ANAGAS. Semecarpus microcarpa Wall.
ANAGAS, BABAE, T. Semecarpus.
ANAGASI, B. Leucosyke capitellata Wedd.
ANAGAT. Pithecolobium lobatum Benth.
ANAGATLI, T. Canarium cumingii Engl.
ANAGU£P. Pithecolobium lobatum Benth.
ANAIIAO, T., V. Licuala spectabilis Miq.
ANÁHAO, T. Licula elegans Mart.
ANÁHAO, T. Livistonia rotundifolia Mart.

ANAIIAO, T. Corypha.
ANAHAO, T. Rhapis flabelliformis Ait.
ANAHAO, T., V. Livistonia.
AN AH ANON, B. Sterculia.
ANAM, V. Buchanania florida Schauer.
AN-AN, Mang. Buchanania florida Schauer.
ANANAGTAG, V. Dysoxylum blancoi Vidal.
ANANANGTANG, V. Dysoxylum blancoi Vidal.
ANANAPLA. Albizzia procera Benth.
ANANAPLAS, T. Albizzia procera Benth.
ANANG, T. Diospyros.
ANANGI, T. Canarium.
ANAO, Pamp. Livistonia papuana Becc.
ANAREP, II. Pithecolobium lobatum Benth.
ANAS, Pamp. Bambusa.
ANATAN, T. Memecylon.
ANATAO, T. Linociera coriacea Vidal.
ANAN, Cag. Livistonia rotundifolia Mart.
ANAVINGA. Casearia cinerea Turcz.
AN ATE. Bixa orellana L.
ANCIIÉBHAN, T. Cassia fistula L.
ANDABAYAN (Cagayan). Alstonia scholaris R. Br.
ANGAI, Pamp. Curcuma longa L.
ANGANSE, Ig. Elattostema.
ANGIIET, T. Premna.
AN&ILANG (Jolo). Cananga odorata H. f. et Th.
ANGLAI, V. Aegiceras florida R. and S.
AN&UD, Pamp. Achyranthes aspera L.
ANIAS, T. Andropogon.
ANIATAN, T. Brackenridgea fascicularis F. Vill.
ANIBIONG. Abroma alata Blanco.
ANIBOG, T. Abroma angusta L.
ANIBONG, T. Abroma alata Blanco.
ANIHONG, T. Abroma angusta L.
ANIBONG, V.? T. Areca nibung Mart.
ANIBONG, V. Cocos nucifera Linn.
ANfBONG, Pamp. Talauma angatensis Blanco.
ANfBUNG, V., T. Areca nibung Mart.
ANIBUNG, Pang. Arenga saccharifera La bill.
ANfi, T. Erythrina ovalifolia Roxb.
ANILAO, T. Columbia serratifolia DC.
ANILAO-UAN, T. Columbia.
ANINAPLA, T. Albizzia lebbek Benth.
ANINO, V. Morinda bracteata Roxb.
ANIS, Sp.-Fil. Foeniculum vulgare Gaertn.
AN£S CAHOI, T. Myristica philippinensis Lam.
ANIS MOSCADA, T. Myrietica philippinensis Lam.

ANITAG, T. Stephegyne.
ANITAP, Pamp. Albizzia procera Benth.
ANITAP, Ig. Macaranga.
ANITAP, Tg. Albizzia procera Benth.
ANOÁANG. Premna.
AN6BING, T. Artocarpus cumingiana Tree.
ANÓBING CAGUIOSING, T. Artocarpus nitida Tree.
AN6BION, Pamp. Artocarpus cumingiana Tree.
AN6BLING, T. Talauma villariana Rolfe.
AN6BLING, T. Talauma angatensis F. Vill.
AN6BLING, V. Artocarpus cumingiana Tree.
AN6BLING, T. Artocarpus nitida Tree.
AN6nLiNG-CAQufESiNG. Artocarpus lainellosa Blanco.
ANOBRAN, II. Premna vestita Schauer.
AN6LANG, T. Polyalthia lanceolata Vid.
AN6NAG, T. Lit sea.
AN6NAG, B. Cordia blancoi Vidal.
ANOXG, T. Cordia blancoi Vidal.
AN6NAS, Sp.-Fil. Anona reticulata L.
ANON6O. Musa sapientum L.
AN6POL (Albay). Conocephalus acuminatus Turcz.
ANOS. Bambusa.
AN6SEP, T. Palaquium cuneatum Vid.
AN6TONG (Zambales). Wrightia ovata DC.
ANS6HAN, V. Stereospermum quadripinnatum F. Vill.
ANTAGAN. Pteroearpus indicus L.
ANTEN, II. Canarium luzonicum Miq.
ANTEN, II. Canarium cumingii Engl.
ANTIP6LO, T., V., Pamp. Artocarpus incisa L.
ANTO, V. Amorphophalus campanulatus Blume.
ANTOBANAG, T. Glochidion.
ANT6LANG, T. Graptophyllum hortense Nees.
ANTOLAÑGAN, T., V. Hibiscus rosa-sinensis Li.
ANT6NG (Nueva Ecija). Casuarina equisetifolia Forst.
ANT6NG (Abra). Canarium.
ANT6NG, T. Dipterocarpus.
ANUANG. Musa sapientum L.
ANUÁNG, T. Musa paradisiaca L.
ANUANG, T. Kyllingia monocephala Rottb.
ANtJBiNG, T. Artocarpus odoratissima Blanco.
ANOBING, T. Eugenia.
ANtJBiNG. Artocarpus cumingiana Tree.
ANtJBiNG NA CAGUfosiN, T. Artocarpus nitida Tree.
ANtJBioN, T. Artocarpus.
ANCBIONG (Tayabaa). Talamna.
ANt3rBULN, T. Artocarpus.
AN^BLING, V. Takuima angatensis F. Vill.
ANtjPiNG (Zamb#aṇga). Myristica simia^um A. DC.

ANtJSKP, T. Palaquium.
AÑIL, Sp.-Fil. Indigofera tinctoria Linn.
APALAYA, T. Momordica balsamina L.
APALIA, Pamp. Momordica balsamina L.
APALIT, Pamp. Pterocarpus blancoi Merrill.
APALONG. Osmoxylon pulcherrimum Vidal.
APANA, T. Eupatorium ayapana Vent.
APARIAGUA, T., V. Laportea guadichaudiana Wedd.
APAS6TIS, T. Chenopodium ambrosioides L.
APATONG, T. Nephelium.
APATOT, II. Morinda bracteata Roxb.
APATUT, T. Morinda bracteata Roxb.
APIAPI, T. Avicinnia officinalis L.
APIIT, Ig. Viburnum odoratissimum Ker.
Apfpi, V. Colocasia antiquorum Schott.
APIS, T. Pothos.
APIS (Zambales). Calamus.
APITON, T. Dipterocarpus grandiflorus Blanco.
APITONG, T. Dipterocarpus grandiflorus Blanco.
APNIT, T. Anona.
APNIT, B. Dipterocarpus.
AP6IAPOYAN, T. Gynandropsis pentsipylla DC.
APOX, T. Amorphallus campanulatus Blume.
AP6O. Bohemeria nivea H. and A.
ApoptfYOT (Cagayan). Diospyros pilosanthera Blanco.
APOS6TIS, T., V., Pamp. Chenopodium ambrosioides L.
AP6Y-AP6YAN, T. Cleome viscosa L.
AP6Y-AP6YAN, T. Ammanirt.
AP6Y-AP6YAN, T. Cleome viscosa Linn.
APPAN (Cagayan). Mangifera altissima Blume.
APtJLONG, V. Osmoxylon pulcherrimum Vidal.
APtJYO (Paragua). Callicarpa.
Apt5YOT, Z. Mallotus philippinensis Muell. Arg.
ARAGAO, V. Premna.
ABAGOfROY, V. Opilia javanica Miq.
ARAIIAX (Albay). Litsea albayana Vidal.
ARÁHAN, B. Diospyros.
ARANA, B. Litsea.
ARAN-CALAO, V. Nepenthes.
ARAND6N, II. Wikstroemia ovata Mey.
ARAÑGA, T. Homalium luzoniense F. Vill.
ARAÑGA BLANCO, T. Eugenia.
ARAÑGAN, T. Eugenia.
ARANA (Manila). Gynandropsis speciosa DC.
ARAT, T. Scleria.
ARAUA, B. Eugenia.
ARAYAN, T. Flagellaria indica Linn.
ARBOL DE FUEGO, Sp.-Fil. Poinciana regia Bojer.

AI:I:ON (Paragua). Cerbera odollaru Gaciin.
ARDATAG, V. Elephantopus spieatus Juss.
ARGAO, V. Fremna vestitu Schauer.
AnictJNDAL, V. Musa-paradisiaca L.
AniLAO. Columbia serratifolia DC.
AUIMAJ, II. Boehmeria nivea Hook, *et* Am.
ABINGIT, V. Marsdenia tinetoria *R.* Br.
AniT6ifaTONO, II. Teiminalia.
ABO, II. Casuarina equisetifolia .Forst.
AIIOE-MAHAY, B. Maoutia.
AROUAYDAY, T., B. Ipomoea pes-csprae Roth.
AROUANAN, '['., Pamp.j V. Hibiscus rosa-sincnsis L.
AU6MA, T. Prosopis juliflora DC.
\I:6MA, T. Aeasia farnesiana Willd.
AII6BO, V.-f T. Maranta arundinacea L.
AR6SEP, II. Antidesnia ghaesembill^ Gacitu.
AROYANGYAKG, V. Abrus preeatorius L.
ARQUIG?, Cag. Pandanua faseiculaiis Lam,
AHKAYAN. Psidiura *giia.ya.va.* L.
ABB6O. Casuarina equisetifolia Forst.
ABB6U-BOU, T_V V. Maranta arundinacea L.
ARUM. Mai lotus ricinoides Muell. Arg.
AETJBU. Maranta arundinacea L.
ASAC-TAI>ONU. Phyllanthus f.
ASAXA, T. Ptci-ot'iirpus indicia Willd., T. vidaliamis Kolfe,
AS-AS, T. Iron stiicta Roxb.
ASIASIMANAN, T. Derris sinuata Benth.
ASIMAO, T. Harrisonia bennetii B. and 11.
As-is, T. Fieus heterophylla L.
As*fs, T., V., Paxap. Ficus hispida L.?
Asisio, V. Physaiis angulata L.
ASNA^GAI, V. Clerodendron intermedium Cham.
ATAIATAI, T. Graptopbyllum hortense Nees.
ATALAIM'! PIC *Z.* SapiaduB.
ATAR6LAN, T. Ardisia.
ATAY-ATAY, V. Erantliemum bicolor Schrank.
ATCOY, Pamp. Bauhinia.
ATON, CanaritBu ovatmn Engl.
ATKS, T. Anona squamosa L.
ATIBANTJUAN. Alsophila glauea Bluine.
AT^LUAO (Ahra). Breyniaa.eumliuttaMneU.Atg.
AT(MON, V. Cucumis raelo IJ.
AX6LA, Bixa orellan;.
ATOATONG, Ig. Selagio J escens Spring.
Axsv'ni. !. B lana L.
AOGOD, Pani; es ftbtusifolifl Lam.
AUA, 11. Mi:
AUSIMAN, B. l'<>mjl:t<'ii oleracea L.

AVILO, T. Garuga floribunda Decne.
A YAM* V. Trianthema monogyna L.
AYANGAO, T. Albizzia procera Benth.
AYANT6TO, Pamp. Amaranth us spinosus L.
AYAPANA, Sp. Fil. Eupatoriuni ayapana Vent.
AYMIT. Ficus glomerata Roxb.
AYMIT, T. Ficus minnahassae Miq.
AYO, V. Caauarina equisetifolia Forst.
AYO, Pamp. Oxalis acetosella L.
AYO, T. Vitia capriolata Don.
AYO-AYO. Micromelum.
AY6BAN, V. Blumea balsamifera DC.
AYU-AYXJ. Micromelum.
AYU, Pamp. Vitis carnosa L.
AYTJMIT, T. Ficus minnahassae Miq.
AYtJPAG, T. Nephelium.
AztircENA. Polyanthes tuberosa L.

B.

BABAGION. Memecylon floribunda Blume.
BABAGION, V. Ardisia humilis Vahl.
BABAISACAN, T. Quercus.
BABALOD, T., V. Nauclea obtusa Blume.
BABAN (Zamboanga). Donax arundastrum Lour.
BABANAT (Nueva Viscaya). Deeringia indica Zoll.
BABEBABE, Pamp. Quisqualis indica L.
BABO-BAGO (Bohol). Garcinia venulosa Choisy.
BABOI-GTJBAT, T. Thespesia populnea Corr.
BACBUY, T. Thespesia populnea Corr.
BACABOC. Scaevola koenigii Vahl.
BACA-BACAHAN, T. Cyperus.
BACAI^AO, Pang. Nephelium.
BACAN, T. Litsea.
BACAN, T. Sterculia.
BACAN (Tinago). Bruguiera gymnorrhiza Lam.
BACANIS (Zamboanga). Eugenia lineata DC.
BACANUN, T. Bruguiera g^^mnorrhiza Lam.
BACAO, T. Ceriops candolleana Arn.
BACAO, T., V. Rhizophora mucronata Lam.
BACAO, T. Bruguiera gymnorrhiza Lam.
B AC A PIE, V. Calamus albus Pers.
BACAUAN, T. TJeriops candolleana Arn.
BACAUAN, T. Bruguiera caryophylloides Blume.
BACAUAN, T. Rhizophora niucronata Lam.
BACAUAN GUBA, Pang. Carallia integerrima DC.
BACAUAN LA^AQUI, T. Rhizophora conjugata Lam.
BACAYAN, V. Canarium cumingii Engl.
BACAYAO, Pang. IHipe betis Merrill.

BAUCALAO. Neplieiium glabrum Noronli.
BACCUNG. Criiium asiaticum Linn.
BACONG, T. Crinum asiatieum L.
BACONG, T. Hipppeastrttm,
BACONG-BAOONG, V. Crimuu umoeiiuui Roxb.
BACONG NGA DITLAO, V. Crinum pratenge Herb.
BACOBTG s.\ PERSIA. Pancratiun zeylsmieuui I,inn.
BACONG SA S6LOO, V. Crininn ,pratens-e Herb.
BACtiCAN, V. Dysoxylum blaneoi Vidal.
BACOIT, Pang. Harrisonia bennetii Hook.
BACÜIT, Pang. Alstonm.
BÁCUNG, V. Criniini usiati^nit! Linn.
BAcuoa, Pang. Vatica.
BADiANG, T., V. Alocasia indica Schott.
BADIANQ. Colocasia, antiquorum Schott.
BADIABA, T., V., Pump. Coleus atropurpureus Benth,
BADIXH, V. Sterospermuiit qnadripmatnm F. Vill.
BADOC, II. Gnaphalium indicum L.
BA•.AO. Eiireti.i.
BAGABAHOI, T., V. Gmelina asiatica L.
BAGA-BABOI, V, Gmelina villosa Roxb.
BAGACAN, T. Bumbusa.
BAOACAY, V. Dendrocalamus membranacens Munro.
BAOAOBAO, Pamp. Eugeni;i.
BAaAiANuiT, T. Palaquiuni lanceolata Bianco,
BAOAI^ANUIT, T. Palaquium luzoneiisis Vidnl.
BAGALIGUAN, B. Aatronia.
BAOALIRAT. Nauclea glubra DC.
BAGALOAN, T. Marlea begoniaefoiiti Koxb.
BAGALOOA, V. Melia dubia Cav.
BAGAWAC. Clerodendron macrostegium Scliauer.
BAGANG, Cag. Amorphophaiius oampKBtuIatua Blmne.
BAGAKG ASO, B. Anaxagorea luzoneiisis A. Gray.
BAOANG-BAQANG, B. Grlochidion.
BAGANITO (Morong). Diospyros.
BAGA6LAN, T, Marlea begoniaefolia Roxb,
BAGA^LAN, T. Guettarda speciosa L.
BAOAK, II. Anisoptera.
BAOARiLAOj T. Anthocephalus cadamba Miq.
BAGARILAO NA iTfit, T, Nauclea.
BAGARILAT, T. Antbocephalug cadainba Miq.
BAGASOA, T., V. Ipomoea pes-cuprae Roth.
BAGA-TAMBAL, V. Zanthosylum avicennae DC.
BAoA-TtJBANG (Samar). v Cratoxylon blaneoi Blume.
BAOAUAC, T. CJerodendftm.
BAG'.UAC NA MORÁO <). T. Clerodemlron blanooanumm F. Vill.
BAGAYBAY. I. Derris.
BAGBAO. II. Erythrinn indica L.

BAGGAB. Clerodendron.
BAQMAN, T. Quercus.
BAGNA, T. Glochidion.
BAGNIT, T. Tristellateia australasica A. Rich.
BAG6. Commersonia platyphylla Andr.
BAG6, V. Gnetuin gnemon L.
BAG6. Garuga floribunda Decne.
BAG6ABON, V. Vitex heterophylla Roxb.
BAGO-BAGO (Bohol). Garcinia cambogia Desrouss.
BAGO-BAGO. Ixora macrophylla Bartl.
BAGO-BAGO, V. Garcinia.
BAG6MBON, Pamp., V. Alpinia gigantea L.
BAGONG (Jolo).« Amorphophallus campanulatus Blume.
BAGONG, V. Tacca rumphii Schauer.
BAGONG-BAGONG, V. Tacca rumphii Schauer.
BAG6NGBONG, V. Alpinia brevilabris Presl.
BAGONITO, B. Cupania.
BAG6-OEN, 11. Parkia roxburghii, G. Don.
BAG6-SILI. Gnetum gnemon Linn.
BAGSANG, V. Caryota rumphiana Mart.
BAGUD, T. Pterospermum diver si folium Blume.
BAGtJEN, II. Parkia roxburghii G. Don.
BAGUI-L6MBOY. Eugenia.
BAGUi-ttfMBAN, T. Aleurites trisperma Blanco.
BAGUING, T. Generally applied to woody vines.
BAGUIN-CASTILA, T. Argyreia.
BAGUIN-CASTILA, T. Ipomoea.
BAGUINUNBINQ NA PULA (Negros). Garcinia.
BAGUIR, II. Ixora.
BAGUIB6RO, V. Viburnum luzonicum Rolfe.
BAGUIR6RO, V. Adenanthera pavonina L.
BAGUIT, B. Tristillatia australasica A. Rich.
BAGUITARIM, T. Hopea philippinensis Dyer.
BAGULIBAS (Mindoro). Buchanania florida Schauer.
BAGULfBAS, T. Garuga.
BAGUMA6NIAO, B. Maesa laxa Mez.
BIHAY, V. Pueraria phaseoloides Benth.
BAIIAY, T. Ormosia calavensis Blanco.
BAHAY, T., V. Lepidopetalum perrottetii Blume.
BAHAY, T., V. Adenanthera pavonina Linn.
BAHAY, T., V. Pygeum.
BAHAY NAM6C, B. Ardisia.
BAin, V. Arenga saccharifera Labill.
BAin, V. Calyptrocalyx spicatus Blume.
BAHI, V. Livistona rotundifolia Mart.
BAHO-BAIIO, V. Cassia tora Linn.
BAIAO, T. Fagraea morindaefolia Blume.
BAIAO, V. Bruguiera eriopetala W. and A.

BAILAYAN (Mindoro). Dipterocarpus.
BAfNO, T. Nelumbium speciosum Willd.
BAIO. Bruguiera criopetala W. and A.
B Af T. Canar ium ?.
BAIT, T., Pamp. Euphorbia neriifolia L.
BAITO, T. Bambusa.
BAIYABÁSIN, T. Cassia alata L.
BALABAGO, V. Hibiscus tiliaceus L.
BALABALAN6YAN, T. Cleome viscosa L.
BALABALAN6YAN, T. Gynandropsis pentaphylla DC.
BALABALANTIAN. Cleome viscosa L.
BALABALATtftf&AN, B. Indigofera teysmannii Miq.
BALABALAYAN, T., V. Gmelina asiatica L.
BALABANG QUiLfNG, V, Connaropsis philippics F. Vill.
BALÁBO, T. Grewia.
BALAB6NOT. Sterculia.
BAXACÁNOG, T. Eugenia.
BALACAT, T. Zizyphus trinervis Poir.
BALACBAC, T.? Jussiaea suffruticosa Linn.
BALACBAC, T. Eugenia jambos L.
BALACBALAC, T. Mai lotus ricinoides Muell. Arg.
BALACBALAC, V. Tournefortia argentea L. f.
BAIIAGANGO, T. Melia candollei Juss.
BAXAGAY, V, Psophocarpus palustris Desv.
BALAG-BALANGG6TAN, T. Eleocharis.
BALAGNAN. Calophyllum vidalii F. Vill.
BALAGNAN, V. Calophyllum cuneatum Vidal.
BALÁI-LAM6C, II. Mussaenda grandi flora Rolfe.
BALAI-I.AM6C, II. Crataeva religiosa Forst..
BALAI-TOCAC, II. Ixora.
BALÁNGHAS. Sterculia balanghas Blanco.
BALANGIGAN, V. Guettarda speciosa Linn.
BALAJVGfQUiN, Cag. Streblus asper Lour.
BALANGOT, T. Typha angustifolia L.
BALANG6TAN, T. Cyperus.
BAI,ANGUD, T. Scirpus mucronata L.
BALANGUN, V. Musa sapientum L.
BALANOI, T. Ocimum sanctum L.
BALANTANA, V. Clerodendron intermedium Cham.
BALANTI, T. Homonoia riparia Lour.
BALANTL Croton muricatum DC.
BALANTI, T. Alchornea moll is Muell. Ary.
BALANTI, T. Homaliinthus fastuosus F. Vill.
BALAO, T. Dipterocarpus vernicifluus Blanco.
BALASABIS. Cupania regularis Bhime.
BAXASBAS, V., T^ GraptophylUim hortense Nees.
BALÁSBAS-MAIL6MAY, T. Graptophyllum hortense Nees.
BALASIN, T., V., Pamp. Anamirta cocculus W. and A.

BALATBAT (Paragua). Licuala.
BALATINAO. Diospyros pilosanthera Blanco.
BALÁTONG, V. Vigna catjang Endl.
BALATOXG, T. Phaseolus mungo L.
BALATONG-ASO, T. Cassia tora L.
BALATONG-ASO, T. Cassia occidental is Li.
BALÁUEN, Pang. Vitex.
BAXAT, V. Cassia fistula L.
BALAYANG, 11. Musa sapient urn L.
BALAY-BAYAN, Z. Pterospermum diversifolium Blume.
BALAY-NAiitJC, II. Crataeva religiosa Forst.
BALAY-OAC, 11. Parkia roxburghii G. Don.
BALAY6HOT, T. Buchanania florida Schauev.
BALAYON, T., V. Afzelia rhomboidea Vidal.
BALAYON; V. Cassia fistula Linn.
BALAYONO, T. Afzelia rhomboidea Vidal.
BAL£BO, Ig. Pinus insularis Endl.
BALENGASOY, T. Buchanania florida Schauer.
BALENGCAY. Flagellaria indica L.
BAL^TE, T. Ficus clusioides Miq. and other species.
BALÉTE-GAPANG (Marinduque). Ficus radicans Roxb.
BALAfCAG, V. Dioscorea sativa L.
BALIBAGAN, V. Dalbergia spinosa Roxb.
BALXBAGAN, V. Guettarda speciosa L.
BALIBAGO, T. Grewia.
BALIBAGO, T., Pamp. Hibiscus tiliaceus L.
BALIBAI, Pamp. Symphorema luzonicum F. Vill.
BALf-BALf, V. Couthovia celebica Koorders.
BALIBANBAN, V. Bauhinia tomentosa L.
BALIBAY. Litsea luzonica Blanco.
BALIC?, V. Allophylus cobbe Blume.
BAIJCAO, V. Schizostachyum.
BALICASAN, T., V. Talaumia angatensis F. Vill.
BALfc-BALfc, Pamp. Amomum ciliatum Blume.
BALfc-BALfc, T. Hoya diversifolia Blume.
BALfc-BALfc, T. Pongamia glabra Vent.
BALICTAN?. Cryptocarya villarii Vidal.
BALICTABIN, T. Clerodendron blahcoanum F. Vill.
BALictJPCUP, V. Epipremnum medium Engl.
BALIGANGAN, B. Duabanga moluccana Blume.
BALIGAN-NIN-GANGAN, B. Eugenia.
BALIGNON, V. Melochia arborea Blanco.
BALIG6HOT, B. Buchanania florida Schauer.
BALIHÚD, T. Buchanania florida Schauer.
BALÍLANG oAc, T. Oroxylum indicum L.
BALILANG OAC, T. Claoxylon wallichianum Willd.
BALILI, Pamp. Imperata arundinacea Cyr.
BALiMBfx, T. Averrhoa carambola L.

BALIMBING, T. Averrhoa carambola L.
BALINANAY, T. Calamus.
BALINA6-NA6 (Unisan). Ixora.
BALINA6-NA6, T. Otophora blancoi BJume.
BALIIJGACTA, II. Diospyros pilosanthera Blanco.
BALINGAGTA-COLORADO (Abra). Diospyros.
BA&INGAHOOD, T. Buchanania florida Schauer.
BALINGÁSAY. Buchanania florida Schauer.
BALINGAY. Flagellaria indica Blanco.
BALIJGGAYO, T. Erythropalum.
BAUNGBIJVG, V. Averrhoa carambola Linn.
BALING CAHOY, V. Glochidion.
BALINGHASAY, T. Buchanania florida Schauer.
BALINGNAY, T. Flagellaria indica L.
BALiNGtJA, V. Evodia triphylla DC.
BAIJNGUAY, T. Flagellaria indica Linn.
BALINIIÁSA, T. Buchanania florida Schauer.
BALINHÁSAY (Morong). Buchanania florida Schauer.
BALINIIÁSAY (Abra). Semecarpus perrottetii March.
B ALINSIÃG AO. Aporosa.
BALiNTtJA (Zamboanga). Myristica philippinensis Lam.
BAUNtJAY, T. Dracaena.
BALIO, V. Fandanus dubius Spreng.
BALISCUP (Zamboanga). Eugenia.
BAIJSENG, V. derodendron inerme R. Br.
BALITADIIAM, V. Quisqualis indica L.
BAULTBITAN, T?. Cynometra ramiflora L.
BALITBITAN, T. Sideroxylon balitbitan Blanco.
BALITI, T., Pamp. Ficus indica L. and other species.
BALITING PAYAPA, T. Ficus.
BAJJTI PULA, T. Ficus clusioides Miq.
BALITNOX, V. Melochia arborea Blanco.
BALIT6SOX. Terminalia.
BALitJT, Pang. Hopea.
BALfYOCO, B. Anrlropogon schoenanthus L.
BALAM-BALAM. Leea ?.
BÁLLANG, Cag. Li vis to na rotundifolia Mart.
BAL6BAR, Pamp. Eugenia jambos L.
BAI.6BO, T. Diplodiscus paniculatus Turcz.
BALOC. Sapindus ?.
BALOCÁNAC, T. Chisoclieton paniculatus Hiern.
BALOCAKAD, T. Aleurites moluccana Blume.
BAL6C BAJL6C, T. Pou garni a glabra Vent.
BAI.6C-BAL6C, T. Glirieidia inaculata H. B.·K.
BAL6C-BAL6C, T. Linociera.
BAL6C-BAT^C, T. Scaevola koenigii Valil.
BAL6D, T., V. Nauclea obtusa Blume.
BALOG6, T., V. PaiiTp.- Kntada scandens Benth.

BAIXH, V. Musa paradisiaca L.
BAL6NG-CADTOS, V. Alleanthus luzonicus Benth and Hook.
BALONGCAUIT, B. Cedrela taratara Blanco.
BALotfc'rfTA. Diospyros pilosanthera Blanco.
BALONG-Lt5YON, Pamp. Corypha umbraculifera L.
BAL6NOS, V. Entada scandens Benth.
BAL6TANG-ASO, T. Cassia occidentalis L.
BAL6T-BAL6T (Tayabas). Pongamia glabra Vent.
BA'LOY, T. Musa paradisiaca L.
BAL6YONG, V. Cassia fistula L.
BALTIC (Paragua). Agathis loranthi folia Salisb.
BALKAN. Macaranga ?.
BALCBAD, T. Anacardium occidentale L.
BALCBAT, Pang. Eugenia.
BALtJBO, T. Diplodiscus paniculatus Turcz.
BALUCANAD, T. Dysoxylum.
BALUCANAD, T. Aleurites moluccana Blume.
BALUCANAG, II. Aleurites moluccana Blume.
BALUCBCC, T. Clausena?.
BALtJCAO, T. Chisocheton.
BALUCLITU (Morong). Uncaria hookeri Vid.
BALIJCOT. Garcinia.
BALUDGANGAN, T. Digitaria.
BALtiGAi. Derris,
BALUN'&CANAYAN, V. Pittosporum floribundum W. and A.
BALtfNtcGAY, V. Moringa oleifera Lam.
BALUNSAYING, V. Canna indica L.
BALtJNUT, B. Mangifera caesia Jack.
BAMBAG. Plumbago viscosa L.
BAMBAN, T. Maranta dichotoma Lour.
BAMBAN. Amaranthus spinosus L.
BAMB^NG, T. Bauhinia.
BAMTOLICO, Z. Diospyros.
BANAASI, II. Murraya exotica L.
BANABA, T., V.. Mang. Lagerstroemia speciosa Pers.
BANABANALO, T. Myristica.
BANAG, II. Allium sativum Linn.
BANAG, V., T. Smilax china L. and other species.
BANAGAN, V. Smilax indi«a Vitm. and other species.
BANAGA-PULA, T. Thespesia macrophylla Blume.
BANNAGO, T., V. Thespesia macrophylla Blume.
BANAGO, T. Garcinia.
BANAGO, T.? Diplodiscus?.
BANAI, V. Hedychium.
BANAI-BANAI, T. Sterospermum quadripinnatum F. Vill.
BANAI-BANAI, T. Sterospermum pinnatum Rolfe and other species
BANAI-BANAI, IL, T. Naravalia laurifolia Wall.
BANAI-BANAYAN, V. Sterospermum quadripinnatum F. Vill.

BANALO, T. Tliespesia populnea Corr.
BANAIX>, T. Cordia subcordata Lam.
BANAOAG, V. Hedychium hasseltii Blunie.
BANAOT, Z. Murray a exotica L.
BANÁRO, T. Guoltardii speciosa L.
BANÁRO, Pang. Tliespesia iriacrophylla Blume.
BANASI, Pang. Murray a exotica L.
BANATI, V., Pamp. Murraya exotica L.
BANATO, T. Mallotus philippinensis Muell. Arg.
BANAUAC, T., V. Uvaria purpurea Blunie.
BANAY, V. Hedychium coronarium Koenig.
BÁNAY, Pamp. Alpinia brevilabris Presl.
BANAY. Sterospermum quadripinatum P. Vill.
BANAYAX, V. Dioscorea cburnea Lour.
BANAY-KÁNAY. Evodia.
BANAYAX. Sterosperniuni quadripinnatuni F. Vill.
BANBAN, T. Maranta dichotoma Wall.
BAXBANG (Morong). Clinogyne grandis B. and H.
BANBAYAN, II. Shorea.
BANB6M, T. Maranta dichotoma Lour.
BANCÁL, T. Sarcocephalus cordatiis Miq.
BANCAL, T. Nauclea.
BANCALAQUAN. Terminalia calamansanay Rolfe.
BANCALAN, T. Calophyllum inophyllum L.
BANCALANAN (Zamboanga). Nauclea.
BANCALAUAG, V. Terminalia calamansanay Rolfe.
BANCALAUAN, T. Buchanania florida Schauer.
BANCALAUAN, T. Terminalia calamansanay Rolfe.
BANCÁL-CABOG. Sarcocephalus cordatus Miq.
BANC6AN. Cyperus difformis L.
BANCOILAN, T. Bridelia stipularis Blumc.
BANC6RO, T. Morinda bracteata Roxb.
BANCTCDO, T., V. Morinda citrifolia L.
BANGA, V. Calyptrocalyx spicatus Blume.
BAN&A (Camarines). Areca catechu L.
BAN5A. Coi-ypha umbra cul if era L.
BANGAL, T. Gnetum gnemon L.
BAN^AL, T. Nauclea.
BANGAÏ^AD, V. Grewia paniculata Roxb
BANGÁR, II. Sterculia foetida L.
BANGATI, T., V. Abrus preeatorius L.
BANGBANG, II. Plumbago zeylanica L.
BAXGCAL. Nauclea glaberrima Blanco.
BANGCAI., T. Sarcocephalus cordatus Miq.
BANCSC6ANO-BOND6C, T. Pandanus dubias Spreng.
BANGC6IX)N, T. Cardiospermum halicacabum L.
BANGCÚDO, V. Morinda citrifolia L.
BANGCÚDO, V. Morinda bracteata Roxb.

BANG-HÁY, V. Hydnophytum.
BANG̃C6BO, T., V. Morinda bracteata Roxb.
BANG̃IL, T., V. Sophora tomentosa L.
BAN̄5BAY, V., T. Zingiber.
BANG̃LES, II. Hopea.
BANQ̃6N, B. Caesalpinia.
BANG6T, T. Pterocymbium javanicum R. Br.
BAN̄&QUILING, V., T. Phyllanthus distichus Muell. Arg.
BANG̃RÁY, V. Zingiber.
BANIG (Morong). Xanthophyllum.
BANfiiAC, V. Terminalia catappa L.
BANILAD, V., T. Sterculia urens Roxb.
BANiNtJ́YO, T. Antidesnia ghaesembilla Gaertn.
BANfTAN, Pamp. Cryptocarya sp.
BANITAN. Xylopia dehiscens Merrill.
BANfTi, T. Garcinia.
BANITI, B. Illipe betis Merrill.
BANITLON. Melochia arborea Blanco.
BANITLONG (Zamboanga). Pierardia?.
BANLATINAO, Pang. Diospyros.
BAN-NAASI (11.). Murray a exotica L.
BAN6T, T. Bauhinia cumingiana Benth.
BANQUILIN, T. Phyllanthus distichus Muell. Arg.
BANSALAGIN, T. Mimusops elengi L.
BANSALAGON, T., V. Mimusops elengi L.
BANSALAGUE, T., V. Mimusops elengi L.
BANSALAGUIN, T. Eugenia.
BANSILAI, T. Gomphia.
BANSILAY, V. Ochna squarrosa Linn.
B ANTAN A . Ixor a.
BANTÁNA, V. Clerodendron intermedium Cham.
BANTIGUI, V. Pemphis acidula Foirst.
BANTOLINAO, V., T. Diosjiyros pilosaiithera Blanco.
BANTOLINON, T. Diospyros.
BANUANG, T. Octomelis sumatrana Miq.
BANUAY, Ig. Vaccinium indutum Vidal.
BAN^TAN (Nueva Viscaya). Hopea palagata Vid.
BANtfYO, T. Dipterocarpus.
BANt5YO, T. Albizzia.
BAOAI%G, V. Allium sativum Linn.
BA6ANG-BAOANG, V. Pancratium zeylanicum Linn.
BAONG, V.]>ioscorea sativa L.
BAQUI-BAQUI, V. Cyperus difformis Linn.
BAQUI-BAQUI, V. Spinifex squarrosus L.
BÁQUIN-BAQUIT, 11. Helicteres spicata Colinb.
BAQUISQUISAX. Eleusine indica Gaertn.
BARABAG. Eugenia jambos L.
BARÁC. T. Curcurma zerumbet Roxb. and other species.

BARACBAC, 11. Eugenia jam bos L.
BARAG, Pamp. Smilax china L.
BARANGOI (Bulacan). Orania regal is Zipp.
BARANHANYO, V. Eugenia.
BARANSIAGO, T. Aporosa.
BABAUMARAN, T., V. Sophora tomentosa L.
BABAYBÁY, T. Cerbera odollam Gaertn.
BARAYON, V. Afzelia rhomboidea Vidnl.
BARBO, B. Celtis?.
BARB6N. Andropogon.
BARC6LON. Cardiospermum halicacabum L.
BAREN, V. Pandanus dubius Spreng.
BARIAT. Pinus insularis Endl.
BARINCUCCRONG, II. Hopea.
BARI6-AN, Pang. Columbia.
BARIT, V. Mctrosideros vera Rumph.
BARIT, II. Calamus haenkaemus Mart.
BARIT, T. Homalocenchus hexandrus O. Ktze.
BARII^AN, II. Pterospermum.
BAKLIS. Diospyros pilosanthera Blanco.
BAR6BO, V. Diplodiscus paniculatus Turez.
BARONG? (Cagayan). Eugenia operculata Roxb.
BAROQUÉBOC, T. Scleria.
BAROY. Pterospermum diversifolium Blume.
BARSIC, T. Mimusops clengi L.
BÁKU. Arenga saccharifera Labi 11.
BARUBAT6NES, V. Kyllinga monocephala Rottb.
BASAR-BASAR, II. Loranthus.
BASENG-BASENG, V. Sida rhombifolia Ijinn.
BASENG, II. Zingiber officinale Linn.
BASIAC, T. Canarium.
BASI AD (Tayabas). Ganarium.
BASILAY. Ochna squarrosa Linn.
BASILOAG, II.])ysoxylum blancoi Vidal.
BATA. Pinus insularis Endl.
BATABIA NGA POTI, V. Musa.
BATAD, V. Sorghum vulgare.
BATANG (Bontoc). Pinus insularis Endl.
BATANG-BATANG (Cebu). Cissampelos pareira L.
BATAO, T., V. Dolochos lablab L.
BATAVIA. Musa sapientum L.
BATBATID6R, Ig. Nepenthes alata Blanco.
BAT£TE. Wrightia?.
BATICAN, Dracontomelon cumingianum Bail!.
BATicuLfNV T. Litsoa perrottetii F. ViU.
BATicui-fNG, T. Litsea perrottetii F. Vill.
BATICULIN, T. Sterospermum quadripinnatum F. Vill,
BATID6R, II. Nepènthes alata Blanco.

BATINAN-AMO, T. Calopbyllum wallichianum Planch and Triana.
BATINO, T. Litsea.
BATINO, T. Alstonia macropbylla Wall.
BATITI, V. Cynometra inaequalifolia A. Gray.
BATITINAN, T. Lagerstroemia batitinan Vidal.
BATITINAN, T. Shorea.
BA'TLAN. Sterospermum quadripinnatum F. Vill.
BATO (Balabac). Justicia.
BAT6AN, V. Dracontomelum mangifcrum Bhime.
BATOBAT6, T v V. Litsea.
BATOBAT6, T. Lepistemon reniformis Hassk.
BATOBAT6NIS, T. Euphorbia pilulifera L.
BATOLINAO (Cagayan). Diospyros pilosanthera Blanco.
BATMAN, V. Garcinia.
BATUL, T. Strychnos multiflora Benth.
BAUANG, V. Allium sativum Linn.
BAUANG POTf (Jolo). Allium sativum Linn.
BAui, T. Pongamia glabra Vent.
BAtfso (central Luzon). Olea.
BAWANG, T. Allium sativum L.
BAYABAR-ASO, Paxnp. Randia.
BAYABAS, T. Psidium guayava L.
BAYA-BAYABASAN, T. Gardenia obscura Vidal.
BAYACTO, B. Trachelospermum.
BAYAG-CABAYO, T. Barringtonia.
BAYAG-CAMBING, T. Orchipeda foetida Blume.
BAYAG CAMBING, T. Caesalpena bonducella Fleming.
BAYAG USA. Mussaenda.
BAYAG USA, T. Orchipeda foetida Blume.
BAYAG USA, T. Tabernaemontana globosa Blanco.
BAYAMBAN. Maranta dichtoma Wall.
BAYANGBAYANG, V. "Amaranthus spinosus L.
BAYANTI, T. Aglaia.
BAYAQUIBOC, T. Vernonia chinensis Less.
BAYASBAS, V. Gynotroches axillaris Blume.
BAYATI, T., V., Pamp. Anamirta cocculus W. and A.
BAYMAN, T. Quercus.
BAYN6, T. Nelumbium speciosum Willd.
BAYN<JD. Columbia serratifolia A. DC.
BAY6C, T. Pterospermum blumeanum Kth.
BAY6C, T. Pterospermum acerifolium Willd.
BAY6C, T. Pterospermum diversifolium Blume.
BAY6C-BAY6C, T. Pongamia glabra Vent.
BAY6G, T. Pterospermum blumeanum Kth.
BAY6G. Callicarpa bicolor Juss.
BAY6G BAY6G, Pamp. Pterospermum.
BAY6GO, V. Chionanthes ramiflora F. Muell.
BAY6GO, T., V., Pamp. Entada scandens Benth.

BAYtJCAN, T. Quercus.
BAY^CAN, T. Sesuvium indicum L.
BAYIJCAN, T. Dipterocarpus.
BAYt5co, V. Artoearpus nitida Trecul.
BAYt5co, V. Dittelasma rarak Benth.
BAYtJCO ifi&A BiBfON, V. Artoearpus nitida Tree.
BAYtjeo N5A CACAUON, V. Artocarpus cumingiana Trecul.
BAYtjeo N&A LANGCAON, V. Artocarpus cumingiana Trecul.
BAYDCO N5A LANHAN, V. Artocarpus lanceolata Trecul.
BAYCG, V. Pterospermum.
BAYUGTIN, T. Pterospermum bluiiieaiiiim Korth.
BAYtJNO, V. Mangifera caesia Jack.
BÉBE. Pinus insularis Endl.
BÉBENG. Pinus insularis Endl*
BÉIIEN. Moringa oleifera Lam.
BEJtJCO-sfPAY, T. Calamus.
BÉLIS, T. Canarium luzonieum Miq.
BELtJNGA, T. Macaranga.
BENOÁNG, T. Commersonia platyphylla Andr.*
BENTICOH6L, T. Musa sapientum L.
BEOBAYANO, V. Buchanania florida Schauer.
BESSIN, T. Bruguiera gymnorrhiza Lam.
BÉTIS, T., Pamp. Illipe betis Merrill.
BÉTIS LALAQUE, T. Illipe betis Merrill.
BiAs, T. Gnetum scandens L.
BIAS-BIAS, Pamp. Commelin.i benghalensis L.
BIÁS-BIÁS, T., V. Polyscias nodosa Seem.
BIAS-P6GO, T. Ainmania baccifera L.
BIBILI, V. Cordia blancoi Vid.
BiBfT, T. Engelhardtia?.
BIBIT-PABANG. Sterospermum.
BfcA, T., V. Vitis latifolia Roxb.
BICACAO, II. Setaria italica Beauv.
BicAL, 11. Hhamnus.
BfcAL-BAniY, T. Bambusa.
BIDAY, II. Ocimum sanctum L.
BIGA, T. Homalomena.
BIGÁ, V. Colocasia imliVa ^r»liott.
BIGAA, V. Ficus.
BIGÁA, T. Zizyphus tinicj\is Poir.
BIGAS, T. Oryza sativa L.
BIGNAI, T. Antidesma bunius Spreng.
BIGNAI-CALADAO, T. Antidesma.
BIGNAI-MÁYA, T. Antidesma.
BIGNAI-P6GO, T. Antidesma ghaesenibilia Gaertn.
BIGNAY, Pamp. Antidesma bunius Spreng.
BIGXAY-P6GO. Phaenthus cumingii Miq
BIGN6N, II. Kleinhovia hospita L.

BILIMBIN, T. Averrhoa earambola L.
BfLAN, Panip. Macaranga tanarius Muell. Arg.
BfLANG-BfLANG ?, V. Cyanotis axillaris Roein. and Schult.
BfLAKG-BfLANG, V. Sesuvium portulacastrum L.
BILANGT6X, B. Calophyllum.
BILÁUN. Macaranga mappa Muell. Arg?.
BfLID-BfLID (Zamboanga). Claoxylori.
BIUMBIN, T. Averrhoa earambola L.
BILIMBINES. Averrhoa earambola L.
BfLis (Zamboanga). Trewia.
BIL6GO, T. Celastrus paniculata Willd.
BIL6IX>, T. Eugenia sp.
BILUÁ, Pamp. Macaranga.
BILUA, T. Octomeles sumatrana Miq.
BiLtJAN, T. Octomeles sumatrana Miq.
BILX'JAN-LALAQUE, T. Macaranga.
BILUCÁO, T. Garcinia cambogia Desrouss.
BfLUNG, T. Macaranga.
BiLtJN^A, T. Macaranga tanarius Muell. Arg.
BiLtJNG-DALAGA, T?. Terminalia.
BINAG^AN, V. Dipterocarpus affinis Brandis.
BINAHIAN, T. Sauropus androgynus Merrill.
BINALATON, V. Musa paradisiaca L.
BiNALfUAN, T. Shorea.
BINAMBANG, T. Oryza sativa L.
BINATO, V. Musa sapientum L.
BINAY6CO, T. Antidesma ghaesembilla Gaertn.
BINBIN'TJUAY, 11. Loranthus pauciflorus Blanco.
BIN~GABING. Macaranga moluccana DC.
BI^G'ABING, T. Macaranga mappa Muell. Arg.
BIN~GLIN, T., V. Polyscias nodosa Seem.
BIN~GLIU, V. Dysoxylum blancoi Viilal.
BINIGUASAN, T. Heterostemma cuspidatum Decne.
BIN~GTICOH6L, T. Musa paradisiaca L.
BIN6LO, T. Terminalia.
BIN6LO, B. Eugenia.
BIN6NANG, T. Octomeles sumatrana Miq.
BIN6N~&A, T., V., Pamp. Macaranga tanarius Muell. Arg.
BINOY6C-BOY6C, T. Modecca palmata L.
BINTIN~G-DALAGA, T. Pithecolobium lobatum Benth.
BINTIN~G-DALAGA (Tayabas). Micromelum tephrocarpum Turcz.
BINT6CO. Casearia moluccana Blume.
BINT6CO, B. Evodia latifolia DC.
BINUAN, T. Macaranga tanarius Muell. Arg.
BINCANG. Octomeles sumatrana Miq.
BINUANG, T. Macaranga mappa Muell. Arg.
BINTJCAO, T. Garcinia cambogia Desrouss.

BiNtJix>, T. Terminalia.
BiNtJNGA, T. Glerodendron macrostigium Schauer.
BIN^NGA, V. Macaranga tanarius Muell. Arg.
BiNtJ1VQA, II. Melochia arborea Blanco.
BiNUSfsi, T. Tristellateia australaisica Rich.
Bfo, II. G-aruga floribunda Decne.
BfRi. Ficus hirta Vahl.
Bfui, T. Carthamus tinctorius L.
BiRfNGi, T. Phaseolus vulgaris L.
BIRLAG, T. Elaeocarpus.
Biaoo. Calophyllum inophyllum L.
BISACLAT, T. Panicum.
BisAco, V. Epipremnum medium Engl.
Bisco, T. Musa paradisiaca L. var.
Bi8T,f s (Tayabas). Ixora.
BISL6T, T. Eugenia.
BITA, V. Alstonia scholaris R. Br.
BITAI-IIAIJANG, Pang. Parinarium.
BITANG. Kleinhovia hospita Linn.
BITANII6I., T. Calophyllum inophyllum L.
BITANII6L, T. Seolopia crcnata Clos.
BITANH6L, T. Flacourtia cataphracia Roxb.
BITANII6L-NA-BABAK, B. Myristica.
BITAOG, V., II., Pamp. Calophyllum inophyllum L.
BITAOI, Z. Calophyllum inophyllum Tv.
BITBID, B. Eugenia.
BITCAC, T. Ternstroemia.
BiTfc, T. Shorea.
BfTis, T. Illipe betis Merrill.
BITLAG, T. Chailletia gelonioides H. f.
BITN6G, II. Kleinhovia hospita L.
BIT?J6N. Kleinhovia hospita L.
BITN6NG, II. Kleinhovia hospita L.
BIT6C. Calophyllum inophyllum L#.
BirocoLfNGj T. Palaquium luzonienso Vidal.
BITOCOLIXG, T. Litsea.
BITO6, 11, Calophyllum inophyllum L».
BIT6GO, T. Cycas circinalis L.
BIT6^?GOL, T. Flacourtia sepiaria Roxb.
BIT6ON, V. Bxrringtonia speciosa Forst.
BfTUG. Barringtonia speciosa Forst.
BfTi'NG, V. Barringtonia speciosa Forst.
BrTtTNGOL, T. Seolopia crenata Clos.
BIUAS, T. Bruguiera caryopliylloides Bliune.
BfuAS, T. Ceriops.
BfuAS, T. RhizopHora.
BL^DO. Amarahthus spinosus IJ.
Bo A, Tl. Areca^ catechu Linn.

BoAc, Ig. Albizzia procera Benth.
BOADA, Ig. Mela s torn a obvolutum Jack.
B6BOA, V. Nephelium glabrum Noronh.
B6BOA, V. Lansium domesticum Rumph.
B6BOG, V. Sterculia foętida L.
BÓBOI, B., T. Ceiba pentandra Gaertn.
B6BOi-GtfBAT, T. Thespesia populnea Corr.
BOBON6YANG, V. Anaxagorea luzonensis A. Gray.
B6BOY, T. Ceiba pentandra Gaertn.
B6BUY-GUBAT, T. Bombax malabaricum DC.
BOCABOC, T., V. Scaevola koenigii Vahl.
BOCAUAY, T. Schizostachyum acutiflorum Munro.
BogAUf, T. Bambusa diffusa Blanco.
BOCAUI, T. Beesha rheedii Kunth.
BocAUf, T. Bumbusa.
B6CBOC, T. Streblus asper Lour.
1?ODB6D, T. Bauhinia.
BÓDOT, V. Dioscorea.
BOGAUAC, T. Clerodendron.
B6GNA, V. Eurya japonica Thunb.
B6GO. Garuga.
B6GO-B6GO. Brucea sumatrana Roxb.
BOGOL6YAC, B. Chisochaeton tetrapetalus Turcz.
B6GOS, V. Acalypha stipulacea Klotzsch.
B6GTO-TAE, V. Streblus asper Lour.
BOHAVE, V. Dysoxylum blancoi Vidal.
BOIIAYAN, V. Dioscorea.
B6HO, T. Bambusa.
B6HO, T. Dendrocalanus flagellifer Munro.
B6HO-B6HO, V. Lantana camara L.
BOH6L. Gmelina villosa Roxb.
BOLAGTAB, V. Solanum nigrum L.
BOLAHAN. Oryza sativa L.
BOI-AXA, B. Aglaia?.
B6LAO, Pamp. Santiria.
BOI-ATONG. Phaseolus mungo L.
13OL-L6, Ig. Acalypha grandis Benth.
BOXL6GO, II. Anacardium occidentale L.
BOLOBOT6NES, Pamp. Euphorbia pilulifera L.
BOLOBOT6NES, V. Kyllinga monocephala Rottb.
BOLOHAN, T. Oryza sativa L. var.
BOL6N, T. Curcurma xanthorrhiza Roxb.
BOLONGAĒTA, T. Diospyros pilosanthera Blanco.
BOL6NG-CAUIT. Jatropha curcas L.
BOLONGUITA, T. Diospyros pilosanthera Blanco.
BOL6NG LtJYONG, Pamp. Livistonia papuana Bece.
BOL6NG TAMBAL, V. Dysoxylum blancoi Vidal.
BOL6NG-TAMBAI,. Clerodendron intermedium Cham.

BOLONGUITA. Diospyros pilosaiithera Blanco.
BOLOT, V. Dioscorea fasciculata Roxb.
BONAC, V. Ocimum basilicum L.
BANATO, T. Mallotus philippinensis Muell. Arg.
BONÆTES. Barringtonia speciosa Pers.
B6jv̄tiA, T., V. Areca catechu L.
B6NGA (Batangas). Bauhinia variegata L.
BONGABONG, V. Macaranga miippa Muell. Arg.
BONGAB6NGA, T. Alternanthera denticulata R. Br.
BONGALON. Bauhinia grandiflora Blanco.
BONGANG-MATYJLIS, T. Areca catechu Linn.
BONGANG-PATO, T. Areca.
B6NGA-PAI-O. Areca catechu L.
B6NGA-SANTOL. Areca catechu L.
BONGAN LABNf, Pamp. Calamus albus Pers.
BONGLAS, V. Zizyphus.
BoNGLfu, V., T. Polyscias nodosa Seem.
BONG6T-BONG6T, V. Cyperus.
BONLAI, B. Lunasia amara Blanco.
BQ^LIN, T. Polyscias nodosus Seem.
BONOG (Paragua). Garcinia.
BONOTAN, V. Cocos nucifera Linn.
B6NTOT-USA, V., T. Helicteres spicata Colinb.
B06-B06, Ig. Pinus insularis Endl.
BOOCAN, V. Lansium domesticum Rumph.
BORN AY GIJBAT, V. Antidesma.
BOBOBOT6NES, V. Kyllinga monocephala Rottb.
BOR6NA, Pamp. Setaria italica Beauv.
BOB6NA. Zea mays L.
BOB6T, V. Dioscorea fasciculata Roxb.
BOSB6RON, T., V. Scaevola koenigii Vahl.
BosfcAD, V. Kyllinga monocephala Rottb.
BOSL6G-AMO, T. Melastoma.
B6TA, Ig. Mussaenda.
B6TA-B6TA, T. Excocaria agallocha L.
B6TA-B6TA, II. Melastoma obvolutum Jack.
B6TANG-GtJBAT, T. Homalanthus fastuosus F. Vill.
BOTAT. Barringtonia racemosa DC.
B6TO, T., V. Scaevola koenigii Vahl,
BOT6AN, T. Musa sapientum L.
BOTOBOT6NES, B. Cyperus rotundus L.
BOTOBOT6NES. Euphorbia pilulifera L. .
BOTOHAN, T. Musa paradisiaca L.
BOT6LAN, T. Fluggea obovata Wall.
B6TON-<:fLO, V. Kyllinga monocephala RottJ?..
BOTONCILLO, T. Gomphrena globosa L.
B6TONG, T., V. Barringtonia specioea Forst.
B6TOXG, V. Co^os niicifri-a Linn/

B6TOS<S, V. Milletia aerioea \\. and A.
B6TONG-H6TONG. T. K.u ringtonia speciosa Forst.
BOT6N(;M\N..« . T. Ntorospenmim quadripinnatum F. Vill.
B6vi, V. Euphorbia pilulifera L.
l;,IVut *v*6a, T. Moniordica eochincbineneis fcpreng.
KiA, Cag. Areca catechu Linn.
Bi'AS, II. Malotua philippinensis Muell. Arg.
BDB-BIJGNAT. Antidesma bwrius Spreng.
Bi i;uv CORAT, T. Bombftx malabaricum DC.
BtfBTJG. Erytlirina indica Lam.
BtJfiCB?. Draeontonielum mangifuni Blume.
Bt!Buv, T. Ceiba pentandta Gaertn.
BUBUT-GU BAT, T. Thespasia populnen Corr,
BUCÁCAO, II. Setaria italica Beanv.
BX5C-B6C, Pamp. Strebhis.
HfTCTON (Masbate). Calamus.
l:i i \.\ vfsTA, Sp.-Fil. Codiaeum variegatum Mitel 1. Arg.
Brf:NO, Pamp. Acorus calamiis Linn.
BU KIJIN, V. Strychnoa eelebica Koordera.
Hi•CJAT6N, II. Abms precatoriiu L.
Bt'ONA, V. Olochidion.
l.i <;N \i. \ Antidesma bunius Spreng., and other species.
B6ONAO. Semecarpus pcrmttetii March.
Bt;ao, V., T. ftaruga floribunda Decne.
BOoos, T., V. Acalyplia grandis Benth., and other species.
BtSoTONOj *V.* Caesalpinia bondtte Bxixb.
BUOUAHON. Lagerstroemia batitinan Vid.
BU <;t:tRUC, T. EragrosU> tenella R. and S.
Bi LEO, V. Dendrocalamus fl&gellifex Munro.
BDICAN, T. Shorea,
BU fQtJfQDiT, T. Mucasa monoeperma DC.
BUJtJCAN (Albay). Fngraea.
BtJtAO, T. Gossypiuin herbaeeum L.
Hi'IAC, T. Ceiba pentandra Gaertn.
BULACÁN, V. Thespesia populnea Corr.
BULACÁN, V. Thespeaia macrophylla Bluuie.
Q\ r.AcAN, T. Ipomoea peltatn Ohoisy, and other species.
ButlGAO (lloilo). Argyreia.
BtJ AC-BULÁCA v. tpomoea prttata Choisy.
BULAC-BUL ><-AN, T, Asdepifta Mirassavica L.
BULAC-C A HOY, T. Grossypium perenne L.
BUL *it* • vsiii v, i'.unil. CeJbg pentandra Gaertn.
BU. M CASTJLA, Pump. Gossypium herba<jeun] L.
BtJLAC-CASTfLA, T. Aselepias curassaviea Linn.
HrLAt! HAM6, T. Aselepias curassavica L.
B(5TJVC-DOND0L (Ccbu). Ceiba pentandra Gnertn.
BUL ^C-MANCC, T.. Pamp. Adenostemma viscosum Forat.
BtJ] AC-NA-M I'JXTf, T. Gossypi llllll perennc L.

BULAC-NA-BUNDOC, T. Gossypiura arboreuin L.
BULAC-\ATOT6O, T. Gossypium peremie L.
BULAC-NA-TOT6O, T. Gossypium urborimni L.
BULAC-MiA-BiSAYA, V. (Jossypium arboreum L.
BLLACLAC-NANCI-DALAUA. Mussaenda frondosa L.
Hi i Ai si so, T. Oiba penUmdia **Gaerta.**
Btn \»;. T. (jorisypium **herbaceum** L.
BULAOAC, B. **Uvaria crralifolia** Dlume,
BuLAnAN, v. ***Laamam*** doiuesticum **Rumph.**
BILAI (Batangas). Doliclios lablab L.
BULAI-I..U \, *T.* Crotalaria vcrrueoaa L.
BL'LALA, I!, Sareoeeplialus cordatus JVliq.
It* i Ai ACAO, V. Argyreia nitida Choisy.
BLLALAXC, B. Pittosporuin.
Hi IAMIII.W, V. **Laportea gaudiehaudiona Wedd.**
liui.Au, T. **C&narium.**
Hi LA6, T. Siiititia.
BULAO-UCLAO, V. **Parameria philippinfflisia Badlk.**
Bi LAO.N, T.. Piimp. Viteac **littoralia** Deone.
Bi I.A.NAN, V. Goniphin.
IJ^usAN, II. Vitex.
BUTJAY (Batangiis). **Dipteroc&rpua** vernicifluus Blanco.
Btii, T. Corypha umbraeulifera L.
iiuii-Bi'iiI. **Corypha ombraculiiera L.**
BUIJ.-CAS.6Y. Vit^.x **philippinensia Merrill.**
Btrto. *V.* Hambusa **tonginodia Mlq.**
OCXKAH, \. Gomphia anguBtifolIa Valil.
Bl i.nMii fTAN, T. Diospyros.
BUNÁYON. Soniu-ratiii jiagatpat Blanco.
BÚNGA (Cagayan). Diptoro(-ai|M.
Bt)Nt>A, *Cag.* **Pteroapermuin divcrBifolrani** Illume.
HI'V&A, T. **Areea catechu L.**
lit NUALON. V. **Homalocenchofi hexandrus** <). Ktze.
Hi M,.\I.U.\. T., V. Avicennia **officinalia** L.
I5i NOALU, T. **Avioennia officinalis** L.
BL NUAH N, V. **SoBDeratia** pagittpat Blanco.
]iu.\T;Axox **(Tinago). Rjparosa.**
BUN&LAS. Zizyjjhus ?.
BUNSIIN, T. Polyacias nodosa Seem.
BUNGALO, V. Amoora.
Bi vi-L6y, V. Polyscias nodosa Seem.
BUNGON, 11. **Allaeakthus** luzonicus n<'iit]). ahd Hook.
BuNGtJLAN, T. Musa jiaradisiaea L. var.
Bi NLAO, V. Justicia ynnl:u ussa, L.
Bl NMV. II. MUSM sapientt mi TJ. var.
BUQUINGAN. Gnaphalium.
BUQUITQUfT. Asclepias curassavica L.
BUNTOT-PUSA, T* Mallotus ricinoidies Muelt. Arg.

BtJNTOT-PtS'SA, T. Setaiia glauca Beauv.
Bt}NTLT-f;sA, T. Helicteris spicata Colinb.
BUNUAT (Bontoc). Vaccinium indutum Vidal.
BUNtJQAN?, Cag. Calamus rhomboideus Blume.
BUQUIÑSAN, T. Gomphrena globosa L.
BuRf, T, Corypha umbraculifera L.
BUSAIN, T. Bruguiera caryoj>hylloides Blume.
BUSÁIN (Leyte). Pterocymbhun javniiicuin R. Br.
BUSAIN, V. Sterculia.
Bust?, Cag. Calamus rhomboideus Blume.
BusfLAC, T. Amoora.
BusfLAC, T. Alchornea felumeana Muell. Arg.
BusfLAO, T. Aglaia minutiflora Bedd.
feisiLi, Fang. Diospyros.
BusiM. Bruguiera.
BusLfo, II. Eleocharis.
BUTA, T. Excoecaria agallocha L.
BUTABUTA, T., Pamp. Excoecaria agallocha L.
BtfTANG-GtJBAT, -T. Homalanthus.
BtJTAO, B. Ardisia humilis Va'hl.
BATING. Phaseolus vulgaris L».
BUTIÑGA, T. Phaseolus vulgaris L.
BUTIÑSUI. Vigna.
BUTN£G, II. Musa sapientum L. var.
BUTN^NG, II. Musa sapientum L. var.
BtfTO-BtfTO, V. Cerbera odo] lam Gaertn.
BtJTO-BUT6Nis, V. Phyllanthus.'
BlJTO-BiTONisAX, T. Euphorbia atoto Forst.
BtJTONG, V. Dendrocalamus.
BtJTOXG, V. Pongamia glabra Vent.
BILTONG, V. Derris sinuata Benth.
BCTONG, V. Milletia pulchra Benth.
BCTONG-MANOC, V. Cyclostemon.
B.UTtJAN, T. Musa sapientum L.
BuTt^LAN (Tayabas). Fluggea obovata Wall.
BUT^NG-MAN6C, B. Hydnocarpus heterophylla Blume.
BtJY, II. Musa.
BtJYAG, T. Citrus medica L.
BUYAYAVA, V. Euphorbia pilulifera Lr.
BUY£N (Balabac). Mussaenda grandiflora Rolfe.
BtJYO, V., T. Piper betle L.
Bt^YO-BtJYO, B. Astronia macrophylla Blume.
BtfYO-BtfYO (Albay). Piper caninum A. Dietr.
Bt^YO-BtJYO. Trichosanthes aniara L.
BUY6C-BUY6C, 11. Ehretia buxifolia Roxb.
BUY6C-BUY6C, T. Momordica cochinchinensis Spreng.
BtJTYO IT AMO, V. Piper caninum A. Deitr.
BtJYO IT AYAM, V. Piper caninum A. Dietr.

Btrro IT IL\TI, V. Piper **eaaintun** A. Dietr.
Hi vox, V. Mussaenda **aiiisophylla** VidaJ.
BCYON«, V. Melastoma.
BOYOR, V. Mussnendn.
I '• *6* v u N (Ziiinboanga). **Lophopetalnm.**

G.

CAISAO. Narcocephalus cordatus Miq.
CÁB.VG-IIAMBABALOS, V. Sarcoct*phnlu.s cordatus Mi<j.
OAJJAIIOV. Eugenia.
CABAICAHAI, T., V: **Sophora tomoitoea** K.
CABAJ UY. Eugenia.
OABAL, T. Fagraea **morindaefolia Blume.**
CABALL^KO, Sp, Fil. Caesalpinia pulcherrima **Swartx.**
CABAL6NOAN, T.J Pump. Strychnos **ignatii Berg.**
CAHALTB, V. **Ethteoearptu oblongua G&erta,**
CABA6-Y. \ Eugenia..
CABALITI. T. V, Colubrina asiatica **Brongn.**
CABATITI, T. Rhanmus wiglitii W. and A.
OABGAB, V. Polypodium quercifolium L,
CAU^BAN, V. IVilyiKidiiim querciiolimn L.
I *WJ* \I:DX, II, Eicphaiitopus Bpicatus .hi.--
CAHflLAO, V. Commclina benglialensis],,
[1] \I;I'ITK, V. Elacoearpus oblongus Gaertn.
CABtQUI, T., V. Mimusops elengi Linn.
OAEIIT-CABAQ, T, Mezoneunnn glabruin Dcsf.
CAEiT-cABAQ, T. Caesalpina Jtuga Ait.
CABITONQ, T., Pang. Eugenia.
CABUN, T., Pamp. 1'ogostemon heyneanus |{tntlt., and other species.
CABOO, T. Unona.
CABOG. Citrus bystrix DC.
CAB6GBOO, T. Antidesma ghaeaembilla Gaertn.
CAso-NtoBO. Caryota urens L.
CABOY. Unonu.
CACRAB, **B.,** T., \'. **Eiythrina indica** *h.*
OABBA-CABRA, V. **Heiiotropmm indicum,** Linn.
CABUCABULAUAN, B. Strychnos.
CABTJOAO, V. Citrus decuman a Linn.
CABUL. Cucumis sativus Linn.
CAB^LAO (Tiaguni. Citrus nunuitiuni L.
CABCTI, T. Boletus?.
CABT3TI, T. Polyporus.
CABCYAO, Pamp. Citrus lj\-tri.\ IX:.
CACA, T. Nepentlies.
CACADI-E, T. Streblus asper Lour.
CACAIM ÁTK, Pamp. (Jlirifiilia **maculata** *U.* B, K.
CACAITU^TE. Arachis hypogaea L.
CAOANA, T. Qii **olerianji** YM;i1. **and otiier** species.

CACAO, Sp. Tlieobroma cacao L.
CACAO-CACAO (Ticao). Agrostistachys maesoana Vidal.
CACAO-CACAOAN. Talauma ?.
OACAO-CACAUAN, T. Lunasia.
CACAO-CACAUAN (Tayabas). Aglaia.
CACAO-ITA (Balabac). Fagraea crassipes Benth.
CAC^UATE. Gliricidia maculata H. K. B.
CACAUATE, TV Arachis hypogaea L.
CACHA. Memecylon edule Roxb.
CACHtJMBA, 11. Argemone mexicana L.
CACHtJMBA, Pamp. Carthamus tinctorius L.
CACUENTASAN, T. Canna indica Lr.
CAD ABA. Gossypium herbaceum Linn.
GI^DAPDAP, B. Diospyros.
CADAY6HAN, T. Celosia argentea L.
CADCO, Ig. Polypodium dipteris Blume.
CADDIL, B. Duabanga moluccana Blume.
CADD6L.. Pongamia glabra Vent.
CADIB. Duabanga moluccana Blume.
CADLfN, V. Pogostemon cablin Benth.
CADL6M, V. Pogostemon cablin Benth., and other species.
C'ADtfXG, Tg. Nepenthes alata Blanco.
OAD-YOS, V. Oajanus indicus K
CAFÉ, Sp. Coffea arabica L*.
CAGATtJN&AX, T. Pygeum.
CAGAYAN, II. Boehmeria nivea Hook, and Arn.
CAGÉL, Sp.-Fil. Citrus aurantium Linn.
CAGUINDI. Phyllanthus acidus Muell. Arg.
CAGufNDi, V. Vitis carnosa Wall.
CAGN6IS, T. Cajanus indica L.
CAGY6S. Cajanus indica L.
CAIIANA (Jolo). Coffea arabica Linn.
CAIIE'I*, T., V. Citrus aurantium L.
CAHOY-DALAGA, T. Morinda bracteata Roxb.
CAHOY-DALAGA. Micromelum.
CAnoY-DALAGA. Pavetta.
CAIIOY-DALAGA, T. Evodia.
CAHOY-DALAGA, T. Mussaenda grandiflora Rolfe.
CAHOY-I>AI.ÁGA, T. JMollotuB moluccanus Muell. Arg.
CAIIOY-DALAGA. Tristira triptera Radlk.
CAICAI, T. Adiantum lunulatum Burm.
CAIR6CAN, T. Beilsjchmiedia cairocan Vidal.
CAIR6NI, T. Dioscorea.
CAJE'IJ, II. Citrus aurantium L.
CALAAD. Cissampelos pareira L.
CALABANG, V. Dacmonorops draco Mart.
CALABANT6S, V. Mucuna nivea DC.
CAIJIBAO, T. Monochoria vaginalis Presl.

CALÁBAO, T. Ottelia alismoides Pers.
CALABASANG-BIL6G. Cucurbita maxima Duch.
CALABÁZA. Cucurbita pepo Linn., and other species.
CALABAZANG BIL6G, T. Cucurbita maxima Duchesne.
CALABAZANG PULA, T. Cucurbita maxima Duckesne.
CALAB6A, Famp. Blechnum brownei Juss.
CALAB6A. Monochoria vaginalis Presl.
CALÁBOT. Citrus toroso Blanco.
CALABXJYO, T. Saccopetalum.
CALACALAMAYAN (Batangas). Cissampelos pareira L.
CALACAM6TE, V. Ipomoea bona-nox Linn!
CALACAUAYAN, V. Arundinella nervosa Nees.
CALACHUCIII, T. Plumiera acutifolia Poir.
CALAotfNG-tjQ, V. Tournefortia sarmentosa Lam.
CALÁLIOS, V. Caryota rumphiana Mart.
CALÁI, T. Monocarpia blancoi F. Vill.
CALAI, T. Xylopia dehiscens Merrill, and other species.
CALAICAI (Leyte). Desmodium pulchellum Benth.
CALAI-CALAI, T. Various species of Anonaceae.
CALAfTic, Mang. Litsea.
CAI^LAUAN, T. Asclepias curassavica L.
CALAMANSALAN, T. Stephegyne.
CALAMANSALAI, T. Stephegyne.
CALAMANSANAI, T. Terminalia calamansanai Rolfe.
CALAMANSANAI, T. Stephegyne.
CALAMANSANAI, T. Diospyros.
CALAMANSANAI, T. Bursera?.
CALAMANS^, T. Citrus aurantium L.
CALAMANTAO, T. Antidcsma ghaesembilla Gaertn.
CALAMAYO, T. Erioglossum.
CALAMAYON, T. Terminalia.
CALAMBAE, V. Litsea.
CALAMBITI. Caesalpinia bonducella Flem.
('ALAMBIBIT, T. Caesalpina bonducella Flem.
CALAMB6-CALAMB6AN, T. Cyperus.
CALAMIAS, T. Averrhoa bilimbi L.
CALAMISMIS. Psophocarpus tctrogonolobus DC.
CALAMISMIS, T. Psophocarpus tetragonolobus DC.
CALAMONDIN, T. Citrus medica Linn. var.
CALANAG, B. Ailanthus moluccana DC.
(^ALANGCANG, V. Heptapleuium subulatum Seem.
('ALANfoi, V. Gardenia.
(JALAMITTIT. Terminalia.
(JALANTAS, T., Pamp. Cedrela toona Roxb.
CALANTIPAY, T. Scirpus.
CALAN-UM-ot5AC, V. Trichosanthes globosa Blume.
CALAOAG, V. Curcuiiui virfliflorn Roxb.

CALAPI, V., B. Calamus albus Pers.
CALAFIA (Mindanao). Palaquium.
CALAPINAI, T. Dodonaea viscosa L.
CALAPINI, T. Avicennia officinalis L.
CALASCST, T. Plumiera acutifolia Poir.
CALATINGAN, T. Pterospermum.
CALATOND6X, T. Cyathea integra J. Sm.
CALATS(5TSI, T. Plumeria acutifolia Poir.
CALATticiiE, V. Plumeria acutifolia Poir.
CALATUMBAGA. Crudia blancoi Rolfe.
CALAUAG, V. Curcuma longa L.
CAL-AUITIT, 11. Terminalia.
CALAVAGA, V. Curcuma longa L.
OALAVAGA, V. Cucumis sativa L.
CALAYACAY, V. Desmodium pulchellum Benth.
CALAYATE, V. Tectona grandis L.
CALBANG, T. Bambusa.
CALIACAY, V. Desmodium pulchellum Benth.
CALIAN, T. Glochidion.
CALIANTANG, T. Leea rubra Blume.
CALIA>H)TANG. Leea sambucina Willd.
CALIBAYOAN. Bruguiera eriopetala W. and A.
CALAICA. Clerodendron intermedium Cham.
CALICOT (Tayabas). Maesa indica A. DC.
CALIMANTAO (Unisan). Evodia.
CALIMANTAO, T. Diospyros.
CALIMANTA6. Vitex.
CALIMBAHIN, T. Microniehini tephrocarpum Turcz.
CALI^BAGIN, T. Psidium guayava L.
CALIPJCIA, V. Cinnamomum pauciflorum Nees.
CALINGAD, Pump. Cinnamomum pauciflorum Nees.
CALIIVGAD, T., V. Cinnamomum pauciflorum Nees.
CALfNGAG, T., V. Cinnamomum mercadoi Vidal, and other species.
CALftf&AN, V. Melochia corchorifolia L.
CAUN-MAN6G. Canthium mite Bartl.
CALI6S, T. Streblus asper Lour.
CALI6T, Pang., 11. Hopea plagata Vid.
OALIPAYANG, V. Codiaeum variegatum Muell. Arg.
CALIRAOKAO, T. Eragrostis plumosa Link.
CAIJSAI, Pamp. Terminalia catappa L.
CALIT-CALfT, T. Vitis carnosa Wall.
CALITES, V. Amaranth us spinosus L.
CALO. Artocarpus incisa L.
CALOBC6B, T. Eugenia jambos TA
CALOCAGO, B. Eugenia.
CALOCATiNGAN, T. PteroMpeiiiiiuiii obliquum Blanco,
CALOCANTING, T. Clitoria ternatea L.
CALOC-CATMO. Kayea.

CALOHADIA. Diospyroa, pilosanthera Blanco.
CALOIIADIANG, Pamp. Diospyros.
CAI.6IS. Streblus asper Lour.
CALOMALA, T. Elaeocarpus lanceaefolius Roxb.
CALOMANS6LA, T, Symplocos.
CALOMATA, T. Clausena excavata Burin.
CALOMFAN, T. Sterculia foetida L.
CALOMPIT, T. Terminalia edulis Blanco.
CALONDAGNI. Bride]ia stipularis Blume.
CAL6O, V. Abrus precatorius L.
CAL6OY, V. Ocimum basilicum L.
CALOT, Pang. Dioscorea.
CAL6TANG-BIL6G. Trumfetta semitriloba L.
CAJLOYANANG. Diospyros pilosanthera Blanco.
CALtfAG, T. Casearia.
CALf^nAY, V. Lagenaria vulgarib Seringe.
CALUBCÚB, T. Eugenia.
CALÚGAY, T. Moringa oleifera Lam.
CALUGC6G, T. Eugenia.
CALAIS, T. Streblus asper Lour.
CALUMACAN, V. Elaeocarpus.
CALUMANAY, T. Rapanea philippinensis Mcz.
C ALUM A NOG, V. Koordersiodendron pinnatum Merrill.
CALUMANOG, V. Terminalia edulis Blanco.
CALtJMBAN, T. Aleurites moluccana Blume.
CALUMIN~GA, lg. Gaultheria.
CAI/OMPANG, T. Sterculia foetida L.
CAI^MPAG-SA-LATT, T. Xylocarpus granatum Koenig.
CALtJMPAG, T, Sterculia foetida L.
CALUMPAGÍN, T. Marlea begoniaefolia Roxb.
CALÚMPAN, Pamp. Sterculia foetida L.
CALXJMPANG, T. Sterculia foetida L.
CALUMPAN~&IN, T. Guettarda speciosa L.
CALUMPAÑ5A-SA-LATI, T. Xylocarpus obovatum Juss.
CALUMPIT, T. Terminalia edulis Blanco.
CALUNACAN, V. Elaoocarpus obovatus Am.
CAL,^N~GAI, T., V., Pamp. Moringa oleifera Lam.
CALtJNGPANG, T. Sterculia foetida L.
CALUNTIN~GAN, V. Anthocephalus candamba Miq.
CAiuNTfNGAN-N~&A-iTiM, V. Nauclea purpurea Roxb.
(¹ALUNTI~NGAN-KGA-MULATO, V. Nauclea purpurea Roxb,
CJALtJPAD, V. Clematis gouriana Roxb.
CALUPCtJP, T. Eugenia.
CAT.UPINES, Z. Ai^Ficennia officinal is L.
CALUTPAMO. Phyllanthus acidus Muell. Arg.
CALUT, Pamp. Dioscorea hirsuta Blume.
CAMACAMATISAN, T. Solanum nigrum L.
CAMACHÍLIS, T. ' Pithecolobium dulce Benth.

CAMAGAHÁL (Moroiig). Diospyros.
CAMAGÓN, T. Diospyros discolor Willd.
CAMAGSÁ, T. Rourea multiflora Planch.
CAMAGSA, T. Smilax indica Vitm.
(JAMAGSA-TAGUfos, T. Rourea heteropliylla Planch.
CAMAGSA-TAGUILIS, T. Connarus.
CAMAGIJAN. Diospyros discolor Willd.
CAMAISA, T. Croton tiglium L.
CAMAISA, T. Macaranga mappa Muell. Arg.
CAMAISA-SA-G^BAT, T. Cleidion.
CAMAL. Ailaeanthus luzonicus, Benth. and Hook.
CAMALAGUI, V. Tamarindus indica L.
CAMAL6N, T. Evodia.
CAMAL6N£AY, T., V. Moringa oleifera Lam.
CAMALÚÑGUE, Pamp. Moringa oleifera Lam.
CAMALÚSON, V. Psophocarpus tetragonolobus DC.
CAMAKCHILE, T. Pithecolobium dulce Benth.
CAMANCH1T.ES. Pithecolobium dulce Benth.
CAMANDAG, V. Croton tiglium L.
CAMANGA, T. Croton.
CAMANGE, V. Ocimum sanctum L.
CAMÁNGUI, T. Dalea nigra Mart, and Gal.
CAMÁNGUI, T. Gynura sarmentosa DC.
CAMANGSI, T., V. Artocarpus camansi Blanco.
CAMAN^UIANIS, T. Clausena excavata Burm.
CAMAN6C, V. Crypteronia.
CAMANSILE, T. Pithecolobium dulce Benth.
CAMANTAYO, V. Cratoxylon formosum Benth. and Hook. f.
CAMANTIGUI, T., Pamp. Impatiens balsamina L.
CAMANTiRfs, II. Pithecolobium dulce Benth.
CAMAOG, V. Geodorum semicristatuni Lindl.
CA-MARiA, T. Artemisia vulgaris L.
CAMABIANG-SONGS6NG, T. Leonurus sibiricus L.
CAMAS (Zamboangn). Myristica gutteriifolia A. DC.
CAMASTÉLES. Pithecolobium dulce Benth.
CAMATIS, T., II. Lycopersicum esculentuni Mill.
CAMATIS. Physàlis angulata L.
CAMAYtJAN, T. Gymnosporia.
CAMAYtfAN, T. Diospyros.
CAMBAL. Pygeum latifolium Miq.
CAMBRA-CAMBBA, V. Heliotropium indicum L.
CAMIAS, T. Averrhoa bilimbi L.
CANfGANG, T., V. Ipomoea pes-caprae Roth.
CAMfGAY, II. Cryptocarya ilocana Vidal.
CAMfiN, Z. Henslowia.
CAMILING (central Luzon). Diplodiscus paniculatus Turcz.
CAMIRING, II. Semecarpus.
CAMfT-cABAG, T. Caesalpina nuga Ait.

OAM-MALEG (Abra). Ficus.
CAMOCAMOTfiAN, T., V. Ipomoea bona-nox L.
CAMOCifiLE. Pithecolobium dulce Benth.
CAMOCHILES, T. Pithecolobium dulce Benth.
CAMOG, II. Olethra canescens Reinw.
CAM6NAY, T. Diospyros.
CAM6NG-CA'MONG. Gapparis aurantioides Presl.
CAMONCSf, T., V. Artocarpus camansi Blanco.
CAMONSILES, T. Pithecolobium dulce Benth.
CAM6TIN, T. Strychnos potatorum L. f.
CAMOT-CABAG, T. Gaesalpinia bonduc Roxb.
CAM6TE, Sp.-Fil. Ipomoea batatas L.
CAM6TING-CAHOY, T., V. Manihot utilissima Pohl.
CA'MOT-PTSSA, T. Mezoneunim.
OAMOT-PCSA, T. Harrisonia bennetii Benth. and Hook. f.
CAMP6POT, T. Tabernaemontana pandacaqui Poir.
CAMP6POT, Pamp. Jasminun sambac Ait.
CAMÚLAO, II. Citrus hystrix DC.
CAMÚNGUI (Zamboanga). Harrisoniii bennetii Benth. and Hook. f.
CAMUNING, T. Atalantia.
CAMUNING, T. Murraya exotica L.
CAMtJMiN, T. Rourea heterophylla Planch.
CAMUNIN, V., Pamp. Murraya exotica L.
(JAMUNTAY, V. Citrus hystrix DC.
CAMUT-CABAG, T. Dalbergia ferruginea Roxb.
CAMUT-CABAG, T. Azima nova Blanco.
CAMtfYO, T. Citrus hystrix DC.
CANA, V. Cardiospermum halicacabum L.
CANAASAGA, Pamp. Abruft prccatorius L.
CAN6noNG, V. Tacca pinnatifida Forst.
CANALA, V. Musa.
CANALONG, V. Tacca rumphii Schauor.
CANARA, V., T. Musa.
CANAREM. Bischofia javanica Blumo.
CANAUAY, T. Uncaria.
CANDÁBA, V. Gossypium herbaccum L.
CANDAR6MA, II. Cinnamomum pauciflonim Nees.
GAND6L, V. Benincasa cerifera Savi.
CAND6N, II. Memecylon edule Roxb.
(-ANfiLA, V. Ocimum basilicum L.
CAN£LA. Cinnàmomum pauciflonim Noes.
CAN£LA-DE-M6NTE. Cinnamomum.
CAN£T, T. Artocarpus.
CIÂNGAY, Pamp. Zanthoxylum avicennae DC.
< 'A^GON-CANGON, T. Hygrophila salicifolia Nees.
CANGC6NG, T., Pamp. Ipomoea reptans Poir.
CANGC6AG-DAPO, T- Jussiaea ropena L.
CANÍNGAG, T^ V. *Qrnnamomum mercadoi Vidal.

CANfsi, V. Piper betle L.
CARLARA, V. Stryclmos ignatii Berg.
CANfNGAG, T. Xylopia.
CAN6MAY, T., V. Diospyros niulti flora Blanco, and other species.
CAN6NAY, T. Croton.
CANSASAGA, Pamp. Abrus precatorius L.
CANsfLAN, V. Cratoxylon blancoi Vidal.
CANIJSAY, V. Cratoxylon.
CANS^YOT. Approsa.
CANTfNGAN (Mang). Pterospermum.
CANTING^N, II. Gedrela toona Roxb.
CANTO-CANTO, T. Exacum tetragonum Roxb.
CANT6N. Gossypium barbadense L.
CANT6N. Boehmeria nivea, H. and A.
CANT6TAI, T., Pamp. Paederia foetida L.
CANT6TAN. Paederia foetida L.
CANT6TAN, T. Vinca rosea L.
CANT6TAY, T. Paederia foetida L.
CANTCTAC, T. Paederia foetida L..
CANTtJTAN, T. Paederia foetida L.
CANUBStJBAN, T. SchpilS.
CANUBSUBAN, T. Panicum.
CANUBSCBAN, Pamp. Polygomnn Imrbnimn 1^.
CAXUS-CABAG, T. Mezoneurum.
CAÑA, Sp. Bambusa.
CAÑA-DtJLCE, Sp. Saccharum offieinarum L.
CAÑA-ESPINA, Sp. Bambusa.
CAÑA-pfSTOLA, T. Cassia fistula L.
CAÑA-FfsTULA, Sp. Cassia fistula L.
CAÑ6N, II. Lilium philippinense Baker.
OAPAL, T. Hoya multifiora Blume.
CAPALAUAN, V. Homalomena miqueliana, Schott.
CAPOL-CAPOL, T. Asclepias curassavica L.
CAPOL-CAPOL, T. Calotropis gigantea R. Br.
CAPANiTtJLOT, T. Justicia gendarussa L.
CAPAS, II. Ceiba pentandra Gaertn.
CAPAS-SANGLAY, II. Ceiba pentandra fTnertn.
CAPAYAS, T., V. Caries papaya L.
CAPCAPA, II. Polypodium quercifoliimi L.
(UpfLi, T. Aleuritcs moluccana Willd.
OAPOC (Jolo). Ceiba pentandra Gaertn.
0AP6N, T. Areca alba Rumph.
CAP6PAT-VISAYA, V. Jasminum sambac Ait.
Capúlao, V., T. Cynomorium philippinense Hlnnro.
Capúli. Physalis peruviana L.
CAPtiTOL, V. Oryza minuta Presl.
CARABAVI, II. Bridelia stipularis Blume.
CARADAP, B. Scheichera.

<JAUACALLA. Phaseolus caracal la Blanco.
CARACAT6N, V. Musa paradisiaca L. var.
CARACH^CHA, T. Plumiera acutifolia Poir.
CARAc6B-BUTiGUf, V. Eugenia.
CARÁDAT, V. Leea javanica Blume.
GARAGDÁ. Tricho^anthes a mar a L.
GARAGLI, T. Gardenia obscura Vidal.
CAHAHXJMAI, T. Pandanus.
CARÁMAY. Phyllanthus.
CARAMBUAYA, II. Euphorbia neriifolia L.
CARAMPÁLIT, Pamp. Sesuvium portulacastrum L.
CARANCAN, V., B. Heptapleurium.
CARANYAN, V. Gomphia angustifolia Vahl.
CARAÑGCANY, V. Heptapleurum venulosum Seem.
CARAOL, Z. Acacia.
CARAPOAP, T. Erythrina indica L.
CARAUAN, B. Duabanga moluccana Blume.
CARIQLJIS, IL Albizzia julibrissin Durazz.
CAKISQUIS, T., II. Albizzïa julibrissin Durazz.
CARITÁNA, V. Bryophyllum calycinum Salisb.
CAKITANA, V. Kalanchoe spathulata DC.
CABLIN, T. Pogostemon cablin Benth.
CARMAI, T. Glochidion.
ÇARNATE, V. Musa sapientum L. var.
CARO, II. Casuarina equisctifolia Forst.
CAKOBC6B, B. Kugenia.
CABOBC6B-BUTIQU£ (Camarines). Eugenia.
CAROCSAN, T. Linociera.
CAB6PI, V. Amomum ciliatum Blume.
CAROPSAN. Linociera luzonica F. Vill.
CAR6T, II. Amorphaphallus canipanulatus Blume.
GAK6T, 11. Dioscorea triphylla *Li.*
GARUCANS6LI, T. Lcucas aspera Spreng.
CARUG15r, T., V. Myristica.
CASABANG, II. Zanthoxylum oxyphyllum Edgw.
CASABHA, V. Carthamiius tinctorius *IJ.*
CASAI, T. Pithecolobium montanum Benth.
CASA-SAGÁ. Abrus precatorius L.
CASAY, B. Albizzia littoralis, Teysin and Benn.
CASAY, T. Aglaia.
CASAY, V. Pithecolobium montanum Benth.
CASAY, V. Adenanthera pavonina L.
CASIBAINLANG (Paragua). Iguanura.
CASIBEN, II. Sapindus turczaninowii Vid.
CASINDIC, T. Erythrina, indica L.
CASIRAG, Z. Dodonaea viscosa L.
CASITAS, V. Cassia alata L.
CASLA, V. Jatropha curcas L.

CASNÚT-CÁBAG, T. Azima nova Blanco.
CASOPANGUIL, T. Glerodendron intermedium Cham.
CASOPANGfL-SA-otJBÁT, T. Clerodendron.
CASOPANGUfL-NA-puTf, T. Clerodendron.
CAS6Y, T., V. Anacardium occidentale Linn.
CASTIO-CASTI6GAN, T. Hibiscus abelmoschus *Li.*
CASTIOGAN, T. Hibiscus abelmoschus L.
CASTO-CASTOLfAN, Pamp. Hibiscus abelmoschus L».
CAST6LI, T. Hibiscus abelmoschus L.
CASTtJLi, T. Hibiscus abelmoschus L.
CAST^MBA, Pamp., T. Carthamus tinctorius L.
CAStJBANG-Aso. Argemone mexicana L.
CAStJBBA. Carthamus tinctorius L.
CASUBHA, T., Pamp. Carthamus tinctorius X*.
CASUBHANG-ASO, II. Argemone mexicana L#.
CAsCl-CASt)iAN, T. Dehaasia.
CASUfT, Pamp. Capparis.
CASUPANTGiL-GtJBAT, T. Clerodendron blancoi Naves.
CASUPANTGiL-GtJBAT, T. Clerodendron in for tuna turn L.
CASTIO, T. Hibiscus abelmoschus L.
CAStiry, T. Anacardium occidentale L.
CATACA-TACA, T. Bryophyllum calycinum Salisb.
CATACA-TACA, T. Kalanchoe laciniata DC.
CATAL6NSA, V. Strychnos ignatii Berg.
CATAMANTAS. Antidesma cumingii DC.
CATANDA, T. Cassia alata I*.
CATANDA, T, Cassia tora L.
CATANDA, T. Crotalaria.
CATANDANG-ASO, T. Cassia tora L.
CATANGAL, V. Eurycles amboinensis Herb.
CATANG-CATAWG, T., B. Ipomoea pes-caprae Roth.
CATANG-CATANG. Alpinia brevilabris Presl.
CATANG-OATANG, T. Ipomoea pes-caprae Roth.
CATAP (Zamboanga). Croton leiophyllus Muell. Arg.
CATAPANG. Shorea guiso Blume.
CATABAT (Balabac). Blumea chinensis DC.
CATAYPA (Dinagat). Ardisia perrottetiana A. DC.
CATBAL6X6A. Strychnos ignatii Berg.
CATCATAN, Pamp., V. Alpinia brevilabris Presl.
CATCATAN, V. Hedychium coronarium Koenig.
CATCHfBONG, V. Datura alba Nees.
CATCHtfBUNG, V. Datura alba. Nees.
CATCH£BUNG, V. Datura metel L.
CATELAKA, T.? Diospyros.
CATICOT, T. Maesa indica A. DC.
CATIGUIS, T. Sapindus turczaninowii Vid.
CATIL, Ig- Eriosema chinense Vog.

CATIM6N, V. Cucumis melo L. and other species.
CATM6N, T., V. Dillenia philippinensis Rolfe.
CATLUSN, V. Pogostemon cablin Benth.
CAT6N (Albay). Ficus.
CAT6NGAL, T. Pancratium zeylanicum L.
GAT6N-MAGH1NG (Zamboanga). Ganarium.
CAT6LAN, V. Alpinia brevilabris Presl.
CAT6TANG, V. Hedychium coronarium Koenig.
CAT6TANG, V., Pamp. Alpinia gigantea L.
CAT6TANG, V., Pamp. Alpinia brevilabris Presl.
CATOY (Albay). Conocephalus.
CATOY (Albay). Artocarpus.
CATstJMBA, T. Carthamus tinctorius L.
CATUBActfLAN, T. Dysoxylum.
CATUIT, T. Euphorbia tirucalli L.
CATT^NGAL, T. Eurycles amboinensis Herb.
CATtJNGAO, Ig. Loranthus spicifer F. Vill.
CATtJBAi, T. Sesbania grandiilora Benth.
CAUAD-CAUABAN, T. Panicum.
CAUAD-CAUASAN, T. Naravalia.
CAUAI, T., V. Sophora tomentosa L.
CAUAT-CAUABAN, T. Cynodon dactylon L.
CAUAYAN-ANOS?. Bambusa longinodis Miq.
CAUAYAN-BALICAO, T. Bambusa luzonica Munro.
CAUAYAN-BOCAUI. Schizostachyum acutiflorum Munro.
CAUAYAN-B*JHO. Dendrocalamus.
CAuAYAN-CHfNA?. Schizostachyum blumei Nees.
CAUAYANG-B6O, T. Bambusa laevis Blanco.
CAUAYAN-GUID, V. Bambusa blumeana Roem. and Schult.
CAUAYANG-TOT6O, T. Bambusa arundinacea Retz.
GAUAYANG QUILING, T. Bambusa monogyna Blanco.
CAUAYAN-LUMANPAO ?. Dendrocalamus.
CAuAYAN-Ñ&A-rrthr, V. Phyllostachys bambusoides Sieb. and Zucc.
CAuAYAN-osuf. Schizostachyum acutiflorum Munro.
CAUAYAN-PANA. Bambusa.
CAUAYAN-TAYO-UANAC (Tayabas). Schizostachyum acutiflorum Munro.
CAUAYAN-TAINANAC. Dendrocalamus.
GAUAYAN-TINIC. Bambusa blumeana R. and S.
CAUAYAN-T6BO. Bambusa blumeana Roem.
CAUAYANG TOT6O, T. Bambusa arundinacea Retz.
CAUMPANG (Jolo). Sterculia foetida L.
CAUON, T. Arenga sacchifera Lab.
CAVAL, T. Garcinia.
CAVILAN, T. Vitis carnosa Wall.
CAYAGA. Hibiscus rosa-sinensis L.
CAYANGA, T., V*t Pamp., II. Hibiscus rosa-sinensis L.
CAYANGA-BÓSA, II. Hibiscus rosa-sinensis L.

CAYANGCAN, V. Heptapleurum venulosum Seem.
BAYANTJCAN. Dioscorea pentaphylla Pers.
CAYANT6I#, Z. Linociera?.
CAYANT6N, Z. Ficus.
CAYAOYAO, T. Alstonia spectabilis R. Br.
CAYAPO, V. Pistia stratioles Linn.
CAYO, B. Ceiba pentandra Gaertn.
CAYOB-C6P (Cebu). Ophiorrhiza.
CAYOMANIS, V. Cocos nucifera L.
CAYONG, V. Glochidion littorale Blumc.
CAYOS, V. Dioscorea hirauta Blume.
CAYUMANIS, T. Clausena pentaphylla DC.
CAYUTANA, Pamp. Zanthoxylum avicennae DC.
CAYUTANA, T. Zanthoxylum oxyphyllum Edg.
CEB6ixi-CEBOLLfsAN, T. Ipomoea.
CER£ZAS, Sp.-Fil. Muntingia calabura L.
CHA, T. Aphananthe.
CHACHA-CHACHAHAN, T. Scoparia dulcis L.
CIIACHA-CHACHAHAN, T. Lippia nodi flora Rich.
CHA-CIMABR6N. Ehretia.
CHAM-BtJNDOC, T. Ehretia buxifolia Roxb.
CHAMPACA, Sp.-Fil. Michelia champaca Linn.
CHAMPAGA, T. Michelia champaca Linn.
CHANCHAE. Cissainpelos pareira L.
CHANG-PARANG (Angat). Osbeckia chinensis L.
CH£CHE (Nueva Vizcaya). Stephegyne.
CHICAJL6TE. Argemone mexicana L.
CHfco, Sp.-Fil. Achras sapota L.
Ciifco-MAMfiY. Lucuma mammosa Gaertn.
CHILE, Sp.-Fil. Capsicum minimum Roxb.
CHfLENG-BUND6c, T. Capsicum minimum Roxb.
CnfLENG-BUND6c, T. Piper.
CIIILI-PICANTE, Sp.-Fil. Capsicum minimum Roxb.
CHINCHAO-CHINCHAUAN, T. Cissampelos pareira Linn.
CIANB6G-TTJGBA. Ternstroemia toquian F. Vill.
CfDRA. Citrus medica L.
CIDBA-CAY6TE. Cucumis citrullus Sir.
CiUNGfwA, V. Averrhoa bilimbi L.
CINAM6MO, Sp.-Fil. Lawsonia alba Lain.
GINAM6MO-DE-CH1NA, Sp.-Fil. Aglaia odorata Lour.
CINCHAO-CINCHAUAN, T. Cissampelos pareira L.
CfNCO-cfNCX>. Gynandropsis pentaphylla DC.
CINCO-IXAGAS (Manila). Erianthemum bicolor Sch.
CfNTAS-ciNTASAN, T. Vallisneria spiralis L.
CIBXJTLLAS. Spondias purpurea L.
CISCA. Imperata arundinacea Cyrill.
CfsiP, Ig. Loranthus.
C6BAG, T. Dioscorea sativa L.

C6BAO-NA-QUIR6I, T. Dioscorea.
COBAMBA, T. Canscora diffusa R. Br.
C6BE. Dittelasma rarak Benth.
C6UONG-C6BONG, V. Cyperus elatus Linn.
COCATMON, V. Buchanania florida Schauer.
C6co, Sp.-Fil. Cocos nucifera L.
C6CONG-MAN6C, T. Barleria prionitis L.
C6GON, T.f V., B. Imperata arundinacea Cyrill.
C6GON-C6GON, T. Hypoxis franquevillei Miq.
COII6MBRO. Gucumis sativa L.
C6LA, T. Geodorum semicristatum Lindl.
CoLABATfAN, T. Cyperus.
C6LANG-BUND6C, T. Geodorum semicristatum **Lindl.**
C6LAS, T. Geodorum semicristatum Lindl.
CoLASfMAN, T. Portulaca oleracea L.
COLATC6LAT. Agaricus.
COLATAY, T. Cynodon dactylon Pers.
COLÉNGAY, T. Astronia.
C6LES, T. Morinda bracteata Roxb.
C6LES, T. Memecylon edule Roxb.
C6LES-MALXJEO, T. Pisonia inermis Forst.
COLIAT, T. Gnetum gnemon L.
COLINTASAN, V. Canna indica L.
C6LO, V. Artocarpus incisa L. f.
COLOB6T, T., V. Citrus hystrix DC.
CoLOCANTfNG. Clitoria ternatea Linn.
COLOC6GO, V. Ocimum sanctum L.
COLOCOL6G, V. Clerodendron intermedium Cham.
COLOHÅDIA, Pamp. Diospyros.
COLONAUAS, T. Averrhoa bilimbi L.
COLONC6GON, B. Hernandia peltata Meissn.
COLONC6GON, V. Ocimum gratissimum L.
COLOPC6P, T. Eugenia.
C6LOT, V. Dioscorea hirsuta Blume.
COL6TAN, T. Triumfetta semitriloba L.
COL6TAN, T., V., Pamp. Urena sinuata L.
COL6T-COL6TAN, T. Chrysopogon aciculatus Trin.
COL6T-COL6TAN, T., V., Pamp. Urena sinuata L.
COLOYANANG, **Pamp.** Diospyros.
C6LUNG-C6LUNG, V. Crotolaria.
COMBAB-COMBAUAN, T. Hyptis brevipes Poir., H. capitata Jacq.
COMIMP6L, V. Hyptage madablota Gaertn.
CoMMONsfL, V. Pithecolobium dulce Benth.
CONACON. Elaeocarpus floribundus Blume.
COND6L, T. Benincasa cerifera Savi.
CoNGf, Pamp. Oxalis corniculata L.
CoNTfNG-coTlii^AN, T. Heliotropiuni indicum L.
C6NTY, T. *Solanum migrum L.

C6PANG, T., II. Parkia roxburghii G. Don.
COPC6P, T. Eugenia montana Blanco.
COPRALIN, T. Ichnocarpus frutescens R. Br.
COROBC6B, B. Eugenia.
CoBOCARCtJDAN, V. Lippia nodiflora Rich.
C6RONG, T. Chailletia.
COR6NG-C6RONG, V. Erythrina ovalifolia Roxb.
CORONITAS, Sp.-Fil. Lantana camara L.
COR6S-COR6SAN, T. Chloris barbata Sw.
COR6T, V. Dioscorea fasciculata Roxb.
COR6T, II. Amorphophallus campanulatus Blume.
COSIB£N, 11. Sapindus turczaninowii Vid.
CosiNDfc. Erythrina indica L.
C6SOL, V. Eurycles amboinensis Herb.
C6SOL, V. Kaemphcria galanga L.
C6SOL-C6SOL^V. Monochoria hastaefolia Presl.
C6TiNGCOTfNGAN. Heliotropium indicum L.
COTM6C, B. Terminalia edulis Blanco.
COT6LAN. Urena multifida L.
CROCALASAY. Selaginella.
CUACUAC6HAN, T. Abutilon indicum G. Don.
CUANT6N, II. Amaranthus spinosus L.
CCBAO. Dictyoneura.
CunATfu, T. Aglaia grandis Miq.
CtJBi, V. Artocarpus cumingiana Tree.
CtiBi. Dittelasma rarak Benth.
CuBfu (Bulacan). Cubilia rumphii Blume.
CucirAl, T. Allium uliginosum Don., A. tricoccum L.
CucunfTAN, T., V., Pamp. Trichosanthes anguina L.
CuctfN-BANtfc (Masbate). Hymenodictyon excelsum Wall.
CUDIAPA, V. Celosia argentea Linn.
CIDIAPA, V. Amaranthus paniculatus L.
GrfiLA. Homalium villarianum Vidal.
CvfihANQ (Benguet). Cratoxylon floribundum F. Vill.
CUIXTAS-CUINTASAN, T. Canna indica Linn.
CufsoL, V. Kaempheria galanga L.
CLXAD, V. Dioscorea fasciculata Roxb.
CCLALAO. Pamp. Curcuma longa Linn.
CuT.AMBfsAN, B. Garcinia.
CULANTA, T. Barleria prionitis Linn.
CrLAXTRfLLO, Pamp. Adiantum lunulatum Burm.
OULANTRO (Manila); Coriandrum sativum L.
CrrAPO, T. Boletus.
CULASI, B. Decaspermum paniculatum Turcz.
CuiAsi, T. Lumnitzera purpurea Presl.
CIXATAI, Pamp. Jasminum sambac Ait.
Cfiu:s. T. Memecylon edule Roxb.

CUL£TES, V. Amaranthus spinosus L.
CULIAO, II. Curcuma longa Linn.
CULIAPA (lloilo). Amaranthus mangostanus L.
CULIAT, V., T. Gnetum gnemon L.
CULICUL, V. Pithecolobium lobatum Benth.
CULILII. Gommersonia platyphylla Andr.
CuLfus, T. Isolepis barbata R. Br.
CULILIS, T. Amaranthus viridis L.
CULILISIAO (Tayabas). Linociera cumingiana Vidal, Elaeocarpus.
CULING-BABUY, T. Chisoclieton.
CULING-MAN6C, V. Canthium.
CtJMOT, Pang. Hopca.
CtJLis, T. Memecylon edule Eoxb.
CtJLis-NA-PULA, V. Aporosa microcalyx Hassk.
CtJLiT, T., V. Morinda bracteata Roxb.
CtfLOC-ctJLOC, V. Eugenia.
CuLUBtJNG, Pamp. Musa.
CtJLU-cuLtJ, B. Galophyllum.
CuLtJTAN. Urena sinuata L.
CULU-OULUTAN, T. Urena sinuata Linn.
CuLtiT-pAMO, Pamp. Vitis carnosa Wall.
CUMBÁR, Pamp. Hypoestes laxiflora Nees.
CtJNAG, T. Calamus.
CUNALON, V. Diospyros cunalon A* DC.
CtJNio, II. Curcuma longa Linn.
CtJNTi, T. Solanum nigrum L.
CtJPANG, T., 11. Parkia roxburghii G. Don.
CtJPANG-BUND6c, B. Gleditschia maculata H. B. K.
CUPCOP, Pamp. Eugenia.
CtJPiT-ctJPiT, II. Lepistemon reniformis Hassk.
CtJRAG. Calamus.
CURAGDÁ, V., Pamp. Trichosanthes anguina L.
CURCAN£LA (Albay). Rauwolfia.
CURRIBUETBU^T, II. Tabernaemontana pandacaqui Poir.
CuRtJGAT (Nueva Viscaya). Shorea guiso Blume.
CUBYAO (Nueva Viscaya). Shorea guiso Blume.
CuscusfPA, II. Cissampelos pareira L.
CUSIB£N, II?. Cupania.
CUSNAO, II. Curcuma longa Linn.
CtisoL, Pamp., V. Kaempheria galanga L.
CtJSUNG, Pamp. Cyperus rotundus L.
CuTCtJBAN, T. Plectranthus.
Ct^Ti, B. Solanum nigrum L.
CuTfL, Ig. Eriosema chinense Vog.
CtJTO-ctJTO, T. Bridelia stipularis Blume.
CUYAO-YAO (Masbate). Alstonia.
CuYA-QufA, Z. Pometia.

CUYANYAN, B. Alstonia.
CtfYON-ctfYON, V. Lepiniopsis ternatensis Valeton.
CtJYOS-ctJYOS, V. Taxotrophis ilicifolia Vidal.
CtfYOS-ctiYOS, T. Cupania.

D.

DAAT, T. Xerotes longifolia R. Br.
DAAT, T. Scleria.
DACANDANG, V. Tephrosia.
DAOtJiTUNQ (Jolo). Clerodendron cumingianum Schauer.
DAGABAS, T., V. Pteris opaca J. Sm.
DAOALfGUAN, V. Astronia.
DAGAMIT, V. Rubus glomeratus Blume and other species.
DAGANGDANO, V. Tephrosia luzonensis Vogel.
DAGANGDANG (Jolo). Maesa.
DAGMAY. ^Colocasia antiquorum Schott.
DAGMAY-NGA-APIPI, V. Colocasia antiquorum Schott.
DAGMAY-Ñ&A-BOLfLAo, V. Colocasia antiquorum Schott.
DAGMAY-ÑSA-INIIXOG, V. Golocasia antiquorum Schott.
DAGMAY-ÑSA-QUINS6L, V. Colocasia antiquorum Schott.
DAQMAY-Ñ£A-TAP6L, V. Colocasia antiquorum Schott.
DAGUINOT, V. Rubus parviflorus L.
DAGUINOT, V. Fragaria indica Andr.
DAHA. Mallotus.
DAHfLi, V. Cocos nucifera Linn.
DAILA, V. Epipremnum medium Engl.
DAITANAG, Pamp. Pterocarpus indicus Willd.
DALACAN, 11. Palaquim oleiferum Blanco.
DALAGANUM, V. Uvaria dulcis Dunal.
DALAGAO, V. Uvaria dulcis Dunal.
DALAGUIT, V. Ficus indica L.
DALAMO, V. Fleurya interrupta Gaud.
DALANAN, V. Tectona grandis Linn. f.
DALANDAN, T. Citrus aurantium Linn.
DALAND6N, V. Tectona grandis Linn. f.
DALANGIAN, V., T. Artocarpus camansi Blanco.
DALA^UIL. Ficus indica L.
DALANTA, V. Zizyphus dalanta Blanco.
DALA6RA, V. Justicia dichotoma Blume.
DALAQUIT, V. Ficus.
DALABA. Terminalia catappa L.
DALAYAP, V. Citrus medica Linn.
DALAYAT, Z. Linociera.
DAL£NSE, T. Terminalia.
DALENSIN, T. Terminalia.
DALIMA (Jolo). Punica granatum Linn.
DALINDI^AN, T. Shorea.
DALINÇA, V. Dioscorea fasciculata Roxb.

DALINGAG, V. Dioscorca fasciculata Roxb.
DALINHÁS, T. Polyalthia.
DALINSI, B. Terminalia catappa Linn.
DALIPAOO, II. Adiantum lunulatum Burm,
DALIPAOEN, II. Alstonia scholaris K. Br.
DAIJSAY (Mindanao). Terminalia catappa L.
DALIVI-DALAGA. Musa paradisiaca L.
DAL-LOPAVEN, II. Alstonia scholaris R. Br.
DALOCNASAN, B. Eugenia.
DALOND6N, V. Tectona grandis L. f.
DALOND6NG, V. Diospyros pilosanthera Blanco.
DALON6BAN. Pipturus asper Wedd.
DAL6NOT, T., Pamp. Pipturus aspcr Wedd.
DAIX>N6TAN, V. Pipturus asper Wedd.
DALUGDCG, V. Cacsalpinia bonducella Fleming."
DAIAJGUIAN. Artocarpus camansi Blanco.
DALt3NOT, T. Pipturus asper Wedd.
DAirfPAN, T., V., Pamp. Urena sinuata L.
DALT5PAN, T. Hibiscus abelmoschus L.
DAI/CPANG, V. Urena sinuata Linn.
DALtJBAY. Aglaia argentea Blume.
DAIAjRU-BABAE, B. Lumnitzcra purpurea Presl.
DALXJRU-LAT.AQUE, B. Sonneratia pagatpat Blanco.
DALtJRUY, Pamp. Aglaia.
DAMA DE N6CIIE, Sp. Oestrum nocturnum L.
DAMAR (Camarincs). Agathis loranthifolia Salisb.
DAMBUIIALA, T. Diospyros.
DAM6-Hf A, T. Mimosa pudica L.
DAM6NG-DAGAT, T. Spinifex squarrosus L.
DAM6NO-HfYA, T. Biophytum sensitivum DC.
DAM6RO, T., Pamp. Carum copticum Bonth.
DAM6RO, V. Fleurya interrupta Gaud.
DAM6RO, I*., V. Carum copticum Benth.
DAMORTfs, II. Pithecolobium dulce Benth.
DAMPALIT, T.J V., Pamp. Sesuvium portulacastrum L.
DAMP6L, T. Glochidion.
DAMP6L,, T. Terminalia.
DAMP6L, T. Bischofia javanica Blume.
DAMtJ-MARfA. Artemesia grata Wall.
DAMfTNcs-GtJBAT, T. Pogonath«»rurn rriiiituni Frin.
DAMtJNG-PASIG, T. Panicum
DAMfis-Apf, T. Panicum.
DANAG, T. Capparis.
DANAPRA, Pterocarpus.
DANCACII, V. Strychnos ignatii Berg.
DANCALAN, T., V., B. Calophyllum inophyllum L.
DANGIJ, II. Vitex trifolia L. f.
DANGI (Tayab^s). Grewia laevigata Vahl.

DANGLIN, II. Grewia laevigata Vahl.
DANGLIN, 11. Dipterocarpus.
DANGLINGAN, T. Callicarpa.
DANGLING-ASO, V., T. Helictercs spicata Colinb.
DA^GLING-ASO, T., V. Grewia multiflora Juss.
DANGLIC, T. Saccopetalum longipes Vidal.
DAJSGOY, T. Grewia.
DANIGGA (Cagayan). Ocdrolla toona Roxb.
DANIRI, V. Oldenlandia diffusa Roxb.
DANLIG, T. Shorea.
DANL6Y. Grewia umbellata Roxb.
DANS6, T. Selaginella.
DANOPRA (Cagayan). Ccdrella toona Roxb.
DANYLIN, T. Grewia laevigata Vahl.
DAo, T., V. Dracontomelum mangifera Blume.
DAo, V. Zingiber zerumbet Rose.
DAOA, V. Setaria italica Beauv.
DAO-DAUA, V. Fleurya interrupta Gaud.
DAPAL, V. Opuntia cochinillifera Mill.
DAPDAP, T., V., Pamp. Erythrina indica Lam., and other species.
DAPEDAPE. Erythrina indica Lam.
DAPNIT, Pamp. Schleichera.
DAPO, T. Universally applied to epiphytic orchids, ferns, lycopodiums, etc.
DAPO-MARIP6SA. Phalaenopsis amabalis Blume.
DAPONAYA, V. Coleus acuminatus.
DAP6-SA-CAHUY. Loranthus philippinensis Blanco.
DAP6NG-BABA, T. Hoya multiflora Blume.
DAP6JJG-TIBATIB, T. Rhaphidophora montana Schott
DAP6-SA-CAUAYAN, T. Cleisistoma amabale T. and B.
DAP6-SA-PAJO, T. Loranthus ampullaceus L.
DARACAN, II. Palaquium oleiferum Blanco.
DARAC6T, V. Triumfetta semitriloba L.
DARAPUT, V. Samadera indica Gaertn.
DARASIG, V. Oxajis acetosella L.
DARAYA, T. Cratoxylon polyanthum Kortli.
DARIAISGAO, T. Albizzia procera Benth.
DARIAS, T., V. Pteris opaca J. Sm.
DARIPAY, T., B., V. Ipomoea pes-caprae Roth.
l)ARonc6B, T. Eugenia macrocarpa Roxb.
DAT, V. Scleria.
DATILES. Muntingia calabura Linn.
DAUA, T., V. Setaria italica Beauv.
DAUA, T. Eugenia tetragona Wight.
DAUA-DAUA, T. Panicum crusgalli L.
DAUAG, T. Capparis micrantha DC.
DAUAG, T. Capparis horrida L. f.
DAtisuM, V. Eurycles amboinensis Herb.
DAUT, T. Scleria.

DAVA, T., V. Setaria italica Beauv.
DAYACA, T. Wallichia tremula Mart.?
DAYAGSAC. Ficus qucrcifolia Roxb.
DAYANG, T. Blechnum brownei Juss.
DAYANG, T. Anisoptera.
DAYANG, T. Cyathula prostrata Blume.
DAYAP, T. Citrus acida Roxb.
DAYAP-DAYAP. Plectrona horrida H. and T.
DAYAP-DAYAPAT, T. Atalantia.
DAYAP-GtJBAT, V. Xanthophylluin.
DAYAP-NA-MONTI, T. Atalantia monophylla Corr.
DAYAQUIT. Ficus indica Linn.
DAYIA, V. Rhaphidophora pert us a Schott.
DAYTANAG, Pamp. Pterocarpus.
DECD£C, II. Chailletia griffithii Hook. f.
DfA, Z. Zizyphus.
DIAC, Pamp. Memecylon.
DIBATIB, V. Epipremnum medium Engl.
DICLAP. Zizyphus trinervis Poir.
DICOTA, Pamp. Paederia foetida L.
DI£GO-DE-N6CHE. Mirabilis jalapa L.
DIGLAS, T. Terminalia.
DlGQufT-DiGQuiT, T. Pisonia aculeata L.
DKJTÁN ^Tayabas) Y. Calamus mollis Jilanco.
Diis, V. Bauhinia tomentosa L.
DILAAN, V. Buchanania florida Schauer.
DILA-DILA, T. Elephantopus mollis H. B. K.
DILA-DILA, Pamp. Lepidopetalum.
DfLA-DILA, T. Cynometra inequalifolia A.. Gray.
1MLA-DIT^A (Marinduquc). Excoecaria a gal loch a Linn.,
DILA-DILA. Onychium auratum Kaulf.
DÍLAG-BUTIQUÍ, T. Podocarpus.
DÍLAN-BUTIQUÍ. Dent el la repens L.
OILANO-ASO, T. Hypoestes.
DfLANG-BAcA, B. Olea.
DILANG-BACA, T. Opuntia cochinillifera Mill.
DILANG-BOAYA, V. Aloe barbadensis Mill.
DiLANG-BUTiQuf, T. Tylophora bifida F. Vill.
IMLANG-BUTZQUI, T. Blumea laciniata DC.
DfLANG-BUTiQuf, T. Dentella repens Forst.
DLLANG-HALO, V. Aloe barbadensis Mill.
DfLANG-usA, T. Elephantopus spicatus Juss.
J)ILANG-USA, T. Carallia integerrima.
DILAO, T. Curcuma longa L.
DILAO-PUTI, T. Curcuma.
DILANAN. Citrus hystrix DC.
DfLlG, II. Canthium confertum Korth.
DILIMÁN (Manila). Polypodium.

DILIVARIO, T. **Acanthus ilicifolius L.**
DILUARIO, T. **Argemone** mexicana **L.**
DINCALIN, T. **Calophyllum inophyllum L#.**
DINGLÁS, **T.? Terminalia.**
DINOLAS. Eugenia.
DINOLAS?, II. Hopea.
DINGCALIN. **Calophyllum inophyllum L.**
DINLAS, T. Eugenia.
DiNUGtfAN, T. Musa paradisiaca L. var.
DIBAN, **11. Zizyphus.**
DiRio, II- Otophora blancoi Blume.
DfBio, II. Capura.
DiRfTA, T. Alstonia.
DfTA, V., T. Alstonia scholaris R. Br.
DITAA. Alstonia scholaris R. Br.
DITAAN **(Zambales). Calamus haenkeanus Mart.**
DfTA-DiTA (Oamarines). **Astronia pulchra Vidal.**
DIUALAT-NA-ITEM, **T. I>ysoxylum.**
DOATLO. **Urophyllum glabrum Jack.**
DOBL^SA, T. **Lumnitzera purpurea Presl.**
D6CAT-D£CAT, **V. Cyathula prostrata Blume.**
D6COT-D£COT, **T. Achyranthes aspera L.**
I>6COT-D6COT, V. Pupalia atropurpurea Moq.
D6COT-D6COT, V. Desmodium **laxiflorum DC.**
136GUE. Dioscorea sativa.
I>AJLD6L, V. Ceiba pentandra Gaertn.
Doi-fTAN. Palaquium luzonense Vidal.
DoLiTAN-PAcATAN, **T. Sideroxylon.**
DOL6TAN-PULA, **T. Sideroxylon.**
rtor-lTAN-PUTi, T. Garcinia.
DOLOARIN, T. Acanthus ilicifolius L..
DOLOCNASAN, **B. Eugenia.**
DOIX>N̄G1AN, T., V. Artocarpus.
DoLOÑ^fAN, T., V. Artocarpus camansi Blanco.
DOL6NTAS, T. Chrysanthemum indieum L.
DOLOVARIO. Acanthus ilicifolius Li.
DOND6L, **II. Ceiba pentandra Gnertn.**
DONG6N, **T. Heritiera littoral** is **Dry.**
DONHAO, **T. Astronia.**
D6OL, V., Pamp. Moringa oleifera Lam.
D6SOL, **Z. Kaempheria galanga L.**
DOY6C-DOY6C, V. Gynotroches axillaris Blume.
DUADUARAN, **T. Panicum.**
DtJAT, T., V., Pamp. Eugenia jambolana Lam.
Dΰ̈ɔA, V. Dittelasma rarak H. f.
Dΰ̈ɔA, V. Erioglossum edule Blume.
DUCLAP, **T. Zizyphus trinervis Poir.**
DucLfTAN, T. **Sideroxylon duclitan Blanco.**

DucTtJLAN, T. Eugenia.
DucTtJNG-AiiAS, T. Naravelia laurifolia Wall.
DuctJM, V. Hibiscus abelmoschu* L.
DtJEQ. Bischofia javanica Blume.
DUELITAN. Sideroxylqn cinereum L.
DtJGAN, T. Eugenia.
DUGARON, T. Bridelia stipularis Blume.
DUGAY6N, V. Decaspennum paniculatum Tnroz.
DUG6AN. Myristica philippinensis Lam.
DUG6N-:LATE, T. Heritiera littoral is Dry.
DUGT6NG-AHAS, T. Parameria philippinensis Radlk.
DuGTtJNG-ÂHAS, T. Streptocaulon baumii Decne.
DUOD^NG-AHAS, T. Vitis quadrangularis Wall.
DITGMAN, V. Wolffia schleideni Miq.
DUG6AN, B. Myristica.
DuGtJAN, T. Myristica cumingii Wavl>. and other species.
DtS'ilA?, V. Pterocymbium javanicuin It. Bi\
DUHAO (Zamboanga). Myristica mindaiiaeiiais Warb.
DtJHAT, T., V., Pamp. Eugenia jainholann Lam.
DtJHAT-MAN6o, T. Ixora.
DufAN (Jolo). Durio zibethinus Lriiin.
DULANART. Acanthus iliciformis L.
DtÍLAO, V. Curcuma longa L.
DtJLAO-BABAE, T. Globba strobilifera Zoll.
DULAUARI, Pamp. Acanthus ilicifolius *IJ.*
DULIAN (Jolo). Durio zibethinus Linn.
DULIAN, 11. Dioscorea batatas Decno.
DULÍTAN-PULÁ, T. Palaquium.
DULUÁRIO, T. Argemone mexicana L.
DULI5PANG, V. Abutilon indicum G. Don.
DuMALf, T. Oryza sativa L. var.
DUMANAI, T. Homonoia riparia Lour.
DUMAYACA, T. Wallichia tremula Mart.
DUN̄SAO, T. Astronia.
DUN̄&ARUG, V. Ficus cuneata Miq.
DÚN̄GON, T., V. Heritiera littoral is Dry.
DUN̄GÓN. Tarrietia sylvatica Merrill.
DUN̄56L. Tarrietia sylvatica Merrill.
DUI^6N-DUN̄G6NAN, T. Pygeum.
DUN̄G6N-:LATE, T. Heritiera littoral is Dry.
DUN̄GÚN, T., V. Heritiera littoralis Dry.
DUN̄GÚN, V. Tarrietia sylvatica Merrill.
DUN̄GURÚN̄GUT, C. Citrus hystrix DC.
DtJRA, V. Ruta graveolens L.
DtJRANd-pARANG, T. Dalca nigra Mart, and Gal.
DURTAN. Durio zibethinus Linn,
DURÚGu, T., V. Myristica.
Dús. Bauhinia^innata Blanco.

DtJso, T. Kaempheria galanga L.
DtJSUL, T. Kaempheria galanga L.
DtfYONG, II. Shorea.

E.

£BANO. Maba buxifolia Peis.
EM-£M, Ig. Chloranthus brachystachys Blume.
ESC6BANG-HABA, T., V., Pamp. Sida rhombifolia L.
ESCOBANG-HABA, T. Sida carpinifolia L.
ESES-MAYA, T. Ficus.

R.

FALUMOR£A, T. Calophyllum.
FANGFANGUN, Ig. Vernonia.
FANGifNHAN. Pterocymbium javanicum R. Br.
FABICTAN, T. GeodoTum semicristatum Lindl.
F£SA, T. Canarium.
FRtJTA, Sp.-Fil. Strychnos ignatii Berg.

a.

GABI, Cag., T., V., Pamp. Colocasia antiquoruin Schutt.
GABI-GABI, V. Monochoria hastaefolia Presl.
GABI-GABI, V. Bootia cordata Wall.
GABI-GABIHAN, T. Typhonium divaricatum Dccne.
GABIHAN, T. Monochoria hastaefolia Presl.
GABILO, T. Garuga.
GABING-MOUADA, V. Colocasia antiquorum Schott.
GABING-ONAC, T. Alocasia indica Schott.
GABING-POLA, T. Colocasia antiquorum Schott.
GABING-SILA]«?GAN, T. Colocasia antiquorum Schott.
GABLOS, T. Ardisia.
GABU^N, V. Blumea balsamifera DC.
GABY-rffcA-GUiNATOS, V. Colocasia antiquorum Schott.
GABY-NA-SIB6YAS, T. Colocasia antiquorum Schott.
GABY-NA-SINIB6YAS, T. Colocasia antiquorum Schott.
GACCA, Ig. Loranthus.
GA-GA, T. Mallotus ricinoides Muell. Arg.
GALA-GALA, T. Agathis loranthifolia Salisb.
GALAMAI-AMO, T., V. Heptapleurum venulosum Scem-
GALAMfNY-AMUc, B. Walsura robusta Roxb.
GALANG&A. Maranta arundinacea L.
GALIANG, V. Colocasia antiquorum Schott.
GALONALPAS, Pamp. Cyperus rotundus L.
GAMAGAMATISAN, T. Solanum nigrum L.
GAM6TSAMBALI, T. Parameria philippinensis Radlk.
GANDA, V. Ailium sativum L.
GANDUS, T., V., Pamp. Colocasia antiquorum Schott.
GAN-GAN, V. Flemingia strobilifera R. Br.

GAPAS, V. Gossypium herbaceum L.
GAPAS-C6STA. Gossypium herbaceum L.
GAPAS-GAPAS, V. Vitex obovata Thunb.
GARADAT, B. Leea javanica Blume.
GARAMANSATAY, T. Ternstroemia toquian F. Vill.
GARANGAN, V. Averrhoa carambola Linn.
GARBAN, V. Epipremnum medium Engl.
GARONG6N, Cag. Hopea.
GAS-GAS, V. Rhodamnia glabra Vidal.
GASPAS-CAS£RA. Gossypium herbaceum L.
GATAS-GATAS. Euphorbia pilulifera L.
GATASAN, T. Garcinia duodecandra Pierre.
GATASAN, T. Terminalia.
GATASAN, V. Fagraea morindaefolia Blume.
GATASAN, T., V. Garcinia cornea Linn, and other species.
GATASAN DILAO (Tayabas). Garcinia.
GATASAN-PTJLA, T. Garcinia venulosa Choisy.
GATAS-GATAS, T., V. Euphorbia pilulifera L.
GAUAY-GAUAY, V. Sesbania grandiflora Pers.
GAUAY-GAUAY 2*GA PULA, V. Sesbania grandiflora Pers.
GAUAY-SING-BUAYA, V. Alocasia.
GAVAI-GAVAI, V., T., Pamp. Nymphaea lotus Linn.
GAVAY, T-, V., Pamp. Colocasia antiquorum Schott.
GAWAY-GAWAY. Nymphaea lotus L.
GAY6MAN-MAN6C, T. Adiantum lunulatum Burm.
GAYOS, V. Dioscorea hirsuta Blume.
Gfcos-Gfcos, V. Abrus precatorius L.
GILALAS, T. Mirabilis jalapa L.
GILIG-GILIGAN, T. Abutilon indicum Don.
GIMUBAON, V. Vitex.
GINABANG, II. Macaranga.
GiNGUfu, T. Holarrliena macrocarpa Hassk.
GINI.AGA.SE (Mindoro). Hopea.
GfNTiN-GiNTiN, V. Blumea balsam if era DC.
G'TOAN-GOAN, V. Aristolochia indica L.
G6GO, T. Entada scandens Benth.
G6GO-CASAY, T. Pithecolobium.
G6GON-TOC6. Albizzia saponaria Blume.
G6GONG BISAYA, T. ? Aglaia grand is Miq.
G6110XG BACAY, V., Pamp. Entada scandens Benth.
GrOLANDRfNA, Sp. Euphorbia pilulifera L.
GOLASIMAN, T. Portulaoa oleracea L.
GOMAMILA, T., V., Pamp. Hibiscus rosa-sinensis L.
G6NA, Pamp. Polypodium quercifolium L.
GORGOR£TA, II. Nepenthes alata Blanco.
G6RUNG-G6RUNG, V. Crotolaria.
(IOYARANO, Sp.-Fjl. Anona muricata L.
GOY6N-GOY6N, T. Cratoxylon.

GOY6BAN, T. Musa pamdisiaca L». var.
GRANADA, Sp. Punica granatum L.
GRANATES, T. Nelitris.
GRANATES. Melastoma.
GRANATIS, T. Melastoma malabatricum L.
GUANABANO, Sp.-Fil. Anona muricata L.
GUAYABAS, Sp. Psidium guayava L.
GuBGtJ1BAO, Ig. Ardisia.
GUAYABO. Psidium guayava L.
GUENAYANG, T. Eugenia.
Gufcos-Gufcos, T. Connarus.
Gufcos-oufcos, T. Rourea heterophylla Planch.
Gufcos-Gufcos, V. Abrus precatorius L.
GufD (Tiagan). Citrus hystrix DC.
Guf JO, T. Shorea guiso Blume.
GUILALAS, T. Mirabilis jalapa L,.
GUILAMHON, V. Cyperus difformis Linn.
GufUNG-GUiiiNGAN, T. Abutilon indicum G. Don.
GufiJT, T. Pygeum.
GUINABANG (Abra). Macaranga tanarius Muell. Arg.
GUINATOS, V. Colocasia antiquorum Schott.
GuiNBABAd. Allaenthus.
GufNGUEN, T. Glycosmis pentaphylla Corr.
GUINGUIN, T. Holarrhena.
GufNTiN-GUfNTiN, V. Blumea balsamifera DC.
GuiRfc-GUTfN, B. Cupania?.
GufSAY-CALABAo, T. Cyperus.
GuiS-GUis, T. Rhodamnia glabra Vidal.
GuisfAN, T. Nephelium glabrum Noronh.
Guisf AN, T. Ratonia montana B. and H.
GuisfAN, T. Kayea racemosa PL and Tr.
GuisfHAN, T. Eugenia.
GuisfHAN, T. Dittelasma rarak Hook f.
GuisfHAN, T. Nephelium glabrum Noronh.
GuisfHANG. Shorea guiso Blume.
Guiso, T. Shorea guiso Blume.
Guis6c, T. Shorea guiso Blume.
GUIS6C-GUIS6C. Aglaia.
Guf SOL, T. Kaempheria galanga Li.
GufsoN, T., V. Sophora tomentosa L.
Guf SONG- DILAO, T. . Shorea mangachapuy F. Vill.
GufsuL, V. Kaempheria galanga L.
GufTiN-GuiTiN. Blumea balsamifera Li.
GULANQULAMANAN, T. Cissampelos pareira *1J.*
GuLii-fSIAO (Tayabas). Elaeocarpus.
GUMAMÉLA. Hibiscus rosa-sinensis L.
GtirME, T. Eriachne.
GuMf AN, V. Artocarpus blumei Tree.

GtJMi-GtJMl, T. Xyris complanata R. Br.
GtJMi-GtJMi, T. Fimbristylis schoenoides Vahl.
GtfMi-otfMl, T. Eleocharis pellucida Presl.
GtJMi-GtJMi, T. Cyperus.
GtJMi-GtJMi, T. Eriocaulon sexangulare Linn.
GUBAYACAN, T. Rourca heterophylla Planch.
GTJRUGUANABAO, V. Linociera luzonica F. Vill.
GtJRUNa-otJRUNG, V. Crotalaria linifolia L. f.
GUSUTAN. Elaeocarpus floribundus Blume.
GtJTA-OAMBA. Garcinia venulosa Choisy.
GuTLf, T., V. Acalypha grandis Benth.
GUYABA, Sp. Psidium guayava L.
GUYABAS, Sp. Psidium guayava L.
GUY6N-GUY6N, T. Cratoxylum blancoi Blume.

H.

HABA, Sp. Phtiseolus lunalus L.
HABUL, V. Elej^hantopus spicatus Juss.
HAGACIIAC, T. Dipterocarpus pilosus Roxb.
HAGADHAD. Dipterocarpus.
HAGAHO, V. Eugenia.
HAGANASI (Camarines). Leucosyke capitellata Wedd.
HAGNAYA. Polypodium.
HAGOBAOA, V. Pancratum zeylanicum L.
HAGON, B. Memecylon.
HAG6NAY, T. Wedelia biflora DC.
HAG6NOG. Uncaria.
HAG6NOG, T. Spilanthes acmella L.
HAG6NOI, T. Sx^ilanthcs acmella L.
HAG6NOY-SA-BCQUID. Sambucus javanrca Blume.
HAG6NOY-SA-LASANO, V. Elaeocarpus.
HAGORILIS, T. Deeringia celosioides R. Br.
HAGOS6S, T. Ficus.
HAGNICHIC, V. Phrynium.
HAGUIGUIT, V. Leptosolena haenkei Presl.
HAGUINUT, V. Ficus.
HAGUPANGA, T. Aglaia.
HAGI^I'IT, V. Ficus.
HAGUSiitJS, B. Canarium.
HAGUSNAY, T. Panicum.
HAGUYOY (Tayabas). Dodonaea viscosa Linn.
HALA-UALA, T. Trichosanthes anguina L.
HAXAMIIAM?, V. Daemonorops.
HALAtJMO, V. Mai lotus paniculatus Muell. Arg.
HALIBUTBCT, B- Tabernaemontana cumingiana A. DC!.
HALIGANGO, T. Hymenodictyon.
HAUM6MO, T: Ehretia.
HALENTIIIINAO, V. A^tronifi omningiana Vidal.

HALOBAGBÚG, T. Ipomoea.
HALOM, T., V. Amaranthus viridis L.
HALON, T. Morinda tinctoria Roxb.
HALON, T. Amaranthus melancholicus L.
HALÓPAG-AMO (Tayabas). Nephelium lit-chi Camb.
HALUOABAT, T. Capparis micrantha DC.
HAMAMÁLE, V. Leeea sambucina Willd.$_k$ and other species.
HAMBABAI, V. Nauclea.
HAMBABÁLOD, T., V. Nauclea obtusa Blume.
HAMBABALOS, T. Sarcocephalus cordatus Miq.
HAMBABAYOD, V. Nauclea.
HAMBALOD, T., V. Nauclea.
HAMINDAN, V. Macaranga bicolor Muell. Arg.
HAMINDAN, B. Clerodendron brachyanthum Sehnuer.
HAMITANAGO, V. Kleinhovia hospita L.
HAMLIBNO, V. Blumea balsamifera DC.
HAMOLAUON, V. Vitex.
HAMPAPARE, V. Cissampelos pareira Linn.
HAMPAS-TABAXANG, T. Smilax.
HAMPAS-TAGBALANG. Dicscorea.
HAMTAC, V. Vigna catjang Endl.
HAMULAON, T., B. Vitex littoralis Decne., and other species.
HANAGÓB, B. Albizzia.
HANARION, T. Trema amboinensis Blume.
HANARION, T. Sponia.
HANDALÁMAY. Pipturus asper Wedd.
HANDABAMAI, V. Pipturus asper Wedd.
HANÉM:, T. Ficus.
HANGABAY, T. Bruguiera ritchieii Merrill.
HANGÓB, T., V. Achyranthes aspera L.
HANGOT, T. Achyranthes aspera L.
HANGUT-NA-BABAE. Lepidagathis.
HANLILIMÓCON, V. Deeringia celosioides R. Br.
HANMABABAO, T., V., Pamp. Rourea heterophylla Planch.
HANMABABÁO, T., V., Pamp. Connarus.
HANMABALAB. Cnestis trifolia Pers.
HANÓPOI., T., V. Conocephalus erectus Blanco.
HANTUTCNGAO, T. Melastoma.
HANÑGDONG, T. Gyrocarpus jacquinii Roxb.
HAPITON, T., V. Dipterocarpus grandiflorus Blanco.
HARA, T. Leea.
HABANGAN, T., V. Centripeda orbicularis Lour.
HARAS, V. Piper corylistachyon C. DC.
HARAS, V. Scleria.
HARAS, V. Garcinia cowa Roxb.
HARUM, V. Amaranthus spino^ns L.
HAUFLT, T. Ficus.

HAÚLI? (Jolo). Cyanotis axilkiris Roem. and Schult.
HAWÍLI, T. Ficus.
HAYA-HAYA, V. Buddleia neemda Hamilt.
HAYOC (Tayabas). Vitis lanceolaria Roxb.
HAY6PAG, T. Quercus llanosii A. DC.
HEB6NG, Mang. Aglaia.
HIBI6C, Vis. Arenga saccharifera JLab.
HICAMAS, T. Pachyrhyzus angulatus Rich.
HIDI6C, V. Arenga saccharifera Lab.
HIKRBA DE SAN PEDRO, Sp. Phyllanthus niruri Muell. Arg.
HIGANT6NG, V. Clerodendron fragrans Vent.
HIGOTBALATO, T., V., Pamp. Sida carpinifolia L.
HfGUis-MAN6c ?, T. Eclipta alba Hassk.
HILALAY-6N. Heliotropium indicum L.
HfMAG, V. Ipomoea paniculata R. Br.
HIMAMAO, T. Chisocheton.
HIMAMAO, T. Dysoxylum blancoi Vidal.
HIMBABALOB, T. Nauclea.
HIMBABAO, Pamp., V. Excoecaria agallocha L.
HIMBABAO, T. Allaeanthus luzonicus Benth. and Hook.
HIMPAPARAY, V. Melochia indica A. Gray.
HIMPAPARA, V. Cissampelos pereira Linn.
HIMPAS-LAGBAIJAXG. Smilax divaricata Blanco.
HiMtJLAO, V. Clausena willdenovii W. and A.
HINAGDCNG, V. Trema aspera Blume.
HIMARAMAY, V. Pipturus asper Wedd.
HINDAI^AMAI, V. Pipturus asper Wedd.
HiNDURtJGU, T., V. Myristica.
HiNGAsfN, V. Derris uliginosa Benth.
HINGASINAN, V. Derris uliginosa Bcnth.
HINT3ONG6TO, T. Bridelia stipularis Blume.
HINGCE-CALABO, T. Beaumontia.
HINGTJ^N, T. Malasia tortuosa Blanco.
HiNGUio, T. Ichnocarpus frutescens R. Br.
HiNGUfoN. Monochoria vaginalis Presl.
HIMLALAY-6N, T. Heliotropium indicum L.
HINT AN. Terminalia catappa L.
HINTIPAIX), T. Drosera indica L.
HINTOT6OR, T. Crudia blancoi Rolfe.
HiPGfl, V. Ichnocarpus ovatifolius A. DC.
HfpoN-ufpoN, V. Vcrnonia chinensis Less.
HfTAM, V. Terminalia catappa L.
HOAG, V. Flagellaria indica Linn.
HOJA CRUZ, Sp. Crescentia alata IT. B. K.
HOJAS DE BUYO. Piper betle L.
HAOGANGA, T. Hymenodictyon.
HOL.6G, V. Hhaphidophora.
HOL6G-N&A-I£A;V. Pothos cylindricus Presl.

HOMAI-HOMAI, V. Typha angustifolia Linn.
H6NGO, T. Elaeocarpus.
H6PONG-H6PONG. Litsea.
H6ROG, V. Epipremnum medium Engl.
HOTH6T, _T. Trichosanthes anguina L.
H6TOG, V. Rhaphidophora.
HuAc, V. Flagellaria indica Linn.
HuALfs, T. Lepidopetalum.
HUAMPIT, T.? Clausena wampi Oliv.
HtJBAB (Balabac). Jasminum sambac Ait.
HUI-ABL-OB, V. Solanum nigrum L.
HULAYA, V. Gynandropsis pentapliylla DC.
HULAYA-SANG-AYAM, V. Cleome viscosa Linn.
HULIOAN&A, T. Hymenodictyon excelsum Wall.
HtiPONG-HtJPONG, V. Buchanania florida Schauer.
Htfsu-Ht'/su, B. Eugenia.
HtJYA-iitiYA, V. Mimosa pudica L.
HtfYA-HtJYA, V. Biophytum reinwardtii Wall.

1.

IACAL, T. Hopea plagata Vidal.
fBA, T., Pamp. Phyllantlms distichus Muell. Arg.
fBA, V. Averrhoa bilimbi Linn.
IBABA. Aglaia.
JBABAO, V. Cassia fistula L.
IBA-IBAAN, T. Phyllanthus urinaria L.
IBAIBAN, T. Hourea.
IBI6C, V. Arenga saccharifera Lab.
fBO, V. Chisocheton tetrapetalus Turcz.
fBUD-fBUD, V. Tristellateia australasica A. Rich.
fcoG-fcoG-SANG-cuTf, V. Heliotropium indicum Linn.
InfAO. Pterocarpus.
Infoc, V. Arenga saccharifera Lab.
IGANG, T. Vitex aherniana Merrill.
IGASUD, V. Strychnos ignatii Berg.
IGASUB. Trichosanthes amara L.
IGIN&A, T. Clerodendron intermedium Cham.
IGNAMA. Dioscorea divaricata Blanco.
iGufA^ Turraea virens L.
loufo, Pamp. Dysoxylum blancoi Vid.
IGUIN&A. Clerodendron intermedium Cham.
IotJT, V. Eugenia.
foiw, T. Dysoxylum blancoi Vidal.
ILAI-BAQUIR, 11. Basel la rubra L.
ILALU-GABAT. Capparis.
iLANG-fLANG, T., V., 11. Cananga odorata H. and Th.
fLANG-fiANG DE CHINA. Artabotrys odoratissimus R. Br.
ILIB, Pamp. Tmperntn nrundinacea Cyr.

ILOILO, Pamp. Aglaia argentea Blume.
IL6NG̃O, T. Elaeocarpus.
INJLLIA, T. Lerana.
INANG̃D6N, T. Oallicarpa.
INATA, T. Limnophila gratioloides R. Br.
IN AT A (Bulacan). Utricularia flexuosa Vahl.
INATA, T. Ceratophyllum submersum Linn.
INATA, T. Hydrilla.
INAUIQUI, V. Albizzia saponaria Blume.
INDANG, V. Litsea perrottetii, B. and H.
INGÁS. Semecarpus perrottetii March.
INIAM, V. Antidesma ghaesembilla Gaertn.
INIGNIN, T. Casearia glomerata Roxb.
INOYABAN . Parastemon.
IN^MANG-CALO, T. Nepenthes.
INYAM, V. Antidesma.
IoAs, T. Harpullia blancoi F. Vill.
IPIL, T., V. Afzclia bijuga A. Gray.
fpiL, Z. Adenanthera.
IRING, T. Grewia?
fins, Mang. Tabernaemontana.
fROO, T. Arenga saccharifera Lab.
fSAi, T. Enhalus koenigii Rich.
Is-fs, T., V., Pamp. Ficus aspera L?.
Isiofsio, T., V., Pamp. Ficus hispida L?.
ITIBAN, T. Parameria philippinensis Radlk.
ITM6, V., T. Piper betle L.
ITM6NG-DALÁGA, T. Ehretia blancoi A. DC.
ITM6NG-OUAC, T. Gnetum gnemon L.

J.

JAMOLAUON. Vitex littoral is Decne.
JANDAYAGC6T, V. Tabernaemontana.
JABAS . Gar cinia.
JARRITO, T. Nepenthes.
JARRO, II. Nepenthes alata Blanco.
JATSAHENGIM, T. Canarium.
JAUNAQUI (Albay). Albizzia saponaria Blume.
JAVILI (Zamboanga). Bridelia.

L.

LABAYO (Tayabas). Commereonia platyphylla Andr.
LABBA-I«ABBA, 11. Zizyphus trinervis Poir.
LABIG, II. Livistona rotundifolia Mart.
LABINDANÁIA, II. Livistona rotundifolia Mart.
LABN^I, Pang. Calamus albus Pers.
LABNf-AuAY-NA-MAL6TO, Pamp. Calamus albus Pers.
LABNIB, B. ' Calamus.

LABNÍS, II. Boehmeria nivea Hook, and Arn.
LABNIT, B. Calamus albus Pers.
LABOG, V. Hibiscus surattensis Linn.
LABOG-LABOG, V. Malachra bracteata Cav.
LABON, V. Abroma alata Blanco.
LABRÚS. Boehmeria nivea H. and A.
LABS6B. Ficus pseudopalma Blanco.
JjÁCAB-BtJLAN, V. Blumea balsamifera DC.
LACATAN, T. Musa sapientum L.
LACB6NG-LACB6NG, V.- Vernonia chinensis Less.
LACDAN-BtJLAN, V. Blumea balsamifera DC.
LAC-HA. Ficus.
LACLAY-GUfNAN, T. Flemingia.
LACTANG, T., V., Pamp. Anamirta cocculus W. and A.
LADC6, Jg. Wendlandia luzoniensis DC.
LAG A (Cebu). Abrus precatorius L.
LAGABI. Phyllanthus.
LAGAYRAI, T., B. Ipomoea pes-caprae Roth.
LAQBAN̄GAN. Guettarda speciosa L.
LAGI-LAGI, V. Eugenia lineata Duthie.
LAGINI, V. Vitis carnosa Wall.
LAGiwr^AGiw, T. Acanthus ilicifolius L.
LAGNA, T. Conocephalus suaveolens Blume.
LAGNT, Pamp. Calamus.
LAGfNi. Cedrela toona Roxb.
LAGNI G. Clausena ?
LAGN6B. Ficus.
LAGNtJB. Ficus.
LAGO, T. Carthamus tinctorius L.
LAG6G (Iloilo). Celtis philippinensis Blanco.
LAG6LO, T. Acrostichum aureum L.
LAG6NHON, V. Ardisia serrata Pers.
LAGPACUM, V. Solanum nigrum L.
LAG-TAL, V. Anamirta cocculus W. and A.
LAGU, T. Olax.
LAGUICDI, Mang. Diospyros.
LAGUINO, V. Capparis horrida Linn.
LAGUIO-LAGUIO, T. Acanthus ilicifolius L.
LAGtJNDi, T. Vitex obovata Thunb.
LAGtJNDi, T. Vitex negundo Linn.
LAGI5NDI-LATT, T. Pluchea indica Less.
LAGTJNDI-SALASA, V.' Buddleia asiatica Lour.
LAGiiNDfN-DAGAT. Vitex trifolia L.
LAGUNDING-GAPANG, T. Vitex obovata Thunb.
LAGUfNO, V. Capparis.
LAGVAY, T., V., Pamp. Colocasia antiquorum Schott.
LAHA? (Jolo). Pandanus odoratissimus Linn. f.
LAHO, V. Myristica.

LAI6C-LAI6C, V. Jasminum mariánum DC.
LAIYA. Harrisonia bennetii B. and H.
LALACDAN, V. Blumea balsam if era DC.
LALASI, Ig. Leucosyke capitellata Wedd.
LAL.6GO, V. Pandanus sylvestris Rumph.
LAMBAY6NQ, T., B., 11. Ipomoea pes-caprae Roth.
LAMB6TAN, T. Calamus.
LAMIIAY, V. Corchorus capsularis L.
LAMIO, T. Dracontomelon mangiferum Blume.
LAMfsi, C. Wrightia ovata A. DC.
LAMOT-LAM6TAN, T. Adiantum lUnulatum Burm.
LAMPACANAI, V. Typha angustifolia Linn.
LAMPARAHAN, T. Gnetum gnemon L.
LAMPAY6NG, T., B., V. Ipomoea pes-caprae Roth.
LAMPXJYAN, T. Zingiber.
LAMPtJYANG, V. Zingiber zerumbet Rose.
LAMPtJYANG, T. Curcurma xanthoi'rhiza Roxb. and other species.
LAMPCYANG-DOBAC, V. Curcuma caesia Roxb. and other species.
LAMPX'JYANG-ITAYAM, V. Zingiber.
LAMPtJYANG-NGA-GUiNAT6LA. Globba marantina Linn.
LAMP^YANG-NGA MAPULA, V. Globba marantina Linn.
LAMPtj*YANG-JVGA-MAPUTI, V. Amomum cardamomum L.
LAMPX'JYANG-TA'POL, V. Curcuma caesia Roxb. and other species.
LAMt'TDio, T., V. Carum copticum Benth.
LAMtfYO, T. Oryza sativa L. var.
LANA. Sesamum indicum L.
LANARAY (Tayabas). Bruguiera parviflora W. and A.
LANCA, T. Artocarpus integrifolia L. f.
LANC6AS, Pamp. Alpinia gnlanga Swartz.
LANDO, T. Bridelia.
LAN^TE, V. Picrasma javanica Blume.
LAN£TE, T. Wrightia ovata A. DC.
LANGA (Cag.). Sesamum indicum L.
LANGALA, V. Fleurya interrupta Gaud.
LANGCA, II. Artocarpus integrifolia L. f.
LANGCAUAS, V. Aipinia galanga Swartz.
LANGGASI, V. Leucosyke capitellata Wedd.
LANGAS, V. Semecarpus microcarpa Wall, and other species.
LANG£RAY, T. Bruguiera ritchieii Merrill.
LANGIL. Albizzia saponaria Blume.
LANGIL, T. Albizzia lebbek Benth.
LANGIL, T. Albizzia retusa Benth.
LAiff&fNGi, V. Vitis carnosa Wall.
LANGIS, Pamp. Sesamum indicum L.
LANGNGA, T. Sesamum indicum L.
LANGPA. Cedrela toona Roxb.
LANoufGi. Phyllanthus acidus Muell. Arg.
LANGUIL. Albizzia lebbek Benth.

LANGUIS. Sesamum indicum L.
LANIGDA, B., V. Cedrela toona Roxb.
LANIGPA, V. Cedrela toona Roxb.
LANfNGUiNG, T. Ficus cumingii Miq.
LANIPGA, V., B. Cedrela toona Roxb.
LANITT, T. Wrightia ovata A. DC.
LAN6GO, V. Pandanus sylvestris Rumph.
LANOT, V. Musa textilis Nees. var.
LAN6TAN, T. Hibiscus grewiaefolius Hassk.
LAN6TAN, V. Musa textilis Nees. var.
LAN6TAN, T. Goniothalamus, and other arborescent species of Anonaccuc.
LAN6TANG-iTfM, T. .Phaeanthus nutans Hook. f. and Th.
LAN6TAN-ITIM. Hibiscus.
LAN6TI, T. Zizyphus trinervis Poir.
LANSINA, T. Ricinus conimunis L.
LANS6NE, T. Lansium domesticum Rumph.
LANS6NES, T. Lansium domesticum Jack.
LANTÁ, T., V., Pamp. Ananiirta cocculus W. and A.
LANTfN, T. Plantago erosa Wall.
LANTONDAL. Musa paradisiaca L.
LAN£SI, Cag. Wiightia ovata A. DC.
LAN^TAN, T. Saccopetalum longipes Vidal, and other species of Anonoceae.
LANtiTAN, T. Thespesia campylosiphon Rolfe.
LANpTAN, T. Xylopia dehiscens Merrill.
LANt5TAN-iTfM. Phaeanthus nutans H. f. and T.
LANtfTAN-PUTf. Goniothalamus giganteus Hook. f. and Th.
LANtfTl, II. Wrightia ovata A. DC.
LANZ6N. Lansium domesticum Jack.
LAOCPAO, Cag. Vernonia arborea Ham.
LAPN^I, Zamb. Calamus albus Pers.
LAPNfs, C. Boehmeria nivea. H. and A.
LAPNIS. Malachra bracteata Cav.
LAPNfs NA BOLOHÂN, T. Malachra bracteata Cav.
LAPO-LAPO, II. Gyrocarpus jacquini Roxb.
LAPONAYA, V. Coleus acuminatus Benth.
LAQUIS-LAQUIS. Acanthus ilicifolious L.
LARA. Capsicum minimum Roxb.
LAR6AN-AN1TO, T. Clerodendron intermedium Cham.
LASA. Nipa fructicans Wurmb.
LASALIA. • Wendlandia luzonensis DC.
LASGAS, B. Villaria philipinensis Rolfe.
LASNÕATON, T., V. Laportea gaudichaudiana Wedd.
LAso, V. Allium sativum Linn.
LASONA, 11. Allium cepa Linn.
LAST6N, V. Vigna catjang Endl.
LASUNA, T. Allium cepa L.
LAUAAN, T., V. Anisoptera thurifera Blume.
LAUAN-NA-PULA, T. Vatica.

LAuAN-MAPUTf, T. Dipterocarpus.
LTAUAIST SANDINA. Anisoptera thurifera Blanco.
LAUAS, T., Nymphaea stellata Willd.
LATJAS, T. Limnanthemum cristatuxn Griseb.
LAUAT, V. Litsea chinensis Lam., and other species.
LAVAS, T., V., Pamp. Nymphaea lotus Linn.
LAYA, II. Alstonia scholaris R. Br.
LAYA, B. Zingiber zerumbet Rose.
LAYAI,, Z. Zingiber officinale Linn.
LAYASfN, T. Leucosyke capitellata Wedd.
LAYO, B. Alyxia odorata Wall.
LAY6HAN, V. Phyllanthus distichus Muell. Arg.
LEASIN, T. Leucosyke capitellata Wedd.
LECH!A. Nephelium litchi Camb.
LECIIIAS, T. Nephelium longana Camb.
LECHIAS, T. Nephelium glabrum Noronh.
LEOAS, T. Semecarpus perrottetii March.
LENGAY, T. Melastoma.
LENGNGA, T. Sesamum indicum L.
LENGUA-DE-PKKRO, Sp. Fil. Euphorbia neriifolia L.
LENO, T. Psychotria malayana Jack.
LETERAN, T. Gouania.
LETLET-TtiBUY, T. Piper corylistachyum C. DC.
Lf A, T. Wolffia schleideni Miq.
LIAPA, Z. Terminalia*
LIBACAN, T. Litsea.
LfBAi, T. Achryanthes aspera L.
LIBAS. Eugenia.
LIBAS. Modecca trilobata Roxb.
LfKAS-LiBAS. Sympiocos.
LIBATO, T. Lumnitzera purpurea Presl.
LIBATO, T. Basclla rubra L.
LIBATO-PUTI, T. Cumingia philippinensis Vidal.
LIBATO-NA-PUTI, T. Neesia altissima Blume.
LIBATO-PULA (Tayabas), Lumnitzera purpurea Presl.
LIBATO-PUUL, T. Xylocarpus gr ana turn Koenig.
LfBAY^ T. Achyranthes obtusifolia Lam.
LIBfRAN, T. Scirpus.
LiBtJN, V. Emilia sonchifolia DC.
LICTANG, T., V., Pamp. Anamirta cocculus W. and A.
LIGAAS, T. Semecarpus perrottetii March.
LfGAO, T. Zizyphus trinervis Poir.
LfGAO, T. Zizyphus a r bore a Merrill.
LfGAO. Grewia.
LIGAS^ T. Semecarpus perrottetii March.
LIGASAN, T. Ceriops candolleana Arn.
LfGUiD-LfGUID, V. Alpinia.
LILITAN, V. Paederia foetida L.

LIMA-LIMA, T., V. Dioscorea.
LIMA-LIMA, T. V., Pamp. Heptapleurium caudatum Vidal.
LiMANG-st)GAT. Erianthemuin bicolor Schrank.
LIMBAON, V. Cocos nucifera Linn.
LIMOLIMOJ T. Heptapleurium caudatum .Vidal.
LIMOLIMO, II. Vitex.
LIM6N, Sp. Fil. Citrus medica L. var.
LIMONATO. Triphacea aurantiola Lour.
LIMONCITO, Sp. Triphacia trifoliata DC.
LIMORÁN. Zalacca edulis Reinw.
LIMOBAN, T. Calamus.
LINALINA-AHAN, T. Zinziber.
LINAS, B. Eugenia.
LINATOGANAC, V. Samadera indica Gaertn.
LINCAMÁS, II. Eriosema chinense Vog.
LINGA, T. Sesamum indicum L.
LINGA-LINGAHAN, T. Hyptis capitata Jacq.
LINCSASIXA, T. Ricinus communis L.
LfNGAT, T. Begonia rhombicarpa A. DC.
LINOAT6X (?). Laportea guadieliaudiana Wedd.
LINGO. Sesamum indicum L.
LfNO, Pamp. Morinda bracteata Roxb.
LfNO, V. Morinda citrifolia Linn.
LINOG, Z. Scaevola koenigii Vahl.
LINTANG-AGUIN, T., V., Pamp. Anamirta cocculus W. & A.
LINT6N-GAMAI, V. Samadera indica Gaertn.
Lfo-Lfo, Ig. Ficus.
LiosfN (Zambales). Heritiera littoralis Dry.
LIPA, T. Laportea gaudichaudiana Wedd.
• LIPA, T. Fleurya interrupta Gaudich.
LfPAi, T. Mucuna monosperma DC.
LIPANG-ASO. Fleurya interrupta Gaud.
LIPANG-CAST£LA, T. Fleurya interrupta Gaud.
LIPANG-D6TON, Pamp. Laportea gaudichaudiana Wedd.
LTPATA, V. Excoecaria agallocha L.
LIPATA, T. Rauwolfia.
LIPATA (Ticao). Cerbera odollam Gaertn.
LIPATAT-GOBAT, B. Ixora amboinica DC.
LfPAY, V. Laportea gaudichaudiana Wedd.
LfPAY, V. Mucuna pruriens DC.
LIP6TE, T. Eugenia.
LIPSIPÁN, T. Lepidagathis luzoniae Neee.
LfRio, V. Rhaes discolor Hance.
LIRIO, V. Crinum.
LfRio, T. Habranthus versicolor Herb.
LisAc, T. Nauclea.
LISANGAY, Z. Curcuma longa Linn.
LIS6HAN, V. Musa.

Lísong-insíc, T. Payena.
LITA, V. Voacanga.
LITBIT, V. Piper corylistachyon C. DC.
Litlí, V. Piper coi ylistachyon C. DC.
Litlít. Piper.
Línas, V. Bauhinia tomentosa L.
Livían. Castanopsis philipppinensis Vidal.
LOBÁLOB, T. Bridelia stipularis Blume.
L6BAS, Pamp. Vitis geniculata Blume.
L6nis, V. Cocos nucifera Linn.
L6BI-L6BI, V. Eulophia elongata- Blume.
LOBIO, T. Mollugo hirta Thunb.
L6BI-NG̃A-HINBÁ'ON, V. Cocos nucifera Linn.
L6BI-NÕA FILIPOG, V. Cocos nucifera Linn.
LOCAY? T. Limnophyton obtusifoliuni Miq.
LOC6AN (Masbate). Calamus.
L6CO-L6CO, V. Hyptis suaveolens Poir.
L6CO-L6CO, T., Pamp. Ocimum sanctum L.
LOCT6N . Tr ich ocary a.
LOCT6N. Duabanga moluccana Blume.
LOD6CONG, Pamp. Moschosma polystachyum Benth.
LOD6NO. Celtis philippinensis Blanco.
T^OP6KG, Ig. Rhododendron verticillatum Vidal.
LOG6G^ V. Celtis pbilippinensis Blanco.
LOGONII6N (Iloilo). Ardisia serrata Pers.
LOII6D-LOH6D, V. Pollia sorzogonensis End!.
LoLfo, T. Artocarpus odoratissima Blanco.
LOL6AN, II. Pistia stratiotes L.
LiOLOQUÍSEN, 11. Limnantliemum cristatum Griseb.
liOMBAY6NO, V. Cassia fistula L.
LOMB6Y, T. Eugenia jambolana L.
L6MOT, T. Potamogaton javanicus Hassk.
L6MOT-LOM6TAN, T. Hy drill a verticillata Casp.
L6MOT-LOM6TAN, T. Adiantum lunulatum Burm.
L6NG̃A, V. Sesamum indicum L.
L6NG̃AS (Cebu). Semecarpus pubescens Thw.
LoNG̃ÁYAN. Wrightia ovata A. DC.
LonÍTI. Wrightia ovata A. DC.
LON6C, V. Ficus.
L6NO-L6NO. Payena.
LOPA, Pamp. Fleurya interrupta Gaud.
L6PO-L6PO, V. Allmania nodiflora R. Br.
L6PO-L6PO, V. Achyranthes aquatica R. Br.
L6UAN-L6UAN, V. Pistia stratiotes Linn.
LOVIAN, T. Castanopsis philippinensis Vidal.
L6Y-A, V. Zingiber.
LUBACAN, V. Cocos nucifera Linn.
LUBALUB, T. Bridelia stipularis Blume.

Lusf. Cocos nucifera L.
LufifGAN, T. Acorus calamus Linn.
LUBf-LUBf, V. Geodorum semicristatum Lindl.
LUBÍ-LUBÍ. Osmelia.
LUBÍ-LUBÍ, T., V.a B. Solanum nigrum L.
LÚBID-LÚBID, B. Semecarpus.
LUBÍ-LUBÍLI (Bataan). Cubilia rumpliii Blunie.
L.UBT6B. ' Ficus.
LuBTtJB. Duabanga moluccanà Blunie.
LUCBIN, T. Citrus decumana Linn.
LucBAN-otJBAT. Citrus.
LU^TI (Zamboanga). Ardisia philippinensis DC.
LUG6, II. Terminalia catappa L.
LtJGOS (Zamboanga). Areca catechu Linn.
LUJCLA. Oxalis acetosella L.
Lui-tfcPAO, II. Abutilon indicum Don.
LUMÁNPAO, T. Bambusa lumampao Blanco.
LUMÁNAI, T. Homonoia riparia Lour.
LtfMANG, Cag. Caryota rumphiana Mart.
LUMANOG, V. Terminalia calamansanay Rolfe.
LUMATI. Lagerstroemia batitinan Vid.
LUMBÁN, T. Aleurites moluccana Willd.
LUMBÁNO, T. Aleurites moluccana Willd.»
LUMBIÁC (Tayabas). Iguanura.
LUMB6I, T., Pamp., V., 11. Eugenia jambolana L.
LUNÁ. Ficus caulocarpa Miq.
LtJNAS, T. Lunasia amara Blanco.
LTJNAS, T. Gonocaryum tarlacense Vidal.
LtJNAS, T. Oleandra neriiformis Cav.
LÚJVAS. Pancratium zeylanicum L.
LÚNAS. Nymphaea lotus L.
LtJNAS-BUND6c, T. Lunasia amara Blanco.
LtfNAS-NA-iTiM. Gonocaryum tarlacense VidaL
LUNBÁN, T. Aleurites trisperma Blanco.
LÚPID, A. Bauhinia.
LÚPO, V. Vitis carnosa Wall.
LUBÚT?, Cag. Calamus rhomboideus Blumc.
LÚSONG (Lepanto). Vaccinium barandanum Vidal.
LUTXJNAN (Zamboanga). Eugenia.
Lt^YA, T. Zingiber officinale L.
LiJYA-LtJYA, T. Panicum.
Lt)YA-i,tJYA, V. Cyanotis cristata Roem. and Schult.
LtiYA-LtJYA, T. Zingiber.
LtjrYA-LUYAHAN, T. Panicum repens L.
LtJYA-LtJYA-iT-AYAM (Iloilo). Globba parviflora Presl.
LÚYAN, T. Diospyros nigra L.
LÚYANG-ÁSO, T. Zingiber.
LÚYA-NGA-ISÁ, V. Zingiber.

LtJYANG-6siu, T. Zingiber.
LtJYONG. Diospyros nigra Retz.
LIOYONG-LIJYONG, V. Cratoxylon suniatranum Blume.
LtfYOS, Pamp. Areca catechu L.
LuYtJSiN, T. Pygeum.

MAASIC, Pamp. Tephrosia luzonensis Vogcl.
MABALOT, T. Sarcoceplialus cord at us Miq.
MAB6LO> T., V. Diospyros discolor Willd.
MABtJLO, T. Trichodesma zeylanicum R. Br.
MACAASIN, T. Carallia integerrima DC.
MACAASIN, T. Eugenia lineata Duthie.
MACAASIN, V. Shorea.
MACAASIN-PULA, T. Eugenia.
MACAASIN-PUTI, T. Palaquium.
MACABALO, Pang. Lagerstroemia spcciosa Pers.
MACABANGON. Aglaia.
MACABINUAO, 'I\ Qucrcus llanosii A. DC. and other species.
MACABtJHAi, T. Tinospora crispa Miers.
MACABtJHAi, T. Lunasia amara Blanco.
MAC A is A, T. Cleidion javanicuin Blume.
MACAISA, B. Ehretia philippincnsis A. DC.
MACAISA, T. Ailanthus moluccana DC.
MACAU fYA, T. Mimosa pudica L.
MACAIIIYA, T. Biophytum sensitivum DC.
MACALALANANG, T. Clerodendron intermedium Cham.
MACALASCALAS, B. Talauma.
MACALBANG, V. Dendrocalamus membranaceus Munro.
MACAJJNGAG, T. Cinnamonium pauciflorum Nees.
MACAMB6JO (Iloilo). Garcinia venulosa Choisy.
MAC AN, V. Panax fruticosum L.
MACAPIL, T. Dalbergia lanceolaria Linn.
MAGASAMPALOC, T. Tamarindus indica L».
MACASIT.AD, T. Corypha.
MACASILI, V. Dysoxylum blancoi Vidal.
MACASIN. Eugenia.
MAOASIN-MULATO, T. Eugenia.
MACASLA, V. Croton tiglium L.
MACATtJRAY. Stereospermum.?
MACIIIN. Musa paradisiaca L. var.
MACtJPA, T. Eugenia jambos L.
MACCPA, T., V. Eugenia malaccensis L..
MADANG, T. Litsea magnifica B. and IT.
MADOND6N, T. Vangueria spinosa Roxb.
MADBE-CACAO, Sp. Fil. Glircida macuiata H. B. K.
MAGAAN, B. Kayea.
MAGABAGABA, T. Arytera rufescens Radlk.

MAGAB6YO, V. Celtis philippinensis Blanco.
MAGAI, V. Agave americana Linn.
MAGALAT. Harpullia arborea Radlk.
MAGALAY, T. Bruguiera ritchieii Merrill.
MAGALAYAO, C. Afzelia rhomboidea Vidal.
MAGARANBt'JLo (Tayabas). Cyclostenion.
MAGARAPALA, T. Teniiinalia.
MAGARILAO, T. Nauclea.
MAGARiLAo, T. Terminalia.
MAGASPÁNG, V. Fluggea obovata Wall.
MAGATADI?, Cag. Mangifera altissima Blanco.
MAGATAS, Pamp. Euphorbia pilulifera L.
MAGCABt'JGAO, V. Atalantia monophylla Correa.
MAGCASAO, V. Aralia javanica Miq.
MAGLIM6CON. Urophyllum glabrum Jack.
MAGLOL6POY, Z. Sterculia.
MAGOTAMBIS, V. Antidesnia.
MAGSAL6RO, V. Tacca palmata Blume.
MAGSAL6RO-NGA-DACXJ, V. Tacca pinnatifida Forst.
MAGSINAYA. Aglaia.
MAGTABIG, V., Pamp. Rourea heterophylla Planch.
MAGTAMB6CAO (Leyte). Canavalia ensiformis DC.
MAGUEY, Sp. Fil. Agave americana Linn.
MAGUILIC, Z. Litsea.
MAGUILIC, T. Geunsia cumingiana Rolfe.
MAOX'JUOC, T. Buchanania florida Schauer.
MAGULIVE, T. Chisochaèton tetrapetalus Turcz.
MAGt'JMU (Albay). Vitex.
MAGUSAYAC, V. Fagraea morindaefolia Blume.
MAGUTTATA, V. Maesa haenkeana Miq.
MAIIIHIIN, II. Biophytum sensitivum DC.
MAU6TAY, V. Mallotus.
MAISIPAISI, T. Clausena excavata Burm.
MAIZ, Sp. Fil. Zea mays L.
MALAACHU^TE, Pamp. Mallotus ricinoides Muell. Arg.
MALAACHU^TE, T. JVElochia arborea Blanco.
MALAACLE (Tayabas). Dracontomelum.
MALAADt'JAs, T. Ailanthus moluccanus DC.
MALAADOAS, T. Dracontomelum cumingianum Baill.
MALAAMt'JYON, T. Ormosia calavensis Blanco.
MALAANfs, Pamp. Scoparia dulcis L.
MALAAN6NAN, T. Shorea malaanonan Blume.
MALAAPI, T. Premna.
MALAAP6LID, Pamp. Kyllinga monocepliala Rottb.
MALAAP6LID, Pamp. Cypcrus rotundus L.
MALAASIS, T. Vangueria spinosa Roxb.
MALAATES, T. Glochidion.
MALABA(\ V. At.ilaniia nitida Oliv.

MALABACAUAN, T. Randia.
MALABACHAO (Cebu). Lorantlms blancoanus F. Vill.
MALABAGA, T. Clerodendron.
MALABAGAN, Pamp. Dysoxylum blancoi Vidal.
MALABAGNA, T. Croton.
MALABAGO, V. Hibiscus tiliaceus L.
MALABAGUIO, T. Olax imbricata Roxb.
MALABAGUIS, B. Eugenia.
MALABAIII, B. Eugenia.
MALAHAIIIO, B. Memecylon.
MALABALANTE, T. Polygonum.
MALABALATONG, Pamp. Fleming!a.
MAT*Ai5ALtJBAT?. Semecarpua gigantifolia Vidal.
MALABAi/tJGBUG-DAcis, Pamp. Oxalis corniculata L.
MALABANABA, T. Amoora grandifolia C. DC.
MALABANABA, T. Duabanga moluccana Blume.
MALABANGAO, Pamp. Dysoxylum blancoi Vidal.
MALABANGQUILIN, V. Connaropsis philippica F. Vill.
MALABAT6AN, T. Garcinia ovalifolia Hook. f.
MALABAYA, T. Chisocheton tctrapetalus Turcz.
MALABAYABAS . Dy soxy 1 um.
MAXABAYABAS, T. Eugenia.
MALABAYABAS, TV Gardenia obscura Vidat.
MALABAYABAS, T. Gardenia pseudopsidiuin Blanco.
MALABAYO. Hibiscus tiliaceus L.
MALABiLtJCAS, T. Litsea.
MALABOCB6C. Ipomoea quamoclit L.
MALABOCB6C. Meusa ferrea Linn.
MALABOGB6G, T. Calophyllum.
MALABOII6C, T., V. Cassytha filiformis Li.
MALABOII6C, V. Casuarina equisetifolia Forst.
MALAB6NGA, T. Iteadaphne confusa Blume.
MALAB6NGA, T. Macaranga.
MALAB6NGA. Beilschmeidia madang Blumē.
MALABON6T. Sterculia stipularis R. Br.
MALABOT6NES, V. Kyllinga monocephala Rottb.
MALAnucBtc?, T. Meusa ferrea L.
MALABIDLAC, T. Borabax malabaricum DC.
MALABULAON, Pamp. Symphorema luzoniense Vid.
MALABÚNAO, B. Ochrocarpus.
MALABX^NOA. Macaranga tanarius Muell. Arg.
^lAi.ABf^NtiA, B. Phoebe umbel 1 in^or a Blume.
MALABUN6T, T. Sterculia.
MALABtiTONG, T. Olea.
MAT.ACABXJGAO, V. Citrus.
MALACABtJYAO, T. Aegle decandra Naves.
MALACACAO, T. Erioglossum eduie Blume.
MALACAC \a. T^epidopetalum.

MALAOACAO, T. Lunasia grandiflora Muell. Arg.
MALACACAO, T. Sterculia.
MALACADIOS, B. Dehaasia.
MALACADIOS, T. Phoebe.
MALACADIOS. Myristica.
MALACADP6, T. Micromelum tephrocarpum Turcz.
MALACAF£, T. Glochidion.
MALACAF£?, V. Mussaenda grandiflora (Meyen) Rolfe.
MALACAFS, T. Randia.
MALACAF£ (Paragua). Agrostistachys maesoana Vidal.
MAI.ACAFS (Tayabas). Webera.
MAtACApf, T. Elaeocarpus.
MALACAQufos, T. Sesbania aegyptiaca Pers.
MALACAHUC, T. Rourea multiflora Planch.
MALACALANTAS, B. Canarium.
MALACALIOS. Elaeocarpus monocera Cav.
MALACALESQUIS, T. Adiantum.
MALACALUBCt'JB, T. Litsca.
MALACALOMPIT, B. Terminalia calamansanay Rolfe.
MALACAMONSftE, T. Pithecolobium montanum Benth.
MALACAM6TE, V. Ipomoea bona-nox T-iinn.
MALACAAI6TE, T. Boddomea luzonensis Vidal.
MALACAPAI, T. Diospyros malacapai A. DC.
MALACARIOS, Z. Desmodium umbellatum DC.
MALACARO, V. Desmodium.
MAL,ACAROPC6P (Bataan). Eugenia montana Blanco.
MALACÁRPA. Randia.
MAT.ACATM6N, T. Delima sarmentosa L.
MALACATM6N, T. Tetracera macrophylla Wall.
MALACATM6N, T. Dillenia speciosa Gilg.
MALACATt'JRAY, Z. Sterospernium.
MALACATt'JRAY, T. Cassia.
MALACAUAYAN, T. Panicum.
MALACAtjrYAN, Z. Hemigyrosa.
MALACBAN, T. Vatica.
MALACBOC (Morong). Acalypha iiliaefolia Muell. Arg.
MAXACD6G, II. Combretum.
MALACLAC. Clethra canescens Reinw.
MALACMAC, T., Pamp. Pygeum.
MALACMAC, T., Pamp. Palaquium oleiferum Blanco.
MALAciTLAiN-BfsAN, T. Gynotroches axillaris Blume.
MALADIAC. Tristira triptera Radlk.
MALADfTA, T. Rauwolfia amsoniaefolia A. DC.
MALADOSD6S, V. Erianthemum bicolor Schrank.
MALADt'JHAT, B. Eugenia.
MAX^ADdfNGUN, T. Heritiera littoralis Dry.
MALAGAHANIP, T. Dalbergia.
MALAGAIIANIP, T. Terminalia.

MALAGAITMON, T. Diospyros.
MALAGÁNIT, T. Albizzia.
MALAGARAYAT, T. Strychnos.
MALAGARAYAT, T. Eugenia.
MALAGASÁHA, B. Piaonia umbellata Seem.
MAXAG6SO, T. Mollugo stricta L.
MALAGQUIT, T. Oryza sativa L. var.
MALAGUiBtJYO, V. Celtis philippinensis Blanco.
MAXAGUINISAN, V. Kayea philippinensis Planch.
MALAIBA, T. . Melia candollei Juss.
MALAIBA, T. Phyllanthus reticulatus Muell. Arg.
MALAIB6HOD. Buchanania florida Schauer.
MALAICMO, T. Celtis philippinensis Blanco.
MAJLAIGOT B. Ixora.
MALAIHAO, T. Dracontomelum.
MALAiPtJTAi, B. Streblus asper Lour.
MALAISA, T. Ardisia pyramidal is Pers.
MALAISIS, T. Ficus.
MALAISIS, T. Malaisia tortuosa Blanco.
MALAITMO, T. Celtis philippinensis Blanco. -
MALAITMO, T. Gnetum gnemon L».
MALAIYAO, T. Dracontomelum mangiferum Blume.
MALAL1GAS-NA-BABAE. Iainasia.
MALALIGAS-NA-LALÁQUE, T. Buchanania.
MALALIM6N. Taxotrophis ilicifolia Vidal.
MALAXtJCBAN, T. Champereia griffithii Planch.
MALALXJPAY, Pamp. Micromelum.
MALALtJYA, T. Globba parviflora Presl.
MALAMÁNGA, Cag. Litsea.
MALAMAYANA, T. Coleus acuminatus Benth.
MALAMBÁNG, T. Mallotus.
MALABANGCABAS (Zambonnga). Pittosporum.
MALAMOLAUIN, T. Evodia.
MALAMOULXJIN, T. Glycosmis.
MALANÁNCA. Ficus luzonensis Merrill.
MALAN^IG, Cag. Caryota rumphiana Mart.
MALAPACPAC-BAIJUJAY, T. Epipremnum medium Engl.
MALAPACO, T. Jussiaea suffruticosa L.
MALAPAHO, T. Diptcrocarpus vernicifluus Blanco.
MALAPAHO, T. Mangifera.
MALAPAHO, T. Sindora wallichii Benth.
MALAPAiTPfT, Sapindus turczaninowii Vidal.
MALAPAJO. Dipterocarpus vernicifluus Blanco.
MALAPAiiii^iT, Pamp. Sapindus turczaninowii Vidal.
MALAPANDACAQUE, B. Gonocaryum.
MALAPANGDAN, T. Freycinetia insignis Blume.
MALAPAO. Dipterocurpus vernicifluus Blanco.
MALAPÁPITA, T., V. Polyscias nodosa Seem.

MAI^APAT6PAT, T. Canthium confertum Korth.
MALAPIGAS, T. Desmodium umbellatum DC.
MALAPILAUAY, B. Canarium.
MALAP6CO, T. Jussiiiea suiFruticosa L.
MALAPOTOCAN, T. Olerodendron macrostegium Schauer.
MALAPXJAD, Pamp. Olea.
MALAPXJSO, B. Litsea.
MALAPUTAD, T. Barringtonia racemosa Blume.
MALAPUTAT, T. Cleidion.
MALAPUTAT, T. Terminalia.
MALAPUTAT, T. Palaquium.
MALAPUTtJTAN,- T. Palaquium.
MALAPCYAO^T. Pygeum.
MALAPtJYAo, T. Cynometra.
MALARÁYAP, T. Gymnosporia montana Roxb.
MALABÁYAT, T. Cratoxylon formosum B. and H.
MALARAYAT. . Atalantia nitida Oliv.
MALABicoNDtJRON, Pamp. Callicarpa.
AlALARtJUAT, T. Eugenia operculata Roxb.
MALARCIIAT-NA-PULA, T. Eugenia cymosa Lam.
MALARtJNGON, T. Heritiera littoralis Dry.
MALASACOT, T. Terminalia.
MAL^SAGA, T. Ormosia calavensis Blanco.
MALASAGA, T. Devris scandens Benth.
MALASÁGUIN. Dysoxylum arborescens Miq.
MALASAGUIN?, T. Aglaia paleinbanica Miq.
MALASAGUIX-PUTI (Tayabas). Erioglossum edule Blume.
MALASAGUIN-LALAQUE. Kayea.
MALASAGUIN-PULA, T. Amoora.
MALASAGING-PULA, T. Alaia.
MALASAGING-PUTI, T. Eugenia.
MALASAMB6NG, T. Vernonia vidalii Merrill.
MALASAMPAGA, T. Wikstroemia indica Mey.
MALASANDIA, V. Ipomoea pes-tigridis L.inn.
MALASANGUI. Cinnamomum.?
MALASANTÓL, T. Sandoricum.
MALASANT6L, T. Thespesia populnca C'oi·r.
MALASAPSAP, T. Pterocymbium javanicum R. Br.
MALASAPUTI, Pamp. Palaquium.
MALASC6G, T. Symphorema luzonensis Vidal.
MALAwSfAC, B. Ardisia humilis Vahl.
MALASICO, T. Liitsea.
MALASIN6RO, B. Fagraea.
MALASITUIX, Pamp. Gonocaryum lurlucviit»ts Vidal.
MALAS6RO, B. Diospyros.
MALASUCA, V. Antidesma.
MALAstJRUT, B. Guettarda spe'ciosa Linn.

MALATABA, T. Callicarpa.
MALATACO, T. Albizzia.
MALATADIANG (Morong). Canihium arboreum Vidal.
MALATAGUN, B. Canarium.
MALATALANG, T. Myristica cumingii Warb.
MALATALANG, Pamp. Diospyros.
MALATALISAY, V. Terminalia.
MALATAMRIS. Kibara coriaeea Perk.
MALATAM6YAN, T. Casearia.
MALATAMP6Y, T. Eugenia.
MALATANGAN-TANGAN, B. Hernandia pcltata Meissn.
MALATAPAY, T. Alanguim octopetalum Blanco.
MALATAPAY, T. Grewia.
MALATAPAY, T. Diospyros discolor Willd.
MALATAYON, Pang. Adenanthera.
MALATiefG, T. Anncslea crassipcs Hook.
MALATinf (Morong). Mel i a.
MALATIGUI. Albizzia ?.
MALIATINTA, T. Phyllanthus reticulatus Muell. Arg.
MALATOC6, T. Albiz/ia odoratissinia Bcntli.
MALAT6RO. Albizzia saponaria Blume.
MALATCBA, V. Cleidion javanicum Blume.
MALA^tJBA, B. Croton consanguineum Muell. Arg.
MALATIJBIG, T. Eugenia.
MALATUMBAGA, T. Crudia blancoi Rolfe.
MALATUMBAGA, T. Conibretum squamosum Roxb.
MALATUMBAGA, T. Nelitris.
MALATtJ^GAO, Cag. Melastoma.
MALANBAN, T. Planchonia.
MALAtJBE, T., V. Aristolochia tagala Cham.
MALAT^PLI. Ficus ampelas Burm.
MALAX5NOT, T. Sterculia.
MALAWIN, T. Vitex negundo I-.
MALAYAMBO, T. Eugenia.
MALAYANT6C, T. Holarrena macrocarpa Hassk.
MALI AN A, T., V., Pamp. Coleus atropurpureus Benth.
MALIBAGO, T. Thespesia populnea Corr,
MALIBAGO, T. Hibiscus tiliaceus L.
MALICASCASAN, V. Talauma angatensis F. Vill.
MALICO, V. Evodia mindanaensis Merrill.
MALf-MALf, T., Pamp. Leea aculeata Blanco.
MALJNGA, T. Benincasa corifera Savi.
MALINTX, T. Phyllantlius rotioulatus Muell.
MAiis, V. Abutilon indicum G. Don.
MALISA. Capsicum minimum Koxb.
MALIBA- (Camarines). Ananassa sativa Lindl.
MALISA, T. Piper nigrum L*.
MALISMALIS, Pamp. Euphorbia pilulifora T^.

MALXT, T. Cynodon-dactylon Pers.
MALIT-CALABAO, T. Panicum.
MALONGAIN, T. Melia candollei Juss.
MALUBAGO, B. Hibiscus tiliaceus L.
MALtino, T., V. Diplodiscus paniculatus Turcz.
MALtJCO, T. Pisonia inermis Forst.
MALUGAGNAO, V. Vitex.
MALtJGiT, V., Pamp. Moringa oleifera Lam.
MALUG6SO, V. Mollugo pentaphyllum Linn.
MALULTJCBAN, T. Champereia griffithii Planch.
MALUNAL-UNSAYAM, T. Ddlbergia.
MALtJN&AY, T., V. Moringa oleifera Lam.
MALUISGAYEN. Melia candollei Juss.
MALtJNGiT, V., Pamp. Moringa oleifera Lam.
MALUStfffcAY, T. Crudia blancoi Vidal.
MALtJTAY, T. Erycibe.
MALVAS, Sp. Abutilon indicum G. Don.
MALVAS DE CASTILLA, Sp. Fil. Abutilon indicum G. Don.
MALVAS-TAGBALANC, T. Delima sarmentosa L.
MAMAGU£L, T. Harrisonia bennetii B. and H. f.
MAMALE, V. Leea sambucina Willd. and other species.
MAMALIS, T. Pittosporum fernandezii Vidal.
MAMALIS-BABAE, T. Pittosporum.
MAMANED. Columbia longipetiolata Merrill.
MAMAO (Jolo). Rhaphidopliora pertusa Schott.
MAMB6B. Stephegyne diversifolia Hook.
MAMB6G, T. Mitragne.
MAMB6G, B. Nauclea blancoi Vidal.
MAMB6G. Stephygne speciosa Korth. and other species.
MAMB6G, T., V. Morinda bracteata Roxb.
MAM£Y, T. Lucuma mammosa Gaertn.
MAMIN, B., T. Piper betle L.
MAMITIC, T., V. Hygrophila salicifolia Nees. and other species.
MAM6LIS, T., V., Pamp. Sida frutescens Blanco.
MAM6N, V. Piper betle L.
M AMP ALAN (Jolo). Mangifera indica Linn.
MAMP£L, V. Uncaria acida Roxb.
MAMP6L, V. Ijoranthus pentandrus *1+*
MAN. Ginnamomum pauciflorum Xees.
MANA, T., II. Jatropha multifida L.
MANABA, B. Premna.
MANABR6NG, B. Aglaia.
MANALAO, T. Aglaia oligantha C. DC.
MANATJHID, V. Heliconiopsis amboinensis Miq.
MANANAN<QTANG, V. Dysoxylum blancoi Vidal.
MANANAOG, V. Strychnos ignatii Berg.
MANAOG, V. Saccolabium.
MANAPO. B. Sindora Avallichii Benth.

MANÁSA, T. Bridelia ovata Muell. Arg.
MANAUL, V. Tournefortia argentea L. f.
MANÁYAO (Central Luzon). Diplodiscus paniculatus Turcz.
MANBAN, T. Maranta dichotoma Wall.
MANC6NO, V. Xanthostemon verdergonianus Naves.
MANDALtJSA (Cebu). Eriantheinum bicolor Sell rank.
MANGA, T., V. Mangifera indica L.
MANGA-ANIS. Mangifera anisodora Blanco.
MANGACHAP6I, T. Vatica mangachapoi Blanco.
MANGA-D6LÒNG, V. Abrus precatorius L.
MANGAGAO, V. Hoya imiltiflora Bluine.
MANGASIN6RO, Z. Shorea.
MANGASIN6RO, Z. Albizzia?.
MANGASIN6BO, T. Fagraea volubilis Jack.
MANGASIRIQUI (Bulacan). Quercus philippinen^is A. DC.
MAJ*GAT6LAY ?. Koordersoidendron pinnatum Merrill.
MANGGA, T., V. Mangifera indica L.
MANGOIS (Jolo). Garcinia mangostann Linn.
MANÕIIA, T. Clerodendron.
MAÑttfpoi), T. Areca catechu L.
MANGIT. Ehretia buxifolia Roxb.
MANGLATI. Lagerstroemia batitinan V'idal.
MAÑSLAY, Pamp. Zingiber.
MANGOSTÁN, V. Garcinia cornea Linn.
MANGOSTANA, V. Garcinia ovalifolia H. f. and T.
MAÑ^QUIET, T. Desmodium.
MANGUfs (Jolo). Garcinia mangostana Linn.
MANGUfr, T., V. Ehretia buxi folia Roxb.
MANGtJPOD. Areca catechu L.
MANGCYAO, B. Sophora tomentosa L.
MANL Arachis hypogaea L.
MANfc-MANfcAN, T. Cyperus.
MANILAD, T. Scyphipbora hydrophyllacea Gaertn.
MANi-MANf AN, T. Desmodium.
MANI-MANIIIAN, T. Cassia tora L.
MANKIT, T. Urena.
MANL6AB, T. Quercus.
MANGAL, T. Samadera indica Gaortn.
MANQUfL, T. Eugenia javanica Lam.
MANQUIT*. Desmodium pulcbellum Benth.
MANTALA, T., V. Sophora tomentosa L.
MANtJL, V. Jasminum sambac Ait.
MANUMBAGA (Zamboanga). Myristica si mi arum A. DC.
MANUNGAL, T., B., V., Pamp-. Samadera indica Gaertn.
MANUISGBAGA, V. Hemigyrosa cjanescens Thw.
MANZANAS, Sp. Fil. Zizyphus jujuba Linn.
MANZAXA-B6SA, Sp. Fil. Eugenia jambos Linn.
MANZAXITAS.· Rp. Fil. Zizyphus jujuha Linn.

MA6RO, V. L,umnitzera purpurea Presl.
MAPOLÁ. -Hibiscus mutabilis Linn.
MAPUTI, T. Leucas aspera L.
MAQUITARIN (Tayabas). Orophea.
MARABICAT, T. Diospyro*.
MAKAC^LAN, II. Litsea.
MARAGAHt]LO, T. SymplocOS.
MARAGAO^D, II. Cinnamomum.
MARALIGAO, V. Casearia c-iu»i-f»a Turcz.
MARANG, T. Litsea.
MĄ́RANG, T. Artocarpus.
MARANMARANG, V. Ficus.
MARAPACO, II. Polypodium dipteris Blanco.
MABAP6TO, V. Hibiscus abelinoschus L*.
MAUAHAYAT-CAHOY, T. Capparis inicrantha DC.
MAUASAGAT, II. Vitex.
MAitAvfCAL (Morong). Diospyros.
MARAVILLAS, »Sp. Fil. Mirabilis j a hi pa L<.
MARAYABAY, T. Cerbera odollam Gaertn.
MARAYAPA, T., V., Pamp. Coleus atropuṙpureus Benth.
MAKBAAR, V. Zanthoxylum avicennae DC.
MAUG6SO, T. Momordica balsamina L.
MAi«j6so-DAMt*ix>G, Pamp. Mollugo.
MARICACAO, T. Gliricidia maculata H. B. K.
MARINDATO. Cnestis trifolia Pers.
MARICXJM, V. Hibiscus abelmoschus L.
MARISCOS, T. Chrysopogon aciculatus Trin.'
MAROP6TO, V. Hibiscus abelmoschus *1J.*
MAKUCtJM, V. Hibiscus abelmoschus L.
MARUtfNAO, V. Bauhinia tomentosa L.
MARUMANCAS, T. Sideroxylon.
MARUMANCAS-NA-LALAQUE. T. »Sideroxylon.
MASAMB6NG. Desmodium.
MASIP6N, Cag. Saurauja.
MAT ARES, T. Micromelum.
MATABAXG-DICUT, Pamp. Paederia foetida 1^.
MATAIJIPAY, B. Symplocos.
MATAMATA, B. Schleichera.
MATANG-ARAN, V. Mus&aenda grandiflora Rolfe.
MATANG-ARAO, T. Melicope ternata Forst.
MATANG-DIABIX), T. Evodia roxburghiana Benth.
MATÁ́NG-OLANG, T. Salacia prinoides DC.
MATANG-OLANG, V. Phyllanthus reticulatus Muell. Arg.
MATANG-PCNE, V. Abrus precatorius L.
MATANO-tfUlN (Tayabas). Breynia cernua Muell. Arg.
MATANG-ULANO (Tayabas). Breynia cernua-Muell. Arg.
MATAVIA, T. Musa paradisiaca L*. var.
MATINGGAIN. Mussaenda frondosa L.

MALJING-DATO, V. Samadeia indicā Gaertn.
MAX'JBAN, T. Planchonia.
MARKING, T. Quercus.
MAyiNDATO, V., Pamp. Rourea heterophylla Planch.
MAYACYAT, B. Canarium.
MAYAGARIN. Citrus hystrix DC.
MAYA'GOS, V. Homonoia riparia Lour.
MAYA'GOS-LALAQUI, V. Acalypha.
MAYAMAGAB, V. Commersonia platyphylla Andr.
MAYANA, T., V., Pamp. Coleus atropurpureus Benth.
MAYANO (Paragua). Gardenia.
MAYAPIS, T. Dipterocarpus mayapis Blanco.
MAY6KO. Timonius philippinensis Merrill.
MAY6YOS, V. Homonoia riparia Lour.
LMAYXJMUS. Micromelum tephrocarpum Turcz.
\MAiitJTBOT, B., V. Eugenia.
M£LBAS', T. Abutilon indicum Don.
MELINDRES (Manila). Lagcrstroemia indica L.
MEL6N, Sp. Fil. Cucumis melo Linn.
MKL6NG-OUAC, T. Modecca heterophylla Blume.
MIAGOS, V. Homonoia riparia Lour.
MIA'GUS, V. Eugenia.
MIAPI, T., V. Avicennia officinal is L.
MfDLLA, Pamp. Lagerstroemia.
MIQUI, Pamp. Xylocarpus obovatus Juss.
MIJO (Cebu). Setaria italica Beauv.
MILI-PILI, V. Canarium.
MIL6N-DAGA', T. Mclothria indica Lour.
MIMHKE. Homonoia riparia Lour.
MIM6NGA, T. Macaranga tanarius Muell Arg.
MfsAY-CALABAo, T. Cyperus.
MITLA, Pamp. Lagerstroemia speciosa Pers.
MOH6TI, V. Antidesma.
M6co (Iloilo). Musa sapientum L. var.
MOGB6C, V. Xanthophyllum.
MOLAUIN, T. Vitex littoralis Decne.
MOLAUIN, T. Murray a exotica L.
MOLAHN-ASO, T. Pienma nauseosa Blanco.
MOLAVE, T. Vitex littoralis Decne. and other species.
MOLAVIN, T. Murraya exotica L.
MOLAVIN, T. Vitex nogundo L.
MOIJ'VVIN, T. Vilex littoralis Decne.
MOLOI'6LO, T., V., Pamp. Urena sinuata L.
MOL.UG6SO, T. Mollugo stricta L.
MONGO-MONG6IIAN,*T. Cassia tora L.
M6NGOS, T. Phaseolus mungo L.
M6PIO, V. Erianthemum bicolor Schrank.
M6RO, Spl#Fil. Andropogon muricatus Retz.

MOUALKJ, **Sp«** Fil. **Graptopbyllum** lion ense Nees.
UOKiiXlHQ. ..hisliciu.
MORA no M; MAPI^TI, T. Juatieia gendaruasa L.
MOUAHONI;-MAPUTI, T. **Qraptophyllum** iiortense Nees.
MORAL. Morug alba Liiin.
Mo«Ai\uo^«-MAn:Ti. **Graptophyllum** hortense Nees.
M6RAS. **Morua** *;i\ba* **L.**
MOSBOR0N, T., V, Scaevola koenijfii Vulil.
M6r\, *V-.xmp,* Cyperus rotundus L.
MosIAZA, Sp. **Brasaica** jtiaeea H. f. and Th.
Mi '.i **£T, Bp,** Til. **Agave unericana** Linn.
Mraula. Koordersoidendron pinnatum Merrill.
Mi I.AON **(Hoilo).** Vitcx **littoralis Decne.**
Mi i MM. T. Vitex.
Mi i.ACK.N-HACAE. Vitex.
.\hi.\MN.T. **Vitex tittoralia Decne.**
MuiJLuis-i.60, T. Premna veatita Sehauer,
MuLiNG-MULfNG, T. Diplodiseua **panieulatua Tu!•<•/.**
\!i M,O, V'. Phaseolua mungo I..
ML'MAI I. \, **Bkrrisonia bennetii** B. and H. f.
MIJRAON-IIAIXJSU6N (lloilo). **Jaamimnn.**
MuKCGNA, V. Phyllantlius.
MITILV, V. Kylliiiyii icdi'iiiivpiiala Ecttb.
MtiTHA, T. Cyperus **rotundua L.**
\|i \IA\I. **V. Htu**risonia **bennetii B. and** M. **f.**

IS.

Nituo, B. Gnetum gnemon L.
NABO, V. Abronm **alata** Blanco.
N.Uio, V. Fieus.
KACBOLfcAN, M. **Clerodendion** m **ei'ostegium** Schauer,
NAOA, V. **Pteroearpua** imlicus Willd. **and** otht-; species.
NAOIIOUOAN, 11. Clcrodendron macrostcgium **Bchauer.**
\ AI,A, Z. Afzelia **bijuga A. Gray.**
NAIJS. **Picraama javanica** BIUDK.[1].
N\M.\II:D, T. Coluthbia.
NAMISAIJALOS. **Saroocephalos cordatoa fcOq.**
NAMACPACA**.. II.T Oehroearpas peotapetalufi Blanco.**
N.VME. **piosoorea** sativa *L. and* **other** ^[»-eies.
NANCA, T. Artotiarpus integrifolia 1.. f.
\A\"<.\, \. **Plectooomia elongatfl** M.nt. and Blurae.
NA\QCA, T. Artocarpus intogrifolja Linn. f.
MANCOH, V. **Etigenia,**
NA **i\N, Ji. Piper corylifitacbyon 0. DC.**
NAPNAP, V. Cephalostaehyum eapitatuni Munro.
\ u&AirofTAS, T., V. Citrus **aurastlum** Hook, *i.*
Sw-.\\->\. T. Citrus decumana L.
N MIANJITAS, T, Citrus aurantium IJ. var.

NABDO (Cebu). Polyanthes tuberosa Linn.
NARRA, T., V. Pteroearpus indicus Willd. and other species.
NARRA-PULA (Unisan). Pterocarpus vidalianus Rolfo.
NATO, V. Palaquium barnesii Merrill, n. sp.
NATO, T. Sterculia rubiginosa Vent.
NATg, V. Terminalia catappa L.
NATOB, T. Terminalia.
NEN£NU, Cag. Anisoptera tlnirifera F. Vill.
N&ATAJY, Ig. Boehmeria weddeliana Vidal.
NGANGAITA, T. Ehretia onava A. DC.
NGISINGISI, T. Lepidopetalum.
N56NGOT, Pamp. Cocos nucifera L.
Nfoui, T. Xylocarpus obovatus Juss.
-NILAD, T. Scypliipbora hydrophyllaeea Gaertn.
NILAR, T. Scyphiphora liydrophyllacea Oaertn.
fp/AioT (Tayabas). Oryza sativa L.
fM*. T., V. Morinda citrifolia Linn.
NINO, T., V. Morinda bracteata Roxb.
NfOG, T., C, II., B.. V. Cocos nucifern 1J.
NfoG-N<&A-POTf, V. Cocos nucifera Linn.
NfoG-Nloa, T. Geodorum semiorlstntuni Lindl.
NioG-NfOG, T. Osmoxylon.
NfoG-Ni6GAN, T. Quisqualis indica L.
NI6G-NI6GAN, T. FiciiR pseudopnlma Ulanco.
NfPA, T. Nipa fructicans L.
NfPAi, V. Mucunia atropurpurea]>C
NfpAY, T. Mucuna]>ruriens DC. and other species.
NfPlN (Zamboanga). Phyllanthes retieulatus Poir.
Nfpis. Agave americana L.
NfTO, T., V. Lygodimn dichotoimun Sw. and other species.
N1TONG-PUT£, T. Lyp:odium scanden^ Sw.
NOC-N6C, V. Fic-us.
NOLĄLAQITT, T. Litsea.
NON6C, V. FioiiH indica L. and other species.
N6OC;-NƠOU ffVhn). Soianiun verbascifolium T..

O.

OAY, Jl. Calamus pisicarpus Hhuue.
6BAT, T. Smilax.
OsfEN, II. Artocarpus.
6BUD-6BUI>, V. Cyperus.
ODA6DEG, Ig. Berchemia])hilip]>inens1s Vidal.
6DLING, V. Cynomętra ramiflora Linn.
OfiY, Pang. Calamus buroensis ^Iart.
OGAO, B. Diospyros.
6GOB, B. ? Artocarpus incisa L. f.
OisAc, T. Nauclea.
OIANG, T. Smilax indica L.

OLÁÑGO, V. Pandanus **radicans Blanco.**
OLA6MAG, **T., V. Sophora tomentosa L.**
OLASIMAN, T. Portulaca oleracea L.
OLAYAN. **Quercus soleriana Vidal.**
OL£T, **Ig. Helicia** cumingiana **Presl.**
OLIÑGON, **V. Cratoxylon celebicum Blume.**
Oi-fVAS, Sp.-Fil. Eusideroxylon.
ÓLOB. Artocarpus rinia Blanco.
ÓLOD, Pamp. **Cynometra inaequifolia A. Gray.**
OLONGÁIN. Trichodesma zeylanicum R. Br.
ÓLOY, T. Artocarpus.
OMADING, Pamp. **Cyperus rotundus L.**
OMADIUNG, Pamp. **Cyperus rotundus L.**
ONAJTAT, Ig. Gnaphalium luteo-album L.
ONAOA, **T.** ·Capura.
ONAVA, T. Ehretia acuminata R. Br.
<3ÑCOT, Z. COCOS nucifera Linn.
6NÑGSAY **(Manila). Coriandrum sativum Linn.**
ONORAN, **Pamj). Cyperus rotundun L.**
6NTI, T. Sol a ɪɪ ll m nigrum **L.**
O6NÜOIST, **11. Bruguiera gymnorrhiza Lam.**
C)6NÑSON', II. Rhizophora mucronata Lam.
()6NOG, **II. Albizzia julibrissen** Duraz.
OPLAY. **Alstonia seholaris R. Br.**
OPI.Î. T. Ficus.
OPLING-MÁYA (Tayabas). **Ficus.**
ÓPO, T. Lagenavia vulgar is Seringe.
6PONG-6PONO, B. **Litsea.**
C)iuci6x9 **Sp. Fil. Mirabilis jalapa L.**
ORATAN, II. Aglaia.
ORAYI, T., V. Amaranthus spinosus L.
OK^GANO, Sp. Fil. Limnophila ropens Benth.
OR^GAXO, Sp. Fil. Coleus aromaticus Benth.
OR^GANO-LALÂQUI, **T. Coldenia procumbent 1-**
C)R6T, V. IMoscorea hirsuta Blume.
ÓROY, V. Amorphophallus campanulatus Blume.
Osiu, T. Bambusa **diffusa Blanco.**
<3TE-6TE. Pittosporum.
OUAY, **II. Calamus pisicarpus Blume.**
6VAI-NA-PAÑGLAO, **11. Naravelia***
OYAÑTifA, V. Abrus precatorius L.
OTfSAN, T. Myristica.
OY6C, Ig. ^fyristica.

P.

PAANBAI^TVIS, T.? Boerhaavia repens L;
PABTO, T. Acalypha.
PAc. Artocarpus camansi Blanco.

PACAC, II. Artocarpus camansi Blanco.
PACACAJL. Mai lot US ricinoides Muell. Arg.
PACAGONC6N-CAST1I,A. Cassia alata L..
PACALCAL, Pamp. Mai lotus ricinoides Muell. Arg.
PACANCAL, Pamp. Palaquium latifoliuni Blanco.
PACAPIS, V. Clerodendron intermedium Cham.
PACAT-ARO, T. Pisonia aculeata DC.
PACAY6MCOM-CAST1L,A, Pamp. Cassia alata L.
I» AC A Y6MCON. Lycopodium.
PACIIAINGAN, T. Canarium.
PAco. Asplenium esculentum Presl.
PACOL, V. Musa.
PA'CONG-AN^ANO. Onychium auratum Kaulf.
PAC6POD, T. Vitis carnosa Wall.
PACPAC-BALANG, T. Berrya.
KACPAC-LANGAO, T. Desmodium triflorum DC.
PACPAC-LAUIN, T. Rhaphidophora pert us a Schott.
PACPAC-ULXJIN, T. Polypodium quercifolium L.
PACNAN, T. Quercus.
PACfiPiS, T. Trichosanthes anguina Li.
PADDAN, Cag. Pandanus odoratissimus Linn. f.
PAD6NG-PAD6NGAN, V. Celosia cristata Miq.
PA£TAN, V. Lunasia amara Blanco and other species.
PAGAIX>. Acrostichum.
PAGAPLACIM, 11. Ficus.
PAGAT, Ig. Cnicus wallichii DC.
PAGAT-PAGAT (Laguna). Diospyros.
PAGATPAT, T., V., B. Sonneratia pagatpat Blanco.
PAGATPAT, T. Diospyros.
l*Aant5T, Pamp. Gardenia obscursi Vidal.
PAOLA, B. Oarcinia.
PAGLUMII (JYEX. Eugenia.
PAGPAGAN, C:ig. lllipe betis Merrill.
PAGSAINGAIN, T. Canarium lu^onicum Miq.
PAGUA, V. Musa textilis Xees. var.
PAGUILING, T\ Ficus.
PAGURINGON, B. Cratoxylum floribundum F. Vill.
PAIIAMPAC, Pamp. Gouania.
PAHO, T., V. Mangifera longipes Griff.
PAIIOII6TAN, V., T. Mangifera odorata Griff.
PAno-sfico (Cebu). Mangifera longipes Griff.
PAiitJTAN, T. Semecarpus.
PAIHOD, V. Albizzia procera Benth.
PAIHOT. Alhizzia procera Benth.
PAfLAN. lllipe betis Merrill.
PAIMAIBAI, T. Litsea.
PAIMO. Sindora wallichii, Benth.
PAINA, 'y. Hopea plagata Vidiil.

PAIPAI-AMO, T. Polypodium quercifolium L.
PAIPAISI, V. Leucas aspera Spreng.
PAIT. Micromelum.
PAIT, T. Lunasia amara Blanco.
PAIT-PAIT (Zamboanga). Lunasia amara Blanco.
PAIT-PAIT. Micromelum tephrocaipum Tuicz.
PAITAN, T. Garcinia.
PAITAN, T. Lunasia amara Blanco.
PAITAN, T. Terminalia.
PAjA-DE-MficA, Sp. Fil. Andropogon schoenanthus L.
PAJO, T. Mangifera longipes Griff.
PALAC-PALAC, T. Palaquium latifolium Blanco.
PALAD-PALAD, V. Hemigraphis repens Blanco.
PALAGÁRIUM, V. Samadera indica Gaertn.
PALAGIUM, V. Samadera indica Gaertn.
PALAOtJCON, V. Orinum asiaticum Linn.
PALALI, B. Dillenia speciosa Gilg.
PALANG. Aca ly pha.
PALANG-PAI-ANG, V. Canavalia obtusifolia DC
PALAO-AN, V. Homalomena miqueliana Schott.
PALAPAD, T. Sonneratia pagati>at Blanco.
PALAPAB, V. Alpinia brevilabris Presl.
PALAPASAGUI, V. Hyptis capitata Jacq.
PALAPIL. Flacourtea.
PALASAN, Z. Calamus albus Pers.
PALATI. Dillenia speciosa Gilg.
PALATPAT, T. Sonneratia pagatpat JJlanco.
PALAUAN, V. Daexnonorops.
PALAY, T. Oryza sutiva L.
J^ALAVEN, lg. Quercus jordanae Lng.
PALI, V. Mangifera odorata Griff.
PAL!A, V. Momordica balsamina L.
PALIÁVAJV, V. Tinospora crispa Miers.
PALICPfC-pfTO, Pamp. Sapindus turezaninowii Vid:il
PALINDÁN, T. Orania regalis Zipp.
PACING HUAI, B. Walsura robusta Roxb.
PAXINLIN, T. Buchanania.
PALIPAL, T. Maesa.
PÁLIS, T. Callicarpa bicolor Juss.
PALfTic. Ficus ameplas Burm.
PALILA, T. Momordica balsamina L.
PAL-LAM, 11. Psophocarpus tetragonolobus DC.
PALMA-BRAVA. Livinstonia rotundifolia M:\rt.
PÁI-O, T. Xylopia sp.
PALOAIIAN. Otophora spectabilis Blunie.
PALOAHAN, V. Capura.
PALOAI, B. Litsea.
PALOCIIINA, V. Cassia alata Linn.

PALO-DE-HIÉRRO, V. Xanthostcmon verdiigonianiis Naves.
PALO-DÚRO (Zamboonga). Eugenia.
PALO-MARIA, T., Pamp. Galopliyiium inophyllinn L.
PALO-MARIA, T. Vidalia lepidota F. Till.
PALO-MARIA DE M6NTE. Calopliyllum wallichianum Planch and Triana.
PALO-MARIA DE PLAYA. Calophyllum iiiopbyllum L.
PATX)-MARfANO-GCBAT, T. Vidalia navesii F. Vill.
PALONAPIN. Tarrietia sylvatica Merrill.
PALONAPOY, Z. Herftiera littoralis Dry.
PALONAPOY, Z. Tarrietia sylvalica Merrill.
PALOXKGRO. Lepidopetalum.
PAI,OXPAL6NGAN. Celosia cristata Moq.
PALO-PÁLO, B. Randia cuniin^iana Vidal.
PAi/)i»fxo. PiniiH insularis End!.
PALOSÁXTO, T. Kourea lietorophylla IMancli.
•ALOSÁNTO, T. Orophea.
PALOSANTO, T. Koordersiodendron piiinaimn Merrill.
PALOS A PIS. Shorea.
1`ALOSAPIS, T. Pinus niercunii Junjrh. and de Vriese.
PALSAHINHIN, T. Canarium cuininprii Kn§rl.
J^LSANiiiNOUfN, T. Canañttm.
PALTCJG-PALTt^CAN, Pamp. Cai'dios]H-rinuiii hulicucahuiii L.
PALNHAMUOB6CAG, V. Dysoxyhun blancoi Vidal.
PALtrNAG. Spilantlies acinelia L.
PALUMDfjYEN, Pang. Eugenia.
PALÚNAI, Pamp. Spilanthes acmella L.
PALUNGÁPOY, 11. Ueritiera littoralis "Dry.
PAMALALIAN, Cag. Sinrtora wallichii Benth.
PAMALATANGU^N, 11. Canthiiim mite Bartl.
PAMALATAGU^N, 11. Amoora.
PAMALIS, T., V., Pamp. Sida carpinifolia L.
PAMAXGPANGON, V. Boeluneria nivea H. and A.
PAMAXGQUILON, V. Amorpliopliallus campanulatus Blume.
PAMANGQITILON, V. Leea aculeata Blanco.
PAMAYUGSf CON. 1 XOVa.
PAMITA6GUEN, 11. Calophyllum inophyllum L.
PAMTTLAIN, II. Ochrocarpus pentapetalus Blanco.
PAWITLAIN, II. Calophyllum inophyllum L.
PAMITLATtX, II. Calophyllum inophyllum L.
PAMITLATIN, 11. Ochrocarpus p(Mita])etalus Blanco.
PAMLOMHOYEN, II. Eugenia.
PAM6COL, T. COCOS nucifera L.
PAMPANG, V. Musa aapientum L. va i.
PAMPAR. Kleinhovia hospita L.
PAMttrciJG, V. Pollia.
PAMtiHAT, V. Premna vostita Rchauer.
PAMULACLÁQUIX, T. Cfonocaryum tarlacense Vidal.
PAMULACLÁQUIX. T. Sym])horema luzonensis Vidal.

PAMULACLAQI'IN, T. Combretum ovalifolium Roxb.
PAMUNÓAN, V. Feronia elephantopus Corr.
PANABANG. Aglaia.
PANAB6LONG. Scaevola koenigii Vahl.
PA^ADON, T. Ardisia.
PANABOR, V. Eurycles amboinensis Herb:
PANAB6LONG, T., V. Scaevola koenigii Vahl.
PANACLA (fiulacan). Pisonia aculeata L.
PANAGufTMON, B. Diospyros.
PANALAYAPIK, T., Jl. Champereia griffithii Planch.
PANALINGAEN. Pterospermum oblicuum Bluiiie.
PANAMPAT, Pamp. Kleinhovia hospita L.
PANANCULANAN, B. Vitex.
PANANGQUfLON, V. Leea aculeata Blanco.
PANAO, T. Dipterocarpiis vernicifluus Blanco.
PANAOX, V. Klettaria.
PANAPTtiM, V. Eriantliemum bicolor Schrank.
PANAQUITIN, T. Sterculia.
PANARI^N, 11. Tacca pinnatifida Foıst.
PANAVAN, V. Tinospora crispa Miers.
PANAYANGTAG6N, V. Leea javanica Blunie.
PAXAYPAY. Memecylon.
PANCALIAN, Cag. Sindora wallichii Benth.
PANcfoo, T., V. Morindu bracteata Roxb.
PANDACAGUC, T. Tabernaemontana pandacaque Poir.
PANDACAQUE-LALAQUE, T. Rauwolfia amsoniaefolia A. DC.
PANDACAQU, T.. ^P.. Pamp. Tabernaemontana pandncaqui Mr. an 1 other species.
PANDAN, T., V. PanJuniw odoratitwiunw LHIII. f. and other sj)ecies.
PANDAN, 11. Terminalia catappa L.
PANDAN-SABOTAX, T. Pandanus.
PANDAPANDA, T. Ganophyllum fnlr«hmi Hlnnic.
PANDAPANDA, T. Dysoxylum.
PANDAYA, V. Tabernaemontaiiii [Mimijicnqui I''''-
PANGAGUASON, V. Strychnos ignatii Berg.
PANGALANGAN, T., V. Sophora tomentosa L.
PANGANAN. Quercus.
PANGANAUA, Cag. Orophea enterocarpoidea Vidal.
PANGANGT6LONG, T., V. Scaevohi kociiiirii Vahl.
PANGSSAS, Pamp. Tournefortia.
PANGAS, Z. Zingiber officinaje Linn.
PANGAS, Pamp. Curcuma longa Linn.
PANGOSIN. COCOS nucifera L.
PANGDAN, V. Pandanus odoratissimus Linn. f.
PANGDAN, T. Freycinetia luzonensis Presl.
PANTJIIAS (Dina^at). Ardisia humilis Vahl.
PANGHfNG-BtTYEX (Abra). Eugenia.
PA'NGI. T. Piui'rinm odiilo Roinw.

PAÑGIÁVAN, V. Tinospora cvispa Mcirs.
PAÑGILÍNON, 'A. Wormia,
PAÑGLANCAÉN, 11, Gelonium glomcriihiiuiti llassk.
PAÑGLOMBÓTAN, li Bugenia.
PAÑGLONBÓYEN, Ig. Loranthus.
PANT;IIAVAN. Anamirta cocculus W. and A.
PA.MIONJN. V. Cocos micifoiii L.
PÁÑGUI, **V. Pangimn** ednle **Reinw.**
PAÑGURÍÑGU, **V. Cratoxylon blancoi** Blume.
PANHÁ**CAD,** v. **Pandonus odoratfasimiu** Linn, *i.*
PANILÓÑGA-RÁCA. .M<-iincvlnn.
PANLAMBÚYEN, II. EfUgenia,
PANIÑGUINÓÑ, Z. Wormia hizonensis Vidal.
PANÍTAN. Qlobba maraniina Linn.
PANTTLAiN. Ocliroonrpiis pontappttttlus Blancf.
r wNiLTAstji-*is*. II. Calopbyllua.
PANNIKII';N. LI. Tuoca pinnatifida. Fo;at.
PANNO. Dipterocarpus vcniicillmis Blanco.
I'VNODIAM, V. Sauranja.
PANOsmftN (Tiagan). SupimhiH turczaninowii Vid.
PANSIPANSI, T,, V. Leucas aapera Spron^r.
PAjfsiPANsf, T. Hypoestes Laarfflora Wees.
PAN8iPANSfA\. T. Nyptis suaveolens Poir.
pANTtauij V. Pempbit aridula Foist.
PAirrda SANG-USA, V. Orebipeda foetida Blutne.
1'\\;u. T. DiptciocarpuB veraidfluua IManco.
PAo, II. M;iB£"ifiT;i lon^ipcs Griff.
PAOPAXAN. Mnngifnra longipfs (hiil*.
PAOPAUAN, T. Mangifera foetida Lour.
PAPACA, Z. CI iinvylon.
PAPALSIS, T. Calliearpa bicolor Juss.
PAPAS. Bolanum tuberoamn L.
PAPÁY\, **Sp. Kil. Carica papaya L**
PAPOHÓTAN. **Mangifera** longipes Griff.
PAP6KYA. Bdangifen longipee Griff.
PAPÑGIA, **/. Bngenia.**
PAPPASAY, Cag. IHipe betis **Merrill.**
pAQtJTT* Dioscor(M.
I'AIM A, T., V.. Pump. Panax fiuticosnm L.
I'AQniixc. Pamp. Kicus.
PAQUIT, T. Bioscorea.
PABACANJ II. l^liizophora inueronata Lam.
PARAGIB, T. Paftpalum<
pARAteO, V.. T. Welia azedarach L.
PÁRANG (Paransque). Alysicarpus tctnigonololms Edgw.
PAI:AÑGISÁT-IT-MANAT.vi), V. Ta.ica.
PABAPAO Ig. \l|iinia.
PARAPARÁÑÁHAN, T. Desmodiuni.

PARAPIT-HAÑSIN, T. Naravelia.
PARASAN, V. Calamus albus Pers.
PAm, V. Cissampelos parcira Linn.
PARIA, 11. Momogdica balsa mina L.
PARĩTtJLOT, T. Justicia gendarussa L.
PARNIPANSL Leucas linifolia Spreng.
PARONAPIN, II. Helicteres.
PARONAPIN, II. Heritiera littoralis Dry.
PARONAPIN, 11. Tarrietia sylvatica Merrill.
PARONGT6NG-AHAS, T. Streptocnulon baumii Decne.
PARS6TIS, T. Chenopodium ambrosioides L.
PARUA, II. Pinus insularis Endl.
PASAC. Paranarium philippensis Radlk.
PASAC, T., Z. Mimusops elengi L.
PAS Ac, T. Pygeum arboreum Endl.
PASACXA, II. Ficus.
PASAf^GiÑ, T. Canarium.
PÁSAO. Corcborus capsularis L. and other spooios
IMSAO, V. Graptophyllum hortense Nees.
PASAO-NA-BIL6G, T. Corchorus capsularis 1...
PASAO-N\-IIABA, T. Corchorus acutangulus Lam.
PASAPLA, II. Ficus.
PASASABIAJT, 11. . Liitsea.
PASCUAS. Euphorbia pulcherrima Willd.
PAsi, B. Ciimamomum.
PASIG, V. Buchanania lucida Blume.
PASITIS, T. Capsicum minimum Roxb.
PAS6TIS, T. Chenopodium ambrosioides L..
PASNIT (Tiagan). Aistonia scholaris R. Br.
PASQufT, T. Memecylon paniculatum Jack.
PASURIAO, V. Dendrobium lunatum Tjindl.
PATA, Ig. Cinnamomum pauciflorum Nees.
PATABUGUfN (Paragua). Vernonia arboroa Ifnin.
PATACT6L, Pamp. Ardisia.
PATAf-6oo, V. Tournefortia sarmentosa L.
PATALO, T. Commersonia platypliylla Amir.
PATANI, V. Phaseolus lunatus Linn.
PATANING-DAGAT, T. Canavalia ensiformis DC.
PATAPTO. Ardisia.
PATATAS, Sp. Fil. Solanum tuberosum Linn.
PAT£PUT, T. Maesa.
PATICAN, V. Caryota rumphiana]Vfjirt.
PATfNl (Mindoro). Phaseolus tunkinensis Lour.
PATfPOI. (Morong). Maesa.
PoT6r.Af T., V. Luffa aogyptiaca Mill, and other sprcios.
POT6T.O, T. Commersonia platyphylla Andr.
PATfjno, T'. Cycas circinalis L.
PATÍHAN (Mindoro). Litsea.

PAUHAPI, T. Shorea.
PAUNN&AGAN, T. Castanopsis philippinensis Viclal.
PAI5TAN, T. Santiria.
PAUPAtiTAir, T. Mangifern.
PAYALE. Timonius philippinensis Merrill.
PAYAN&CA (Bulacan). Flemingia.
PAYANGPAYANG, T. Desmodium pulchellum Benth.
PAYANGUIT, V. Marsdenia tinctoria R. Br.
PÁYAOPÁYAO, V. Monochoria hastaefolia Presl.
PAYAPA, T. Ficus payapa Blanco.
PAYIIOD. Albizzia procera Benth.
PAYNA, T. Scolopia.
PAYONG-PAYONG, V. Cyperus.
PAYONG-PAY6NGAN, T. Boletus.
PAYPAYST, V. Leucas aspera Spreng.
PEOP£D, II. Casearia.
PKL6TAN. Rhizophora mucronata Lam.
PEPINO, Sp. Cucumis sativus L.
PEpfTA, T. Strychnos ignatii Berg.
PEPITA-DE-SAN IGNACIO, Sp. Fil. Strychnos ignatii Berg.
PEP1TA-SA-CATBAL6NGAN, V.? T., B., Pamp. Strychnos ignatii Berg.
PERNAMBCCO, Sp. Fil. Gossypimn barbadonse L.
PET^TAN, T. Bruguiera gyninorrhiza Lam.
PIAGAO, T. Xylocarpus obovatus Juss.
PiAio, V. Agathis loranthifolia Salisb.
PIAPI, T., V. Avicennia officinalis L.
PIÁS, II. Averrhoa bilimbi L.
PIAYO, V. Agathis loranthifolia Salisb.
PICII£L, T. Nepenthes.
PIDPID, II. Casearia.
PILA. Codiaeum variegatum Blume.
PILANI,. T. Canarium luzonicuni Miq.
PILAPIX, T.? Scolopia.
PILAUI, T. Canarium ovatnin *En?},*
PiLDis, Pamp. Garcinia.
PIL£U, V. Ficus.
PfLT, T. Canarium luzonicum Miq.
PfLi, V., T. (Canarium ovatum Engl.
PfLi (Zamboanga). Gelonium.
PfLic (Cebu). Ficus.
PILI-PILAUAY, T. Canarium eonimune L.
PiLfpoG, V. Cocos nucifera Linn.^
PILIPUD, V. Mallotus ricinioides Muell. Arg.
Pfos, V. Abutilon indicum G. Don.
PfLiT, B. Pemphis aciduhi Font.
PiMlfiNTA^ Sp. Piper nigrum L.
PIMI£NTANG-BUND6C, T.- Piper philippinum Miq.
PTXXTT. Canarinn lu/^iiiirum Miq.

PÍNANG, V. Areca alba Rum ph.
PINCABANAO, T. UUXUS rolfei Vidal.
PINCAPÍNCA, T. Oroxylum indicum 'L.
PINCAPINCAHAN, T. Oroxylum indicum L.
PING6L, T. Engelhardtia.
PING6L-BAT6, T. Begonia rhombicarpa A. DC.
PiNtf AN, Ig. Maoutia pi a ty stigma Wedd.
PIÑA, Sp. Fil." Ananassa sativa Lindl.
PIÑ6NES, V. Quisqualis indica Linn.
Pin, V. Litsea garciae Vidal.
Pfpi, V. Albizzia retusa Benth.
Pfpi, V. Semecarpus macrophylla Męrrill.
Pipisfc, T. Aegiceras corniculatum Blanco.
PiPlSic, T. Aegiceraa floridum R. and S.
PiPisic, T. Avicennia officinalis L.
PiPisio, T. Scyphiphora hydrophyllacea Gaertn.
PIRAPIT-ANĞIN, Pamp. Vitis repens W. and A.
PIRAS, T. Evodia roxburghiana Benth.
PJRIS, T. Clausena.
PiRiS, T. Garcinia.
Pis A, T. Canarium luzonicum Miq.
PISANG-DAYA, T. Mimusops.
Pisic. Aegiceras corniculata Blanco.
PIS6NG, T. Citrus aurantium Linn. var.
Pissic, V. Centripeda orbicularis Lour.
PITA, II. Ananassa sativa Lindl.
PITA (Cebu). Agave amęricana L.
PIT6GO, T. Cycas circinalis Linn.
PLATANO, Sp. Musa sapientum L. var.
P6AS, T. Harpullia blancoi F. Vill.
POCOTP6COT, V., Pamp. Trichosanthes anguina L.
P6LANG-P6IIANG (Iloilo). Ipomoea pes-caprae Forst.
POLAYAGAN, T. Bursera javanica Baill.
POL^O. Verbena bonariensis L.
PCML6GAN, V. Dioscorea.
POLONIA, T. .Alpinia cernua Roxb.
PoÑGÁPON, T. Amorphophallus paniculatus Blume.
PÓÑGLO-POÑVGL6AN. Corchorus capsularis L.
PÓÑGO. Dipterocarpus vernicifluus Blanco.
POXOAN, V. Feronia elephantum^Correa.
PONOAN, V. Samadera indica Gaertn.
PORAO, II. Toona ciliata Royle.
P6RAS, V. Phyllanthus disticlius Muoll. Arg.
P6RO. Piper betle L.
POSTALAGON. Gomphia angustifolia Valil.
PosTAtAooN, Z. Mimusops.
POTAT, T. Barringtonia racemosa Blume.

POTAT, T. Aralia javanica Miq.
POTIAN, T. Eugenia.
POT6C. • Cyperus.
POTOCAN, T. Physalis peruviana L.
POT6C-POTOCAN, T. Physalis peruviana L.
POT6T, V. Cocos nucifera Linn.
POTOTAN, T. Bruguiera ritchieii Merrill.
POTOTAN, V. Ceriops candolleana Am.
POTOTAN. Rhizophora mucronata Lam.
Pottaso, Pamp. Jasminum sambac Ait.
PtJAS. Harpullia blancoi Vidal.
PucoptfcoT, V., Pamp. Trichosanthes anguina L.
PUGAHAN, T. Caryota cumingii Mart.
PUGAHAN, T. Arenga saccharifera* Lab.
PUGAHAN, T. Caryota urens L.
PtfGANG, V. Dioscorea.
PUGAUY. Decaspermum ?.
PUIGAP.UIGAHAN, T. Arthrophyllum.
PULANG-BALAT. Eugenia.
PULAT, T. Linociera coriacea Vid.?
PULAT. Barringtonia racemosa Blume.
PULAYAGAN. Bursera javanica Baill.
PtJLUG (Zamboanga). Kibara coriacea Perk.
PUNGAPUNG, V., T, Amorphophallus campanulatus Blume.
PUNTAS-PUNTAS, T. Ipomoea paniculata R. Br.
PuQUfNGANG, T. Chitoria ternatea L.
PURA, B. Saurauja.
PURIQUET, II. Pisonia aculeata L.
Puso-PtJSO, T. Litsea chinensis Lam.
Puso-Ptjso (Mindoro). Buchanania florida Schauer.
Puso-pt>so, T. Eugenia.
Puso-Pt>so (Tayabas). Agrotistachys maesoana Vidal.
Puso-Ptjso (Marinduque). Quercus castellaranauiana Vidal.
PUTAD, T. Barringtonia racemosa Blume.
PUTAT, T. Barringtonia racemosa Blume.
PurfiNG, T. Linociera.
PUTIAN, T. Eugenia.
PuTPtTTAY, B. Ehretia buxifolia Roxb.
PUTUOAN, T. Hibiscus abelmoschus L.
PuTth> (Nueva-Viscaya). Viburnum luSbnicum Rolfe.

QUETQUÉT, *lg.* Deutzia pulchra Vidal.
QUIAPO, T. Pistia stratiotes L.
QUIAQUIA, Z. Pometia.
QUIBAL, T. Vigna catjang Endl.
QUIBAL, T. Dolichos.
QUTT-AA, V. Cordyline.

QUILALA, V. Saccharum officinarum L.
QUILALA, V. Musa.
QUILAMO, T. Crypteronia paniculata Blume.
QUILÁP, T. Uncaria.
QUILING, T. Bambusa.
QuiLiNGfVA, V. Averrhoa bilimbi L.
QUILITE. Amaranthus spinosus L.
QUILITIS, T. Amaranthus spinosus L.
QUINAMB6Y, V. Curcuma longa L.
QUINAMPAI (Cebu). Dioscorea.
QUINA-PÉSTULA, T. Cassia fistula L.
QUIMP6Y, V. Colocasia antiquorum Schott.
QUINANDA, T. Oryza sativa L. var.
QUINANAYAN, T. Musa paradisiaca L. var.
QUINASAICASAI, T. Adenanthera pavonina !••
QufxAY-QuiNAY, T. Pterospermum.
QUINDAY6HAN, T. Celosia argentea L.
QUINTANA, T. Melia candollei Juss.
QuiNTASfN, B. Ixora.
QtJio, T. Ardisia.
QUIRAP, T. Sumbavia rottleroides Baill.
QUIR6I, T. Dioscorea sativa L.
QUISOL, V. Kaempheria galanga L.
QufTA-QufTA, II. Xylia.
QufTA-QufTA, II. Albizzia.
QUITA-QUITA, II. Bischofia javanica Blume.
QuiTfcoT, V. Capsicum minimum Roxb.
QUIUATUL^AN, T. Erianthenmm bicolor Schrank.
QuENAtusct^A, T. Hoya.
QUER6E, T. Dioscorea.
QUES^RO. Bonibax malabaricum L.

R.

RAQUIJVDI, Pamp. Hibiscus tiliaceus L..
RAIZ-DE-M6RAS, Sp. Fil. Andropogon schoenanthus L.
RAMI, Sp. Bohemeria nivea H. and A.
RATIPAN, II. Arenga saccharifera Lab.
RAY-YARAY-YA, II. Ficus.
RIMA, T., V. Artocarpus inci^a L.
RiMO, T. Artocarpus incisa L. f.
RIRAO, B. Palaquium.
ROCN6HAN, T., V. Sophora tomentosa L.
R6MA, T., V. Acacia farnesiana Willd.
ROMÉRO, Sp. Rosmarinus officinal is Linn.
R6CTAS. Smilax.
R6SAS-CABALLERO, Sp. Fil. Caesalpina pulcherrima S\v.
R6SAS-DE-PERSIA, Sp. Fil. Pancratum zeylanicum L.
R6SAS-SA-BABAY, V. Vinca rosea Linn.
R^MBANG, V. Aleuritee moluccana Willd.

S.

SAANG-CABAYO, T. Scoparia dulcis Linn.
SABA, T. Mallotus.
SABA, II. Musa sapientum L. var.
SABAÎSTG-VISÂYA. Musa paradisiaca L.
SABIA, T. Piper caninum Dietr.
SABILA, T. »Vanda lissochiloides Lindl.
SABILA, T. Aloe barbadensis Mill.
SABILAO, V. Commelina benghalensis L.
SABILAO, V. Cyanotis axillaris Roem. and Shult.
SABILÁO-NG̃A-LABA-AN, V. Commelina benghalensis L.
SABLES. Asplenium nidus L.
SABLOT, I]. Litsea chinensis Lam.
SABN£T, T. Rubus.
SABONG-SAB6NG̃AN, T. Eleusine indica Gaertn.
SAB6NG-SAB6NG̃AN, T. Panicum flavidum Retz.
SABOT AN, T. Pandanus sabotan Blanco.
SÁBUNG-SABÓXG̃AN, T. Paspalum.
SÁBAY (Tiagan). Colocasia antiquorum Schott.
SACAT, T. Terminalia nitens Preal.
SACSAC, V. Metroxylon.
SACSIC, T. Areca catechu L.
SADAC, Ig. Ichnocarpus ovatifolius A. DC.
SADtJNGAN, V. Garcinia cowa Roxb.
SAGA, Z. Nipa fructicans Wurmb.
SAGA, T. Abrus precatorius L.
SAGAD, IT. Vitex littoralis Decne.
SAGAMAMfx, T. Abrus precatorius L.
SAGAPSAP, V. Chionanthes.
SAGSA, V. Glochidion littorale Blume.
SAGASA. Lumnitzerìa purpurea Prcsl.
SAG As A, T. Scyphiphora hydropliyllacea Gaertn.
SAGASA, T. Osbornia octodonta F. Vill.
SAGA-SAGA, T. Abrus precatorius L.
SAGAT, 11. Vitex littoralis Decne.
SAGAY, V. Claoxylon indicum Hassk.
SAGAY-CANÓAT. Zanthophyllum oxyphylluin L.
SAGID, V. Parameria philippinensis Radlk.
SAGIN, T. Pinus insularis Kndl.
SAGING, T., V. Musa sapientum L.
SAGIT, T. Parameria philippinensis Radlk.
SAGK1, T. JUicium anisatum L.
SAGMIT, T. Ruhus rosaefolius Smith.
SAGNIT, T. Mezoneurum glabrum Desf.
SAG6MAT. Psychotria malayana Jack.
SAGC. Caryota urens L.
SAGUILALÁ, T. Cory del ine.

SAIJUILALA, T. (Jodiaeuin **variegatum** Mucll. ATg.
SÁGUI-••; **T. Musa** panulisiaca L. var.
SÁGUING-N\.\Ú-CALAO, B. Myristica.
HAGUIITO-SÁGUING, V, Canna indica L.
SÁGUIN-SAGiiv.w, T. Aegiceras cornicululum Blanco.
SXQUIS-SAGUIK-ESTACAS. **Aegieeraa oornicttlatum Blanco.**
SAGUINsiN, V. Memecylon edule RoxL.
SAGUINsiK. Agiceras.
SAGUIT. Lunnsia **amara** Bluneo.
SAGurfyATE, V. Tectomi grandis **L.** *t*
S.VIA, I'.. *V.* **Mallotua philippineosia Muell.**
SÁi.A. M;il!i>lu> **ricinoidea WLuell.** Ar^'.
8ALAB, **T. Cupaoia regolaria Blume.**
SALAJJ, **T. Hemigyroaa** cunesceng Thw.
SALADAV. **ST. Eryeibe** paniculata Roxlx
SALABAY. ZanUioxyluni oxyph\ Ihini Edgew.
SÁL\.*Q.* **Hemigyrosa** cano-cens T-,^\\
SAL**Loo,** \". Fliiilcri;! perfottetkui:] **B. and** H.
SALÁGO, T., \'. **Wikstroemia indioa** iley.
N.VIAGSÁLAG, **P. Trichosontbea anguina** I.
SAL iiii J.N •!•! i \. Amooni rohittika W. and A.
SAIAGUISO I.\limy), Lcueosyke hispidisshna Miq.
N.\LAI, **T. Aadropogon** sehoenaiitims L.
SAL\ii>. **Andropogon** scboonanllius L.
SALAMCÑGAY, F*. Aglaia.
SALANOCUGU I. Albizzlia tomcntosa Miq.
SAL vi'Ao, T. Ventilftgo nifideraspataiuL (inertn.
SALÁPONG, **T. Modecca cardiopbylla Mart,**
BALAQI **i. T. Amooro** J»LJ rottetiana C. DC.
SAL tQOlj T, (J)iisoclietA)n ceramieufl Miq.
SAI.AQuiwQ-i'ULA, T. Anioorn **roMtufca W.** and A.
SALARÁBAN, B. I'.ugenia.
SALASÁN, T. Crypteronia.
SALASANDÍA, V. lpon oea pes-tigridis Linn.
SÁL tr, V. /uTitliow **I urn 0x3 phyllmn I** dgew.
SÁLAY, **1'.m 1 p. Zanthoxyhnn avicennaia DC.**
SÁLAY, *V.* **Bomba^malabarimun !** DC.
SÁLAY, **I. Andropogon scboenantime L.**
SÁLAY-CÁÑGAY, **Pamp.** Xanthoxylum av**ift?nnae DC.**
SALAYSAV. 'IVritjin alia eat**ippa U**
SALBÁC, Pamp., V. A!|'ini;i **gigantea** L.
SÁLENG, tl. fiim- **insularis** Endl.
SALEOÁSOL, V. Areca **triandria Roxb.**
SALIBANGBÁNG, **V. Crinum asiaticom Linn.**
. S A I • NGBÁNG, *V.* Buiiliin in.
SALILÍHAN, V. Deca**^ermmn paaiouIatraB Turcz.**
SAL iu \!;A. T. Piper.
RAIMÓMO, *V.* **Gapparia naiorantha DG.**

SALIM6MO, T. Ehretia philippinensis A. DC.
SALIMP6COT, T. Trichosanthes anguina L.
SALINCÁPA. Vitex littoral is Decne.
SALING-B6BOG, V., T. Crataeva religiosa Forst.
SALING-OUAC, V. Clerodendron maei·ostegium Schauer.
SÁLING-OUAC-N&A-MAITUM, V. Clerodendron bianco a num F. Vill.
SALING-SAGUING, B. Agiceras corniculatum Blanco.
SALIPAPA (Albay). Vitex.
SALISAY. Terminalia catappa L.
SAL-LACÁPO, II. Tournefortia sarmentoaa L.
SAL-LADAY. Connarus ferrugineus Jack.
SAL-LOCAPO, II. Tournefortia.
SAL6AG, V. Ptychosperma punicea Miq.
SAL6GO, V. Pandanus.
SALOMAGUE, 11. Tamarindus indica L.
SALONG, Z. Pinus mercusii J. and de V.
S A LONG, V. Canarium multi pinnatum Llanos.
SAL6YONG, T. Corchorus olitorius L.
SALSALIDA, V. Mollugo pentaphylla l^inn.
SALUDSALÚD. Nepenthes ventricosa Blanco.
SALUMÁGUI, 11. Tamarindus indica L.
SAJLUNG (Paragua). Canarium.
SALUPISIN (Bontoc). Podocarpus.
SAMAC, II. Macaranga tanarius Muell. Arg.
SAMAC, Pamp. Melochia.
SAMALAGUI, V. Tamarindus indica Linn.
SAMAT, Pamp. Piper betle L.
SAMBÁC, B. Tamarindus indica L.
SAMAT, Pamp. Piper betle L.
SAMBAGUI, V. Tamarindus indica Linn.
SAMBALABÚJAN. Koordersoidendron pinnatum Merrill.
SAMBALAGUI, V. Tamarindus indica Linn.
SAMBÁLE, T. Eleusine indica Gaertn.
SAMBILAO, V. Commelina communis Linn.
SAMB6N, T., Pamp. Blumea balsamifera DC.
SAMB6NO, T. Blumea balsamifera DC.
SAMBONG GALA, T. Sphaeranthus indicus L. '
SAMIJ6NG GALA, T. Pterocaulon eylindrostachyum Clarke.
SAMBUALAU, V. Nephelium.
SAMBULAGUAN. Koordersoidendron pinnatum **Merrill.**
SAMBULX̌JAN (Mindoro). Hopea.
SAMBX̌JNG, T. Blumea balsamifera DC.
SAMBt;NG-c6LA, T. Buddleia asiatica Lour.
SAMILIN, T. Cinnamomum.
SAMPAC, T. Michelia champaca L.
SAMPACA, T. Michelia champaca L.
SAMPAGA, T. Jasminum sambac Ait.
SAMPÁGA-DEL-M6NTE, T. Gynura angulosa DC.

SAMPAGANG, Pamp. Jasminum sambac Ait.
SAMPAGUITA. Jasseminum sambac Ait.
SAMPALAGUI, B. Tamarindus indica L.
SAMPALÍA, V. Momordica balsamina L.
SAMPALOC, T., B., Pamp. Tamarindus indica L.
SAMPAIX>C-SAMPAL6CAN, T. Dalea nigra Mart, and Gal.
SAMPÁNG, T. Vitis geniculata Blume.
SAMPAPARE, V. Cissampelos pareira Linn.
SAN-ANT6NIO. Bauhinia tomentosa Linn.
SANDALAITAN, T. Sophora tomentosa L.
SANDANA, T., V. Anisoptera thurifera Blume.
SANDANA, V. Cedrela taratara, Blume.
SAND AN A. Anisoptera oblonga Dyer.
SANDANA, T., V. Anisoptera thurifera F. Vill.
8AN-FRANcfsco, Sp.-Fil. Codiaeum variegatum Blume.
SANGAY (Zamboanga). Caladium bicolor Vent.
SANGC6YLANG, V. Bridelia stipularis Blume.
SANGDIG£QUIT, T. Plumbago zeylanica L.
SANGII-O, V. Piper corylistachyon C. DC.
SANGITAN?. Gelonium glomerulatum Hassk.
SANG CM AI, T. Triclioglottis rigida Blume.
SANGUMAIN, T. Dendrobium.
SANGÚMAY, T. Panicum indicum L.
SANQUÉ, V. Pterocarpus hlnn^oi Morrill.
SANQUf, T. Clausena.
SANSALI, T. Sapindus.
SANSAO. Cissampelos pareira Linn.
SANSA6SAN-SANSA6SAN, T. Cissampelos pareira Ii.
SANTAN, T. Ixora stricta Roxb.
SANTA ANA. Ixora stricta Roxb.
SANTA HELENA. Leucaena glauca Benth.
SANTA MARIA. Artemisia vulgaris L.
SANTAN, T. Ixora coccinea L.
SANTIAGO, V. Acacia farnesiana Willd.
SANT6L„ T., V. Sandoricum indicum L.
SANT6R (Zamboanga). Sandoricum indicum L.
SAOG, V. Piper corylistachyon C. DC.
SAPANG, T., II. Caesalpinia sappan L.
SAPISNOT, T. Hibiscus.
SAPftco, Ig. Pollia thyrsiflora Endl.
SAPINIT, V. Rubus glomeratus Blume.
SAPINIT, T. Schrankia aculeata Willd.
SAPfNIT, T. Rubus rosaefolius Smith.
SAPfNIT, V. Hibiscus abelmoschus L.
SAPfNIT, T., V. Caesalpinia nuga Ait.
SAPINSAPIN, T. Peristrophe contorta Blanco.
SAPiNSAPfN, T. Blechnum brownei Juss.
SAPIT-USA · (Albay). Tabernaemontana.

SAPJLIT, B. Albizzia.
S A PI.´tJNG AN-COLORADO. Chisochaeton.
SAPLtyN̆GAN, T. Hopea plagata Vid.
SAPINTIT, T., Pamp. Mezoneurum glabrum Desf.
SAPNIT, T. Rubus.
SAPOL6N̆QAN, T. Hopea plagata.Vidal.
SAP6TE. Diospyros ebenaster Retz.
SABAMO, V. Achyranthes aspera L.
SARANQ-PUTI, V. Euonymus.
SARASA, T. Graptophyllum hortense Noes.
SÁRAY, Cag. Shorea guiso Blume.
SARIPONGP6NG, B. Litsea.
SAROC, Ig. Pogostemon cablin Benth.
SARSALIDA, T. Mollugo oppositifolia L.
SASA, T. Nipa fructicana Wurmb.
SATING-CAGAN, B. Cratoxylon floribundum F. Vill.
SAUA-SAUA. Scolopia dasyanthera Benth.
SAUA-SAUA, V. Flacourtia sepiaria Roxb.
SAtJCE. Salix azaolann, Blanco.
SAXJCE. Sambucua javanica Blume.
SATJSATJLI. Sapindus turczinanowii Vid.
SAUSAXT6LI, T.? Cupania.
SAYCtJA, V. Luffa acutangula Roxb.
SAYICAN, T. Portulaca quadrifida L.
SAYICAN, T. Euphorbia pilulifera L.
SAYICAN, T. Portulaca oleracea L.
SAYICAN, T. Euphorbia pilulifera L.
SAYO, *Ig*. Weinmannia luzonien^is Vidal.
SELBANG. Erythrina indica Lam
Sf AC, V. Excoecaria a gal loch a J^.
SIB6G, T. Acacia concinna DC.
SIBUCAO, V., T. Cacsalpinia sappan L.
SiutrYAS, T., Pamp. Allium cepa L.
SIB6TAS-SA-TAAL. Allium porrum Linn.
SIB6YAS-SONGS6NG. Allium jaquemontii Kunth.
SICÁTEG, V. Morinda bracteata Roxb.
Sfco, V. Achras sapota Linn.
SfcAY, V. Ltagenaria vulgaris Seringe.
SiEMPREvfvA, Sp. Fil. Kalanchoe laciniata DC.
SIGAX-DAGAT, B. Cordia subcordata Lam.
SIGANG-DAGAT, T. Elephantopus spicatus Juss.
SIGGAY, Tl. Hopea plagata Vidal.
SfiT, V. TVlezoneurum glabrum Desf.
SfLAC, II. Corypha umbraculifera L.
SILAO. Dolichos scsquipedalis L.
SiLASfLA, T. Derris uliginosa Benth.
SILHIG6TT, V. Sida carpinifolia L.
Sfr.T, T. Capsicum minimum Roxb.

SILISÍLI, T. Jabiiiiiiiuiu iiiarianuui DC.
SILISILI. Plectrona moluccana Merrill.
SILISILIHAN, T. Cleome viscosa L.
SILIPAO, T. Ventilago maderaspatana Gaertn
SILISI AN, T. Cleome viscosa L.
SiLisfHAisr. Gynandropsis pentaphylla DC
SILISILAIIAIST, T. Cleome viscosa L.
SILISILIHAN, T. Sphenoclea zeylanica L.
SILISILIHAN, T. Krianthemum bicolor Schrank.
SINALIGAN, 11. Cordia blancoi, Vidal.
SINAMPÁGA, T. Randia dumetorum L.
SINCAMÁS, T. Pachyrhyzus angulatus Rich.
SINCAMAS-ASO, T. Pueraria javanica Benth.
SI;NC6YLANG, V. Bride! ia stipularis Blume.
SIND6C, T. Cinnamomum.
SÍNGON, Tg. Vernonia.
SINGCULCÚGOS, T. Jasminum marianum DC.
SINGÍTAN, *Ig.* Jasminum luzoniensis Vidal.
SÍNIT. Memecylon.
SINT6XIS, T. Citrus aurantium Linn.
SfpiT-ciAiT. Leea javanica Blume?.
SIPIT-OLAG. Smilax latifolia Blanco.
Sn«ic-pt:*YO, V. Lippia nodiflora Rich.
SIRIJICCLAS, T. Spondias pnrpurea L#
SiRfQUE. Quercus vidalii F. Vill.
Sfsio, V. Physalis angulata Li.
Sfsio, V. Physalis peruviana X*.
SISIÓHAN, Pamp. Kuphorbia pilulifera L*.
SITAO (Manila). \Tigna catjang Endl.
SoAr„ T. Cyathocalyx zeylanicus Champ.
VSOBOSABO, T. Terminalia.
SOBS6B, Tl. Blumea balsam if era DC.
SOBS6GAX-B6GO, B. Oeunsia cumingriana Rolfe.
SOGOKS6GON, V. Nepenthes gracilis Korth.
SOLÁSI, T. Ocimum basilicum L.
SOLASOLASIAN, T. Leucas aspera Spreng.
SOLIXAO, T. Maesa gaudichaudii A. DC.
SÒL6NTJA, V. Impatiens balsamina Li.
SoNTfNG, T. Cassia alata *Ti*
S6OB-CABAYO, T. Hyptis suaveolens Pbir.
SOROGS6ROG, T., Pamp. Euphorbia neriifolia T-.
SOY6SOY, Ig. 141 him philippinense Bakor.
StJA, II. Citrus.
StrAL. Bruguiera.
SUBIAN-DAOA. Ploctronia.
SUBSÚBAN, T. Polygonum barbatum T-.
SÚCAO. 11. N''elumbium speciosum T-.
SuD-sth>, V, Cjyperus.

SUD-SCD, V. Kyllinga monocephala Rottb.
SUGANDA, T. Coleus.
StfGPON-stfcPON, V. Vitis quadrangularis Wall.
SuostJ'GA, lg. Aralia hypoleuca Presl.
StJHA (Batangas). Citrus hystrix DC.
SULAMIOG, V. Ficus pseudopalina Blanco.
SULASI, T. Ocimum basilicum L..
SULBANG, Pamp. Erythrina indica L.
SuLf AC-DAGA, T. Plectronia.
Sur.fPA. Gardenia pseudopsidium Blanco.
SuLfAC-DAGA. Canthium horridum Blume.
SULIAO, V. Dendrobium lunatum Lindl.
SuLUDSt5r.UD, V. Nepenthes gracilis Korth.
StJMA, T., V., Pamp. Anamirta cocculus W. and A.
StrMAG, Pamp. Elephantopus spicatus Juss.
SUMALAGUI, V. Tamarindus indica L.
StJN?jUT-oi,ANG, V. Breynia cernua Muell.
StJNTGOT-OLANG, V. Phyllanthus reticulatus Muell.
SUNTING, V., T. Cassia alata L.
StJPA, T. Sindora wallichii Benth.
St^PiT-CAfG, T. Lieea javanica Blume.
SURANTGA, V. Impatiens balsamina L.
SUBANSUKAN. Gordonia luzonica Vidal.
86ROG-S6ROG, T., Pamp. Kuphorbia neriifolia L».
86RO-S6KO, T., Pamp. Euphorbia neriifolia L.
SuRStJB, Pamp. Cyperus rotundus L.
StJSONG-CALABAo, T., V. XJvaria purpurea Blume.
SCNTENG. Cassia alata L*.
St^GPON-StJGPON, V. Vitis.
SUBAN-SURAN, V. Gordonia.
SUSOCAY6LT, T. Oxalis corniculata L.
StJSOi, T. *Crotalaria quinquefolia L.
StJSONG-CALJkBAo, T. Unona.
StJSOisro-DAMfXLAG, Pamp. Uvaria.
StrisoNG-DAMtJLAG, Pamp. Artabotrys.
SUSOSUS6YAN, T. Crotalaria quinquefolia L.
SuspfROS, Sp. Mirabilis jalapa L.

T.

TAAL?, V. Chamaerops excelsa J^inn.
TAAL, T. Afzelia bijuga A. Gray.
TARACO, Sp. Fil. Nicotiana tabacum L.
TABACO-TABAC6H;AN. Solanum verbascifolium L.
TABAG. Hernandia peltata Meissn.
TABANTGAN, Cag. Lagerstroemia speciosa Pers.
TABA-TABA, V. Mussaenda grandiflora Rolfe.
TAB AT AII AC AH AN, T. Elephantopus scaber L.
TABAYAC (Iloilo). Piper subpeltatum Willd.

TAGÁTOI, T. lllipe.
TAG6GON, Z. Tenninalia.
TAGOISMON, B. Diospyros.
TAGPA, C. Pterocarpus.
TAGP6, T. Ardisia.
TAGP6, T. Psychotria malayana Jack. "
TAGPCNG-PULA, T. Ardisia.
TAGtxc-TAGtJc, V. Parameria philippinensis Radlk.
TAGUILMA. Heptapleurum.
TAGufMAN, V. Ardisia perrottetiana A. DC.
TAGUIPAN. Clerodendron lanuginosum Blume.
TAGUIPAN. Caryota urens L.
TAGUIP-ASIN, T. Mallotus moluccanus Muell. Arg.
TAOufp-s6so. Hydrocotyle asiatica L.
TAGUISAN-BAYAUAG (Unisan). Ficus.
TAGUISI, T. Bambusa.
TAGULAUAY, T., V. Parameria philippinensis Radlk.
TAGULAUAY. Ficus.
TAGULINAO, T., Pamp. Emilia sonchifolia DC.
TAGUIP-CÚIIOL. Hydrocotyle asiatica L.
TAGUM, V. Indigofera tinctoria L.
TAGUM, V. Indigofera teysmanni Miq.
TAGUM-TAGUM, V. Tephrosia luzoniensis Vogel.
TAGUM-TAGUM, V. Indigofera tinctoria L.
TAGUNG, V. Indigofera tinctoria L.
TAGUSTÚS, V. Scaevola koenigii Vahl.
TAGÚTONG, V. Solanum ferox L.
TAHAD-LABTS'YO, T. Cudrania javanensis Tree, and other species.
TAHfT-LABtJYOc, F. Allaenthus.
TAH6D-NGA-ILAHAS, V. Ixora fulgens Roxb.
TAI£TI, Ig. Alsophila glauca Blume.
TAINANAC, Bambusa.
TAINGANG-DAGA. Oxalis corniculata L.
TAIRIS, V. Alpinia previlabris Presl.
TAITAI, V. Paederia foetida L.
TAIUANAC, T. Bambusa blancoi Steud.
TALA, T. Limnophilia roxburgii G. Don.
TALACATAC, T. Castanopsis philippinensis Vidal.
TALACTAC, II. Capparis harrida L. f.
TALAHID, T. Anthistiria gigantea Cav.
TALAILO, T,, V., Pamp. Nymphsiea lotus Linn.
TALAMPAY, T. Solanum.
TALAMP6NAT, T., Pamp. Daturu alba Nees.
TALAMP6NAi-NA-rrfM, T. Datura fastuosa L.
TALANAS, T. Zizyphus.
TALANCAO, II. Plumbago zeylanica L.
TALANG, T., Pamp. Diospyros discolor Willd.
TALANQ-BOTLO, T. Solanum sanctum L.

TALANG-BUND6C, T. Myristica guatteriifolia A. JXJ.
TALANGCAW, II. Plumbago zeylanica L.
TALANG-GI^BAT, T. .Dio.spyros embryopteris Pers.
TALANG-INDONG, B. Strychnos.
TALANG-TALANG, T. Myristica philippinensis Lain.
TALANISOY, B. Tabernaemontana.
TALA6NOR, V. Eurycles amboinensis Herb.
TALALABACO, V. Sphaeranthus africanus L.
TALATALA, Pamp. Liinnophila menthastrum Bentli.
TÁLA-TALARUM, T. Aristolochia tagala Cham.
TAXAtJYO, T. Thmeda gigantea L..
TALÁYLO. Nymphaea lotus L.
TAT.BAC, Pamp. Alpinia.
TALIANTAN, T. Leea.
TALIANTAR, Pamp. Morinda bracteata Roxb.
TALIB6BONG, V. Ehretia philippinensis A. DC.
TALIC-HARAP (Tayabas). Mussaendn.
TALICN6NO, T. Buddleia.
TALICORAN, T. Hippeastrum mini.atum Herb.
TALICOT, V. Ficus.
TALICTÁN, T., Pamp. Dysoxylum blancoi Vidal.
TALICUT. Ficus.
TALIGANA, Z. Pterospermum.
TALiMtiRONG, T. Mitrephora reticulata H. f. and Th..
TALIMISRONG, Pang. Cyclostemon."
TALINGHARAP, T. Anisomelis ovata R. Br.
TALTNO-CNO, Pamp. Capura.
TALIP6PO, V. Mimusops elengi L*.
TALISAI, T., V., Pamp. Terminalia catappa *IJ.*
TALOCNASI. Pygeum.
TALOCT6N, Z. Gomphia angustifolia Vahl.
TAL6DA, T. Calamus buroensis Mart.
TAT,6LON (Marinduque). Quisqualis indica L.
TAL6r.ONG, II. Cudrania javanensis Tree.
TAL6LONG, II. Allaenthus.
TALONG, T., V. Solanum melongena 'L.
TAr.ONG-Gt)BAT, T. Solanum ferox L.
TAL6]?^ON, T. Solanum.
TALONPtfcNAY. Datura metel L.
TAL6SAN, T. Helicteres spicata Colb.
TAT,O9TOS. Leea.
TAL6TO, T. Pterocymbium javanicum R. Br.
TAIX>T6-ON (Beriguet). Ilex.
TAi-tr.cTOc (Nueva Ecija). Ficus.
TALÚNGUN, V. Gmelina villosa Roxb.
TALÚTO. Pterocymbium javanicum R. Br.
TALÚTÚ, V. Bombax malabaricum DC.
TAMANÍAN. Calophyllum inophyllum L.

TAMARÍNDO, Sp. Fil. Tamarindus indica Linn.
TAMAUÍAN, T. Calophyllum inophyllum L.
TAMAÚYAN. Gymnospo[illegible] **y m L.**
n[a] ambigaa Vi.lal.
TAMAÚYAN-PULÁ **(Tayaba3j** *** «a t a -.**
TAMAÚYAN-PUTÍ,
TAMBÁL, T. Eur[illegible] 2. Gynmospori;,
TAMBALAHÁSE. i amboinensis Herb.'
TAMBALAGUÍSAI, [illegible] **CaUicarpa** cana L.
TAMBALÍSA, V. [illegible] Sophora tomentosa L.
TAMBALÍSA, V. Cassia occidentalis Linn.
TAMBAO, T. V. Sophora tomentosa L.
TÁMBAO, T. [illegible]ristica.
TAMBÍS. **Eugenia.**
TAMBÍT (Dinagat). Eugenia,
TAMB[illegible]a, T. JMiragmitea roxb[illegible]urghii Nees.
TAMBÓN-TAMBÓN (Tayaba[illegible] . Mallotus ricinoides Muell. Arg.
TAMBÓ [illegible] Casearia moluccana Blume.
TÁMBU-HAS[illegible] tenr, a Eugeni,
TAAIIS, V. Dioscorea.
TAM-JS, V. Coeos nudfera Linn
TA..1SA.V, V. Coeos nucifera Ljim.
TAMLÍ[illegible] O. Aglala.
TÁM[illegible] O, T. Zingiber zerumbet Rose.
TÁMO[illegible])> **T** Pamp. **Curcuma** jtanthorrhfea Ro.xl,
TAMO[illegible] CAUN. Coatua.
TAMOHÍLA[illegible] N, T. Globba strobilifera Zoll.
TA[illegible] MP6I, T., V. Eugenia ja[U)bo9 L.
[illegible] **Unrtfc,** T. Eugenia.
TAMP[illegible] **UHfaro, T. Musa** -.=,,.;,.,,tlll11 L
TAMPÚPO[illegible] **T, T. Tabermaemontaaa.**
T[illegible] \K-AO, **T., V. KleinhoTia** hospita L.
T ^ ! " : ^ V If[1'1^^' Br«g«iera parviflora W. an,: A.
1 \.\ÀQDON. Parasponia.
TANÁU[illegible] ^ r. Prerima.
TANCÁPAN[illegible], B. Evodia latifoliaDC.
TANCÓNG[illegible], V. Ipomoea reptuns Poir.
TANDADÁ[illegible] GLIY. Fieus.
TANDÚC-T[illegible] ^•»&CA[M], T. Adeems cornicul.tum Blanco.
T[illegible] -VMA-HABAE. Bruguiera eiirnphylloiJea Blume
TA[illegible] ÁL, T. T ^i Cei,iOpa Can(iolIear)a A'»-
r^f[1]" J- [illegible] Bru^»«-a gymnorriiiia Lam.
* Jj7[Ll L] [illegible] '0^» mucronata I.arn.
[illegible] '-. B. Terminalia.
[illegible] '^ i a _ U I ^ ' 1 . T. r,,-iop8 roxbupghian:,.
[illegible] ;vv (Marinduque). **Quiaquajia indica** Lh.,,.
ANGAI-TAN6AL, T. **O^iops** ***TttbUTghizm*** An,
[illegible]AN-TÁNGAN, x. Sofama[illegible] ton, L

TANGCONG, V. Ipomoea rcptans Poir.
TANGI, T. Oryza sativa L. var.
TANofu, T. Dipterocarpus polyspermua Blanco.
TANGILI, T. Shorea?.
TANGILI (Tarlac). Gonocaryum.
TANGISAN, T. Ficus.
TANGISAN, T. Terminalia.
TANGISAN, T. Uvaria.
TANGisANO-BAofo, T. Xylopia dehiscens Merrill.
TANGfSANG-BAYtJAC, T. FicUS.
TANSISAN-P^NAY, V. Phyllanthus.
TANOITAN, V. Alstonia maerophylla Wall.
TANGLÁD, T., V. Andropogon schoenanthus L.
TANGLAY-MAL6TO, Pamp. Premna vestita Schauer.
TANGL6N, Pang. Amoora?.
TANG6LON, T., V. Quisqualis indica L.
TANSO-TANSO. Randia.
TANGPtJPO, V. Ixora coccinea L.
TANGUILI. Dipterocaipus polyspermus Blanco.
TANSUISAN-BAYAUAC, T. Ficus cuneata Miq.
TAN&tJtAY, X- Alphitonia.
TANGXJLON, T. Quisqualis indica Lr.
TANIIAS, V. Dolicl land rone spathacea K. Sch.
TANIGAD (Dinagat). Rapanea philippinensis Mez.
TANITAN, V. Alstonia?.
TANXJAL, V. Eurycles aniboinensis Herb.
TAOIXTAOIN, II. Aristolochia tagala Cham.
TAPA-LA6, Zamb. Pinus mercusii J. and de V.
TAPAT-TAPAT, T. Casearia.
TAPIASIN, T. Coldenia procumbens J^.
TAPIASIN. COCOS nucifera L*.
TAPfT, B. Mallotus rioinoides Muell. Arg.
TAPLf, Z. Albizzia.
TAPOLANGA, T.f V., Pamp. Hibiscus rosa-sinensis L.
TAPONAYA, V. Coleus acuminatus Benth.
TAPULAGA. Hibiscus rosa-sinensis L.
TAPCLAO. Pinus mercusii J. and de V.
TAPURAN&A, V. Hibiscus rosa-sinensis L..
TAPURAN&A, V. Canna indica L.
TAPtJRAS (Mindanao). Palaquium.
TAPtJYAY, V. Ganophyllum falcatum Blume.
TAQUING-BACA, II. Sida frutescens Blanco.
TAQUINES, V. Ficus.
TAQufNG-BAcA-BAcA, II. Sida frutescens Blanco.
TAQUI. Dioscorea hirsuta Blume.
TAQUIPAN, T. Caryota urens L..
TAQUIR-ASIN, T. Mallotus ricinoides Muell. Arg.

TAQufp-AsfN, T. Macaranga tanarius Muell. Arg.
TAQuip-AsfN-, T. Garuga.
TAQU1P-C6HOL, T- Hydroeotyle asiatica L.
TAQU1P-SUS6, T. Hydroeotyle asiatica L.
TARAMB6LO, T. Solanum ferox L.
TARAMHAMPAM, T. Limnophila menthastrum Benth.
TARAN (Zamboanga). Bridelia ovata Decne.
TARATAC6PES, V. Abutilon indicum G. Don.
TARATARA, T. Cedrela taratara Blanco.
TARATÁRA, II. Limnophila menthastrum Benth.
TARNATE, V. Musa sapientum L. var.
TAROCAÑSA, T., V., Pamp. Hibiscus rosa-sinensis L.
TARRIN. Curcuma viridi flora Roxb.
TARTARAO, II. Quisqualis indica L.
TARUMPALIT, T. Sesuvium portulacastrum L.
TARUMPtJNiA, T. Datura metel L.
TATA, Cag. Nipa fructicans Wurmb.
TATANfc, T. Psychotria.
TATATABA, T. Jatropha curcas L.
TATCHtJBONG, V. Datura alba Nees.
TATLAC-ANAC, T. Garcinia.
TATL6NG-PALAD, T. Hippocratea obtusifolia Roxb.
TAVATAVA, II. Jatropha curcas L.
TAVATAVANGsfNA, II. Ricinus communis L.
TAVAVA, V. Euphorbia pilulifera L.
TAWATAWA, II. Jatropha curcas L.
TAWATAwXsfNGA, 11. Ricinus communis *U.*
TAYABAS, T. Psidium guayava *Li.*
TAYACAN, Mang. Gardenia.
TAYA-L,5rNGO (Paragua). Artocarpus.
TAYAN (Tayabas). Alchornea javensis Muell. Arg.
TAYANG TAYtfUffcAN, B. Indigofera tinctoria Linn.
TAY6BONG, V. Tacca pinnatifida Forst.
TAY6CON, V. Aegiceras corniculatum Blanco.
TAYOC-TAYOC, V. Eleocharjs.
TÁYOM, T. Indigofera tinctoria L.
TAYOMAMIS, V. Cocos nucifera Linn.
TAYOMTAYOM, II. Marsdenia tagudina Blanco.
TAYOMTAY6MAN, T. Tephrosia luzonensis Vogel.
TAYON-TAYON. Indigofera angustifolia L.
TAYONG-TAYONG, T. Eugenia.
TAYULAUAY (Iloilo). Parameria philippinensis Radlk.
TAYUM, T. Indigofera.
TAYUNG, Pamp. Indigofera tinctoria L.
TEB-B£G, Ig. Ficus.
TEB£C. Ficus.
T£CA, Sp. Fil. Tectona gi-andis Linn. f.

TECHEC,]]. Fi'us.
TEOB^J T. Coix lachrynm-jobi L,
TELB6NG. Evythrina inrtica Lam.
TENAATS'. Phy]];intlius?.
TiiNAAN-i!A.\iAY (Tnyalms), CYclusteinon eiriiiingii Baill.
TENOLU£NG-GATOS, T. Miussaenda.
TFIJI i . 'J'. 1'iUu'Colobium.
TKHNATE, T. GraptopiiyUum hoi tense Xeeg.
'IXu i. I. Shorea?.
TLAUN, T. Salix (Blanco).
TIBANG, Z. Canarium.
TIHATII;, Pam p. Poly pod i uui **querdfpliu)!]** L,
TIRATIB, T. Epi])rein»um **medium** Engl.
TIBCAL, Z. **Aglaia,** *
TIBIAYON, V. Benincaaa cerifera Savi.
TiDlo, T. Ficus glomerata R<i.\l>.
TIBIOI. Xyloearpus obovatus Juss.
TIBIQ-JNA-LAI.AQUI, T. Ficus glomerata Roxb?.
TICAMAS, V. Pachyrhizus angulatus Rich.
TlOAS, T. Canna indica L.
TfcAS-TicAS,£. Canna indica T..
TICAY, T. Cyperus.
TIDA, T. Tectona grandis TJ.
TICL^B, *lg.* Quercus.
TIOATOT, V. Etaeoearpus multiflorus F. VUI.
TiGAOj B. Callimrpa angusta **Sehauer.**
TIGASÁN, T. Ceriops caodolleana **Am**
TIGASÁN. Rhizophora mucronata **Lam.**
TIGASAN, T. Bruguieria **gymnorrhizR** Lam.
THHIALANO, **T. Snlilax.**
TIOBAO, V. Heteropogon eontortua Rocui. and Sehult.
TIOBAO, V. Anthistiria.
TIGUf, T. Coix **lacfiryma-jobi** *L.*
TIGCAL, Z. **Aglaia.**
TiOHiMAN, T. Cassia **oeeidentaUs L.**
Tmstj V. Ipomoea batatas L.
Tint.i. i J'INU., V. **Eranthenram** bieolov **Scbrank.**
TIl.E, Z. Xyli;i.
!iii. *Z.* **Albizzia.**
TILIi i -.. \ . \<:. **iranthua spinosua L**
Tm ÁNGAN, T. Ajistoloobis tagala < ***ham.***
TuriiANf, i i',if.. ÁNGAN, T. Aristoloehia tagali t hum.
Tn SÍN, T. Rottbot'llirt **murieata Retz.**
Til! UYUNG, I. Antidesnia gliaesemliilla GiierUt.
TINAAN, T. Phyllanthns.
Tr^AISGUI, T. Ne phelium glabram Noronb.
TES ÁLONG, I. \ftisa paradieiaea L. VMI*.

TiNATfNAN, T. Phyllanthus reticulatus Muell. Arg.
TINCAL (Zambonga). Pierardia.
TfNDALO, T. Afzelia rhomboidea Vidal.
TIND6I, T. Acanthus ilicifolius L.
TINGAN-IIAQUIS, T. Aegiceras corniculatum Blanco.
TfNGAN-TfNGAN, T. Pterospermum obliquum Blume.
TfNGA-TfNGA, T. Mussaenda grandiflora Rolfe.
TINGCAL, Z. Aglaia.
TINSL6G, T. Acanthus ilicifolius L.
TiNGiXfr, T. Acanthus ilicifolius L.
TINISA, T. Artemisia vulgaris L.
TlNiTBfoo, T. Ischaemum ciliare Retz.
TINAQUI, V. Albizzia lucida Benth.
TiNTATfNTA, II. Eclipta alba Hassk.
TINTATINTAHAN, T. Phyllanthus reticulatufl Miiell. Arg.
TINULTJAN-GATAS, T. Mussaenda.
Tipfo. Ficus.
TIP6IX>, T., V., Pamp. Artocarpus incisa L. f.
TIQU^S, T. Pithecolobium montanum Benth.
TiQUiO, T. Cyperus difformis Linn.
TiQUfs-TiQDfs, T. Sapindus turczaninowii Vid.
TiQUfs-TiQufs, T. Canna indica L.
TIRBATIB, V. Epipremnum medium Engl.
TiRiHtJiiAN, T. Panicum colonum L.
TIR6RON, B. Canthium?.
TITIO, V. Acanthus ilicifolius L.
TfTio, T. Cyperus difformis Linn.
Tltfi, V. Dolichondrone spathacea K. Sch.
TOAR, V. Tabernaemontana pandacaqúi Poir.
ToA, T. Bischofia javanica Blume.
To Ac, T. Bischofla javanica Blume.
TOBAYAN (Tayabas). Conocephalus ovatus Tree.
TOB6GOR, T. Mai lotus ricinoides Muell. Arg.
T6BO-T6BO-LAI?GIT, V. Kyllinga monocephala Rottb.
T6COD-BANUA, Pamp. Amorphophallus campanulatus Blume.
T6COD LANGIT, V., T. Amorphophallus cainpanulatus Blume.
T6COR-PARI, Pamp. Cordyline terminalis Kunth.
TOCT6C-CALO, T. Cerbera odollam Gaertn.
TOCCD-LANGIT, T. Semecarpus gigantifolius Vidal.
TOGNAO-TOGNAO, B. Astronia rolfei Vidal.
ToGufNG-p6ix>. Dioscorea.
Tootfis, V. Amomum.
ToGtJis-NGA-fSA, V. Amomum villosum Lour.
Toi, T. Dolichandrone spathacea K. Sch.
TOI«ANG-SANG-BANUG, V. Clematis.
TOMATES, Sp. Fil. Lycopersieum esculentum Mill.

TOMB6NG-ASO. Morinda citrifolia L.
TONCAPAN, V. Evodia.
ToNc6D-OBfspo, T. Cordyline terminalis Kunth.
TON&NAO-TONGNAO, B. Astronia rolfei Vidal.
TOXGO, T. Dioscorea fasciculata Roxb.
T6NGOG, V. Rhizophora conjugata I#.
T6NGOG, B. Lumnitzera purpurea Presl.
TON6C. Serianthes grandiflora Benth.
TONUAR, V. Eurycles amboinensis Herb.
T6OB, T. Bischofia javanica Blume.
T6OB, T. Chisocheton tetrapetalus Turcz.
T6oc, T., V. Bischofia javanica Blume.
T6OG, T. Bischofia javanica Blume.
TO6GAN, Cag. Bischofia javanica Blume.
TOQUIAN, T. Ternstroemia toquian F. Vill.
ToQufNG-PAix>. Dioscorea.
TORTORAOC, T. Quisqualis indifca L.
TOST6N, T. Trianthema monogyna L.
TOTOCCALO, T. Cerbera odollam Gaertn.
T6VAL, T. Gnetum scandens L.
TRES-PtJNTAS, Sp. Fil. Mallotus ricinoides Muell. Arg.
TROMPALIPAIJTE, V. Heliotropum indicum L.
TSAMPACA, T. Michelia champaca L.
TSATSATSATSAHAN, T. Lippia nodiflora Rich.
Tsfcu, T. Achras sapota L.
TtjrA. Dolichandrone spathacea K. Sch.
TtJA. Bischofia javanica Blume.
TUADTUABAN, T. Panicum.
TtJBA. Jathropha curcas Lr.
TtJIBA, T. Croton tiglium L,.
TtJBA, T., V., Pamp. Anamirta cocculus W. and A.
TtJBA-CAMAfsA, T. Croton tiglium L.
TtJ^BAC-TtJBAc (Iloilo). Bidens pilosa Linn.
TtJBANG DALAGA, T. Callicarpa bicolor Juss.
TtJBA-SA-BtJouiD, V. Croton tiglium L.
Tt3rBA-Tt>BA, V. Barringtonia racemosa Blume.
Tt3rBLi, T. Milletia splendens W. and A.
TUB6, T. Saccharum officinarum L.
TUCAN-CAJLAO, T. Aglaia.
TUCAN-CALAO, T. Sterculia.
TtJCAS-TtJCAS. Canna indica L*.
Tu£, T. Dolichandrone spathacea K. Sch.
TU£L, Ig. Bischofia javanica Blume.
TUGABANG, V. Mezoneurum glabrum Desf.
TtJGAN, T. Myristica guatteriifolia A. DC.
T^GAS. Vitex littoralis Decne.
TuGJLfMA, V. Heptapleurum venulosum Seem.

TUGNANG, II. Buddleia.
TUG6GONG, Z. Terminalia.
TuGuf, T. Dioscorea.
TuGufs-:fffcA-iSA, V. Alpinia.
TuGui-TUGuf AN, T. Ipomoea marianensis Chois.
TuGt;p, V. Artocarpus.
TuGtfs, T. Amomum.
TXi, T. Dolichandrone spathacea K. Sch.
Tuf A, T. Pouzolzia indica Gaud.
T6LANG-NAN6C, B. Casearia.
TtfoA-TtfLA, B. Mallotus floribundus Muell. Arg.
Turin AS, T. Micromelum tephrocarpum Turcz.
TtfLO-i*ALAQui (Iloilo). Pluchea indica Less.
TUMAIIIBA, T. Curcuma xanthorrhiza Roxb.
TtJNBON-ASO. Morinda mnbellata Linn.
TtfMBONG-Aso, T. Morinda bracteata Roxb.
TCMBONG-ASO, T. Zingiber.
TtJMBONG-Aso-nAPAY, T. Morinda tinetoria Roxb.
TuMiNTfNG, V. Vitis.
TÚNAN-TÚNAN, V. Melastoma obovatum Jack.
TÚNAN-TÚNANr, B. Astronia calycina Vidal.
TtJNAS, T., V., Pamp. Nymphaea lotus Linn.
TtJNAY-TtJTNAY, V. Astronia calycina Vidal.
TCXCAL, V. Tabei·naemontana.
TtjiNCO-Tt^NCO, T. Evodia.
TtJNCUT-LAJ?GUiT, T. Tacea.
TÚÑGAO, B. Melastoma.
TÚÑGUNG\, V. Ceriops candolleana Arn.
, TuNQUfN. Ipomoea muricata Jacq.
TURUCÁN, T. Hyptis capitata Jacq.
TtfTAo, T. Vigna catjang Endl.
TiTTur-LACAc, T. Physalis angulatai L.
Ttiry, B. Dolichandrone spathacea K. Sch.
TtJYAT-BAGUfo, V. Desmodium iimbellatum DC.
TtJYA-Tt^YA, B. Mallotus floribundus Muell. Arg.

U.

UAC, V. Flagellaria indica T.inn. •
UACÁTAN, V. Alphitonia nioluccana Teysm. and Binn.
UALISUALISAN, T. Decaspermum blancoi Vidal.
UAMPIT. Clausena wampi (Blanco) Oliv.
UJLNI (Jolo). Mangifera caesia Jack.
UANUAWTA-NA-PUTI, B. Glochidion.
UATITIC, T., V. Colubrina asiatica Brongn.
UAUAUESIN, T., V., Pamp. Sida frutescens Blanco.
UAYAN, T. Quercus blancoi A. DC.
UBÁXDO, Z. Jasminum.

CBAN, B. Adina philippinensis Vidal.
tJBAN, T. Barringtonia.
tf BAN. Premna ?.
ÚBE. Dioscorea.
ÚBE-ÚBE, T., V. Aristolochia tagala Cham.
tJBi. Dioscorea alata L. and other species.
UBIAN (Tarlac). Myristica.
UsfAN, II. Artocarpus.
CBic-tJBic, II. Loranthus.
tJBl-UBfHAN, T. Smilax china L.
UBODtJBOD, T. Eleocharis.
UDIAON, T. Pterocarpus.
UGABANG, V. Mezoneurum glabrum Desf.
UGAO, V. Cyclostemon.
UGAO, B. Diospyros.
UIMBABAON, T. Sterospermum quadripinnatum F. Vill.
ULIGB6NGON. Commelina bengalensis Linn.
tSriUD (Tarlac). Gynometra ramiflora L.
CLUD, Z. Crudia.
UNCI6N. Smilax.
UNG-ALI, V. Solanum verbascifolium Linn.
UNGALT-NA-PULA, V., Pamp. Rourea heterophylla Planch.
UNIP, Pang. Acacia.
UNfsoc, T. Adina polycephala Benth.
U6s, B. Sterculia oblongata R. Br.
UPLAS, II. Ficus heterophylla L.
UPLf (Tayabas). Ficus.
ÚPO. Lagenaria vulgaris Seringe.
UBIAN. Pterocarpus blancoi Merrill.
t^RUNG (Paragua). Fagraea fragrans Roxb.
URUTAN, T. ^anociera.
tJSiu, T. Bambusa.
CTTA (Cag). Musa textilis Nees. var.
UYAYAN, V. Quercus.
tJYO, T. Calamus buroensis Mart.
tJYOS. Cupania.

V.

ViCBfQui, Ig. Rhododendron rosmarinifolium Vidal.
Vftos, Pamp. Mallotus ricinoides Muell. Arg.
VfTAM. Calophyllum inophyllum L.
VOCABUL, T. Malachra bracteata Cav.
VÚAS, II. Mallotus philippinensis Muell. Arg.

W.

WAMPI, T. Clauscna wampi Oliv.
WAWAIISIN. Sida carpinifolia L.

Y.

YÁBAG, T., V. Sophora tomentosa L.
YACAL, T. Hopea plagata VidaL
YACAL-DILAO, T. Sindora wallichii Benth.
YACAL PUTf, T. Vatica.
YACOT, Z. Sindora ?.
YANT6C LIMORÅN, T. Calamus pisicarpus Blume.
YAHON-YAHON, V. Hydrocotyle asiatica L.
YAMBAN, II. Shorea guiso Blume.
YAMBO, T. Eugenia jambos L.
YAMBOLIN. Eugenia jambos L.
YAMB6SA. Eugenia jambos L.
YAHP6NG, V. Abutilon indicum G. Don.
YANT6C. Calamus.
YATE, V. Tectona grandis L. f.
YAYO, Pamp. Oxalis corniculata L.
YBA, T. Phyllanthus distichus Linn.
YEMOUM6HAN, T. Cissampelos pariera L.
YNGULA, T. Flagellaria indica L.
Y6KO (Mindoro), Caryota.
Y6VAS, T. Graptophyllum hortense Nees. var.

Z.

ZABAGHE. Phaseolus lunatus L.
ZALENG, V. Canarium.
ZAP6TE. Diospyros ebenaster Retz.
ZAP6TE-N£GBO, Sp. Diospyros nigra Blanco.
ZfTAN, Cag. Shorea guiso Blume.

PART II.

A.

ABROMA ALATA Blanco. *(StemiHacev.)* Shrubs, the roots and bark somewhat used in the practice of medicine; the bark also yields a valuable fibre.

Anaba, T.; Anfibong, V.; Anfbiong, Anfbong, T.j LAbon, V.; Nfibo, V.

A. AUGUSTA L. Anfbong, T.; Anibog, T.; Anfibo.

A. FASTUOSA, R. Br. Anabo.

ABRUS PRECATORIUS L. *(Leguminosecc.)* A small vine, very common in the Philippines, the small seeds, red and black, used as beads; also used in the practice of medicine.

AgAy-on (Cebu); Agniyiiñgyiftng, V.; Agiyfiñgyi Sng, V.; Aguyfingyan, V.; Aroyañgyang, V.; BafigAti, T., V.; Bugay6n, II.; Caltfo, V.; Cfisasftga, Cansasfiga, Pamp.; Gfcos-gfcos, V.; Gufcos-gfcos, V.; Lfiga (Cebu); Mangadólong, V.; Matdng-pfine, V.; Oyafiñgfa, V.; Saga, T.; Saga-saga, T.; Sagamamfn, T.

ABUTILON INDICUM G. Don. *(Malvacew.)* A small shrub with yellow flowers, common, used in the practice of medicine.

Cuacuac6han, T.; Gulling guilliigan, T.; Gilig-gilfgan, T.; Dulfipang, V.; Lulflpao, II.; Mdlvas de Castflla, Sp. Fil.; Mfilvas, Sp.; Malls, V.; M«lbas, T.; Pflis, V.; Taratacópes, V.; Yamp6ng, V.

ACACIA. *(Leguminosew.)* Spiny shrubs or small trees, generally producing more or less gum similar to gum Arabic.

Carfiol,Z.; Unfp, Pang.

A. COXCINNA DC. Sibtfg, T.

A. FAOESIANA Willd. Ar6ma, T.; B6ma, T. V.; Santiago, V.

ACALYPIIA. *(Urticacew.)* Trees, shrubs, or herbs.

Mayagos-lalaqui, V.; %)bto, T.; Palang.

A. GRANDIS Benth. B0M6, Ig.; B(5gos, T. V.; Gutlf, T., V.

A. STIPULACEA Klotzsch. B6gos, V.

A. ULiiEFOLiA Muell. Arg. Malacb6c (Morong).

ACANTHUS ILICIFOLÍUS L. *(Acanthacew.)* A small shrub with glossy spiny leaves resembling ilex, and blue flowers, common in regions inundated by salt water.

Dilivario, T.; Doloarin, T.; Dolovario, Dulanari, Dulauari, Pamp.j Laguio-Wguio, T.; Laquis-iaquis, Laglw-lagfw, T.; Tind6i, T.; Tiifg-k5i, T.; Tiiigl6g, T.; Tftio, V.

Acinus SAPOTA Linn. *(SapotacecB.)* **A tree introduced from Mexico, cultivated for its edible fruit. In Mexico a valuable gum, known as "gum chicle/' is obtained from the bark, extensively used in the United States as the basis of chewing gums.**

Chfco, Sp. Fil.; Sfco, V.; Tsfcu, T.

ACHYRANTHES AQUATICA R. Br. *(Amarantacece.)* **Herbaceous plants, somewhat utilized in the practice of medicine.**

L0po-l6po, V.

A. ASPEHA L. Afigud, Pamp.; D6cot-de*cot, T.; Hâñgot, T.; Hang6r, T., V.; Lfbai, T.; Sarámo, V.

A. OBTUSIFOLIA Lam. Afigod, Pamp.; Llbay, T.

ACORUS CALAMUS Linn. *(Aroidece.)* **Herbaceous, the root stock very aromatic. The "sweet flag" of the United States.**

Bu&ig, Panip.; Lubfgan, T.

ACROSTICHUM. *{Filices.)* **Pagálo.**

A. AUREUM L. A large coarse fern, common in tidal marshes.

Lag6lo, T.

ADENANTHERA. *(Lcguminosece.)* **Trees without spines or tendrils, with bipinnate leaves and very small flowers in small spike-like racemes.**

Adambaguln, II.; Alang-lâñgal; fpil, Z.; Malatáyon, Pang.

A. PAVONINA Linn.

Alaláfigat; Báhay, T.f V.; Baguir6ro, V.; Cásay, V.; Quinasaicftsai, T.

ADENOSTEMMA viscosi'M Forst. (*Composita\)* **A glandular-pubescent herb.**

Búlac-manúc, T., Pamp.

ADIANTUM. *(Filices.)* **The "maiden-hair" fern.**

Malacalesqufs, T.

A. LUNULATUM Burm.

Caicâi, T.; Culantrillo, Sp. Fil.; Dalipflco, II.; Gay6man-man6c, T.; Lámot-lam6tan, T.; L6mot-lom6tan, T.

ADINA POLYCEPHALA Benth. *(Rubiacece.)* **Shrubs or small trees with globose heads of white flowers.**

Unfsoc, T.

A. PHILIPPINENSIS Vidal. tJrban, B.

AEGICERAS CORNICULATUM Blanco. *(Myrsinaceco.)* **Shrubs or small trees, common along the borders of mangrove swamps, etc., on the seashore.**

Pisfc; Pipisfc, T.; Súguin sagufñgan, T.; Ságuin-ságuin-estácas; Sáling-sfiguing, B.; Tay6con, V.; Tanduc-tandúcan, T.; Tlngan-báquis, T.

A. FLORID UM R. and S. Aíiglai, V.; Pipisic, T.

AEGLE DECANDRA Naves. *{Rutacea*.)* **A small tree, the fruit with a mucilaginous, aromatic, acid pulp.**

Malacabúyao, T.

AFZELIA BIJUGA A. Gray. *(Leguminosece.)* **A very valuable timber tree, always found near the seashore.**

fpiLT.? V.;Naïa, Z.; Tafil, T.

A. RHOMBOIDEA Vidal. Like the preceding, producing a very valuable timber. Pods much larger, and leaves smaller than in *A. bijuga.*

Balâyon, T., V.j Balâyong, T.; Barâyon, V.; Magalâyao, C.j Tfndalo, T.

AQARICUS. Many species of *Agaricus* and other genera of fleshy fungi are found in the Philippines, some of which are used by the natives as food.

Colatcdlat.

AGATHIS I/)RANTHIFOLIA Salisb. *(ConiferccB.)* Very large trees, growing in the mountains, and yielding the valuable gum known in commerce as "dammar."

Baltic (Paragua) j Damâr (Camarines); Gâla-gâla, T.j Biâyo, V.

AGAVE AMERICANA L. *(Amarylidew.)* Introduced from Mexico and cultivated for the valuable fiber known as "maguey."

Magûey, Sp. Fil.j Màgai, V.; Mugfiey, Sp. Fil.j Nfpis; Pfta (Cebu).

AfflLAiA. *(Meliacece.)* Mostly very large trees, some valuable for timber, many species being found in the Philippines.

Agapfiñga, II.; Bayantf, T.j Bolâla, B.; Cacdo-cacâuan (Tayabas); Câsay, T.; Dalûruy, Pamp.j Guis6c-guis6c; Heb6ng, Mang.; Hagupâilga, T.; Ibabâ; Malasâging-pulâ, T.; Macabâilgon; Manabrdng, B.; Magsinâya; Oratân, II.; Panâbang; Salamûfigay, T.j Tamllg; Tigcâl, Z.; Tibcâl, Z.; Tingcâl, Z.; Tucân-câlao, T.

A. ARGENTEA Blume. Dalûray; Iloflo, Pamp.

A. GRANDIS Miq. G6gong-bisaya, T.; Cubatili, T.

A. MINUTIPLORA Bedd. Busilao, T.

A. ODORATA Lout. A small tree with fragrant yellow flowers, introduced from Asia and cultivated for ornament.

Cinam6mo-de-China, Sp. Fil.

A. OLIGANTHA C. DC. Manâlao, T.

A. PALEMBANICA Miq. Malasfiguin, T.

AGROSTISTACJIYS HiESOANA Vidal. *(Euphorbiacece.)* Shrubs.

Caciio-cacfio, Ticao; Malacaf^ (Paragua); Pusopilso (Tayabas).

AILANTHUS MOLUCCANA DC. *{8imarube<v.)* A lofty tree with large leaves and winged seeds.

Calânag, B.; Malaadtias, T.; Macaisâ, T.

ALANGUIM OCTOPETALUM Blanco. *{CornacecB.)* Malatâpay, T.

ALBIZZIA. *{Legumino8ecB.)* Trees, many valuable for timber.

Acl^ng-pârang, Pamp.; Banliyo, T.; HanagO, B.; Malatfgui; Malagânit, T.; Mangasin6ro, Z; Malatâco, T.; Quitaquita, 11.; Saplft, B.; Tapli;Tlle,Z.

A. JULIBRISSIN Durazz. Carisqufs, T.; Cariquis, II.; O6nog, II.

A. LEBBEK Benth. Aninâpla, T.j Lafigufl; Lâñgil, T.

A. LITTORALIS Teysm. and Benn. Casay, B.

A. LUCIDA Benth. Tináqui, V.

A. ODOBATISSIMA Benth. Malatoco", T.

A. PROCERA Benth. Ananfiplas, T.j Ananfipla; Adaân, T., II.j Adyângao, T.j Ayfingao, T.; Anftap, Pamp.; Bo.1c, Ig.; Dariañgâo, T.; Pafhot; Pafhod, V.

A. RETUSA Benth. Pfpi, V.; Lâñgil, T.

A. SAPONARIA Blume. O6gon-toc6; Inauáqui, V.; Jaunáqui, (Albay) ; Láñgil; Malatóro.

A. TOMENTOSA Miq. fcJalaiigcûgui.

ALCHORNEA BLUMEANA Muell. Arg. *(EuphorbiacecB.)* **Trees or shrubs.**

Busflac, T.

A. JAVANSIS Muell. Arg. Tayán (Tayabas).

A. MOLLIS Muell. Arg. Balânti, T.

ALEURITES MOLUCCANA Blume. *(EuphorbiacecB.)* **Tree, the seeds yielding large quantities of a valuable oil, used for illuminating purposes, etc.**

Bfiguilûmban, T.; Balucánad, T.; Balucánag, II.; Balocánad, T.; Caltimban, T.; Lumbdn, T.; Lunbân, T.; Lumbáng, T.; Rûmbang, V.; Capfli, T.

ALLAEANTHUS LUZONICUS Benth and Hook. *(UrticacecB.)* **A deciduous tree.**

Tahft-labúyoc; Tal6long, 11.; Guinbabaó; Balóng-cadyós, V.; Al6can, II.; Cárnal; Buñgfln, II.; HimbaMo, T.

ALLIUM GEPA L. *(Liliacece.)* **The onion.**

Lasoná, II.; Lasuná, T.; Sibtiyas, T., Pamp.

A. JAQUEMONTII Kunth. Sibóyas-songsóng.

A. FORRUM Linn. Sibdyas-sa-Taâl.

A. SATIVUM L. Garlic.

Bâuang, V.; Bánag, II.; Bâwang, T.; Báoang, V.; Bâuang pott (Jolo); Gandâ, V.; Láso, V.

A. ULIGINOSUM Don. Cuchái, T.

ALLMANIA NODIFLORA R. Br. *(Amarantacece.)* **A diffuse dichtomously branched herb, with a sessile globose inflorescence.**

L6po-I6po, V.

ALLOPIIYLUS COBBE Blume. *[tiapindaccu:)* **A small tree or shrub with trifoliate leaves and edible red globose fruits.**

Balfc?, V.

ALOCASIA INDICA Schott. *(Aracecp.)* **Herbaceous, leaves very large, known to English-speaking people as "elephant's ears."**

Badiang, T., V.; Gâbing-6nac, T.

ALOE BARBADENSIS Mill. *(Liliacece.)* **Introduced from America and cultivated for ornament and for medicinal purposes. Aloes of pharmacists.**

Dflang-boáya, V.; Dflang-hâlo, V.; Sábila, T.

ALPHITONIA MOLUCCANA Teysm. and Binn. *(Rhammacece.)* **Shrubs or trees.**

Taiĩgûlay, T.; Uacátan, V.

ALPINIA. *(Marantacece.)* **Tall herbaceous plants.**

Parápad, Ig.; Liguid-lfguid, V.; Talbâc, Pamp.; Tuguts-ñga-isá, V.

A. HREVILABRIŚ Presl. Bánay, Pamp.; Bagóngbong, V.; Cat6lan, V.; Catcátan, Pamp., V.; Catótang, V., Pamp.; Cãtang-cfttanǵ.

A. CEBNUA Roxb. Polonfa, T.

A. GALXVXGA Swartz. Lancdas, Pamp.; Lañgcâuas, V.

A. GIGAOTEA L. Bagómbon, Pamp., V.; Catótang, V., Pamp.; Salbâc, Pamp., V.

ALSOPHILA GL[illegible] [illegible] ern Philippines. [illegible] the north-
Alibangbán, Ig.; Taiéte.

ALSTONIA [illegible] (*Apocinaceæ.*) Trees with milky sap, the bark [illegible]ing use [illegible] practice of medicine as a substitute for quinine. [illegible] Pang.; Cuyao-yáo (Masbate); Dirita, T.; Cuyanyán, [illegible] tan, V.

A. MACROPHYLLA Wall. Batíno, [illegible] Tangitan, V.

A. SCHOLARIS R. Br. Andarayan (Cagayan); Bita, V.; Dita, V., T.; Ditáa; Dal-lopáven, Il.; Dali (Tiagan).

ALTERNANTHERA DENTICULATA R. Br. [illegible] trate, flowers white. Bongabonga, T.

ALYSICARPUS TETRAGONOLOBUS Edgw. (*Leguminosæ.*) A small herb. Párang (Parañ[illegible]).

ALYXIA [illegible] (*Apocinaceæ.*) Shrubs with milky sap. Layo, B.

AMARANTHUS MANGOSTANUS L. (*Amarantaceæ.*) Culiápa (Iloilo); Cudiñpa, V.

A. [illegible] Halon, T. [illegible] herb, very common in waste places about towns and [illegible] Ayantóto, Pamp.; [illegible]gbá [illegible] Bambán; Blédo; Culites, V.; Cuantón, Il.; Cu[illegible], V.; [illegible]; Orayi, [illegible]; Quilite; Quilitis, T.; Tilites, V.; Tilíes, V.

A. VIRIDIS L. Common in waste places. Culitis, T.; Halom, T., V.

AMMANIA BACCIFERA L. (*Lythraceæ.*) A small herbaceous plant. Apoy-ápoyan, T.; Biñs-pógo, T.

AMOMUM (*Scitamineæ.*) Herbaceous plants, with creeping rootstocks. [illegible]gás, T.

A. CILIATUM Blume. Balic-balic, Pamp.; Carópi, [illegible]

A. CARDAMOMUM L. The cardamon plant. Lampúyang-nga-[illegible]

A. VILLOSUM Lour. Tog[illegible]

AMOORA (*Meliaceæ.*) Large trees, valuable for timber. Bu[illegible], V.; [illegible]; Mal[illegible]; [illegible] T.; [illegible]

A. GRAN[illegible] Malabanaba, T.

A. PERROTTETIANA C. DC. Baluquí, T.

A. ROHITUKA W. and A. Agae-ae, V.; Salaguin-pula.

AMORPHOPHALLUS [illegible] enormous herb with rough, [illegible] petioles and purplish spathe. Apon, T.; Anto, V.; Bagáng, Cag.; Bágong (Jolo); Corót, Il.; Carót, Il.; Oroy, V.; Pamangquílon, V.; Pungápung, V., T.; Tócod-lángit, V., T.

AN ACAUDI UM OCGIDENTALE L. *(Anacardiacece.)* A small tree introduced from America and cultivated for its edible fruits, the seeds of which also yield a valuable oil.

Casóy, T., V.; Casúy, T.; BollSgo, II.; Baltibad, T.

ANAMIRTA COCCULUS W. & A. *(Menispermacece.)* A vine with long petioled glabrous leaves, the roots being extensively used in the practice of medicine.

Bayáti, T., V.; Pamp.; Balfisin, T., V., Pamp.; Lag-tál, V.; Lantá, T. V., Pamp.; Lactáng, T., V., Pamp.; Lictáng, T., V., Pamp.; Lin-tang-bfiguin, T., V., Pamp.; Súma, T., V., Pamp.; Túba, T., V., Pamp.; Abútra, Sp. FiL; Pañgmávan.

ANANASSA SATIVA Lindl. *(Bromeliaccce.)* The pineapple, introduced from America and cultivated for its fiber and for its edible fruits.

Malfsa (Camarines) ; Pita, 11.; Plfia, Sp. FiL

ANAXAGOREA LUZONENSIS A. Gray. *(Anonacece.)* An under-shrub.

Bagfing áso, B.; Bobon6yang, V.

ANDROPOGON. *(OraminecB.)* Coarse or fine grasses.

Aniás, T.; Barbón.

A. MURICATUS Retz. Móro, Sp. FiL

A. SCIIOENANTHUS L. The roots of this species yield an essential oil, used for perfumes, etc.

Balfyoc, B.; Pfija-de-m6ca, Sp. FiL; Raiz-de-m6ras, Sp. FiL; Sálai, T.; Sálay, T.; Saláid; Tañglfid, T., V.

ANISOMELIS OVATA R. Br. *(Labiatea:)* A coarse erect branching herb with purplish flowers.

Talingharáp, T.

ANTSOPTERA. *(Diptcrocarpacew.)* Tall trees, very valuable for their timber.

Bágar, II.; Dáyang, T.

A. OBLONOA Dyer. Sandana.

A. THURIFERA Blume. Lauáan, T., V.; Nenfinu, Cag.; Sandána, T., V.; Lñuan sandána.

ANNESLEA CRASSIPES Hook. *(Ternstroemiacece.)* An evergreen tree with crenulate, acute, or obtuse leaves.

Malatibfg, T.

ANONA MURICATA L. *(Anonacew.)* This species like the two following were introduced from America, and are now generally cultivated in the Philippines for their edible fruits. The "custard apple," "sour sop," etc., of English-speaking people.

Goyabáno, Sp. FiL; Guanabfino, Sp. FiL

A. RETICULATA L. An6nas, Sp. FiL

A. SQUAMOSA L. Ates, T.

ANTHISTIRIA GIGANTEA Cav. *{Qraminece.)* A coarse, tufted grass growing in open lands.

Tigbáo, V.; Talához, T.

AxniocEPHALus CANDAMBA Miq. *{Rubiacece.)* A glabrous tree with - flowers in solitary globose heads.

3igarilat, T.; Bagarllao, T.; Caluntlfigan, V.

ANTIDESMA. *(Euphorbiaceu.)* Trees or shrubs, bearing numerous small spherical fruits which are edible, having a pleasant acid taste.

Bornáy-gúbat, V.; Bignái-máya, T.; Bignái-calabáo, T.; Inyfim, V.; Mob6ti, V.; Malasucá, V.

A. BUNIUS Spreng. Bignáy, Pamp.; Bignfii^T.; Bfignai, V.; Bub-búgnay.

A. CUMINGH DC. Catamantfis.

A. GHAESEMBILLA Gaertn. Ar6sep, II.; Baninúyo, T.; Binaytfyo, T.; Bignay6co, T.; Bignái-p6go, T.; Calamantáo, T.; Cab6gbog, T.; fniam, V.; Timtiyung, T.

APHANTHE. *(Urticacece.)* Chfi, T.

APOROSA. *(Euplwrbiacew.)* Trees with alternate entire leaves.

Alfimag, T.; Baransifigo, T.j Balinsiágao; Cansúyot; Cúlis-na-pulfi, V.

ARACHIS IIYPOGAEA L. *(Lcgumínosece.)* The peanut, introduced from America and more or less cultivated.

Cacachue*te; Cacauáte, T.; Manl.

ARAIIA JAVANICA Miq. *(Araliacew.)* Magcásao, V.; Potfit, T.

ARDISIA. *(Myrsinaceat.)* Trees or shrubs, many species being found in the Philippines.

Atar6lon, T.; Bahay namdc, B.; Gáblos, T.; Gubgiibao, Ig.; Panfibon, T.; Patact6l, Pamp.; Patftptoj Qflio, T.; Tagp6, T.; Tagpfmg-pulá, T.

A. HUMILIS Vahl. Babagion, V.;. Bútao, B.j Malasiac, B.; Pangháas (Dinagat).

A. PERROTTETIANA A. DC. Catfiypa (Dinagat); Tagulman, V.

A. PHILIPPINENSIS DC. Lu^ti (Zamboanga).

A. PYRAMIDALIS Pers. Malalsa, T.

A. SEBRATA Pers. Logonh6n (Iloilo).

ARECA. *{Pahnew.)* Several species of *Arcca* are found in the Philippines. the nuts of one species *(A. catechu),* the "betle nut," being extensively used by the natives, being chewed with the leaves of *Piper betle,* and slaked lime.

Bofigáng-páto, T.

A. ALBA Rumph. Cap6n, T.; Pfnang, V.

A. CATECHU L. Bdnga (Camarines); B6nga, T. V.; B6nga-sántol; Boiigángmatrilis, T.; B6nga-palo; Boá, II.; Buá, Cag; Búiiga, T.; Lúyos Pamp.; Lugos; Mangúpod; Mañglpod, T.; Sacsfc, T.

A. NIBUNG Mart. Anfbung, V. T.; Anfbong, V. T.

ARENGA SACCHARIFERA Labill. *(Palmos.)* Anibung, Pang.; Báhi, V.; Báru; Criuon, T.; Hidi6c, V.; Hibi<5c, Vis.; Ibi6c, V.; froc, T.; Idloc, V.; Pugilhan, T.; Ratipdn, II.

ARGEMONE MEXICANA L. *(Papavaracea.)* An herb with large yellow flowers, spiny leaves, and yellow sap, introduced from Mexico.

Cachumba, II.; Chical6te; Casubang-fiso; CasubMng-áso, 11.; Diluáno, T.;Duluário,T.

ARGYREIA. *(Convokulacece.)* Scandent shrubs with showy flowers.

Báguin-castfla, T.; Buhlcao (Iloilo).

A. NITIDA Choisy. Bulalilcao, V.

ARISTOLOCIIIA TAGALA Cham. *(Aristolochiacece.)* Aétan, T.; Goân-goân, V.; Malafibe, T., V.; Taointaofn, 11.; Tála-talárum, T.; TimbáiTgan, T.; Timbáng-timbáilgan, T.; tibe-ube, T., V.

ABTABOTBYS. *(Anonacew.)* Sarmentose or scandent shrubs.

Sfisong-damúlag, Pamp.

A. ODORATISSIMUS R. Br. Alag-álag sonson, T.; Alang-flang sónson, T.; Ilang-flang de China.

ABTEMESIA GRATA Wall. *[Compositw.)* Damú-Marfa.

A. VULGARIS L. An erect herb, used in the practice of medicine.

Ca-Marfa, T.; Santa Maria; Tinfsas, T.

ABTIIOPHYLLUM. *(Araliacece.)* Shrubs or small trees.

Puigapuigáhan, T.

ARTOCABPUS. *(Urticacccc.)* Large trees with milky sap, many of the species bearing very large edible fruits.

Anúblin, T.; Amtigni, V.; Anúbion, T.; Ablbling, B.; Cátoy (Albay) ; Cane*t, T.; Doloñgfan, T., V.; Márang, T.; Obfen, II.; 61oy, T.; Tugfip, V.; Táya-lCiñgo (Paragua); Ubfan, II.

A. BLUMET Tree. Similar to *A. incisa,* but leaves small, entire.

Gumfan, V.

A. CAMANSI Blanco. CamáiTgsi, T., V.; Camongsl, T., V.; Dalangian, V. T.; DoloiTglan, T., V.; Dalugufan; Pác; Pacác, II.

A. CUMINGIANA Tree. A valuable timber tree.

An6bion, Pamp.; An6bling, V.; Anfibing; AnObing, T.; Bayfico figa langcáon, V.; Bayúco ñga cacáuon, V.; Ctibi, V.

A. INCISA L. f. A tree with large incised leaves and large edible fruit.

Antipćilo, T., V., Pamp.; Cólo, V.; CAlo; 6gob, B.?; Rfmo, T.; Rtma, T., V.; Tip6lo, T., V., Pamp.

A. INTEGRIFOLIA L. f. A tree with small ovate, entire leaves, fruit on trunk and larger branches.

Láiigca, II.; Lánca, T.; Nánca, T.; Náñgca, T.

A. LAMELLOSA Blanco. Andbling-caqufosing.

A. LANCEOLATA Trecul. Bayúco ilga lanhán, V.

A. NITIDA Tree. AnCbling, T.; Anóbing cagufosing, T.; Anúbing na cagulosin, T.; Bayuco, V.; Bayfico iñga birfon, V.

A. ODORATISSIMA Blanco. Anfibing, T.j Lolfo, T.

AKUXDIXELLA XERVOSA Nees. *{Graminea?.)* A tall, coarse grass growing in wet places.

Calacauáyan, V.

ARYTERA BUFESCENS Radkl. (*Sapinddcete.)* Shrubs or small trees.

Magabagflba, T.

ASCLEPIAS CUBASSAVICA L. (*Asclepiadacew.)* A small herb, introduceil from America, with milky sap, red and yellow flowers, etc. Now very common in the Philippines and used by the natives in medicine.

Búlac-bulfican, T.; Bńlac-damó, T.; Bńlac-castfla, T.; Buquitqult; Calalduan, T.; Cápol-cápol, T.

ASPLENIUM NIDUS L. *(Filices.)* The "bird's-nest fern." Very common in forests, growing in large tufts on the trunks and branches of trees.

Sábles.

A. ESCULENTUM PresL Young stems and leaves much used for food by the natives.

Pfico, T.

ASTRONIA. *(Melastomacece.)* Shrubs or small trees.

Bagalfguan, B.; Col&igay, T.j Dagalfguan, V.; Dongfio, T. j Donhao, T.; Dungfio, T.

A. CALYCINA Vidal. Tunan-tunan, B.; Tunay-tunay, V.

A. CUMINOIANA Vidal. Halentihlnao, V.

A. MACROPHYLLA Blume. Bfiyo-buyo, B.

A. PULCHRA Vidal. Dfta-dfta (Camarines).

A. BOLFEI Vidal. Alintutfinas; ToiTgnao-toiTgnfio, B.; Tognao-tognao, B.

ATALANTIA. *(Rutacem.)* Small trees.

Camunfng, T.; Dfiyap-dayfipat, T.

A. MO.WIIYLLA Correa. Dfiyap-na-montf, T.; Magca-bfigao, V.

A. NITIDA Oliv. Malfibac, V.; Malarfiyat.

AVERRHOA BILIMBI L. *(Qtmiacw.)* Tree, cultivated for its edible acid fruits, which have rounded lobes.

Calamfas, T.; Ciling-fwa, V.; Camias, T.; Colonauas, T.; fba, V.; lias, II.; Quilihgfva, V.

A. CARAMBOLA L. Fruit similar to that of the preceding species, but the lobes angular.

Bilimbmes; Balimbfn, T.; BilimWn, T.; Balimbfng, T.; BaliiTgblng, V.; Garangfin, V.

AvicENNUOFPicmLisL. *(Verlenacew.)* A shrub or a small treei growing in wet soil along the sea shore, with small yellow flowers. The barK is used in dyeing.

Apiapi, T.; Bun^alon, T., V.; Bufigalu, T.; Caluptaes, Z.; Calaplm, T.j Miflpi, T., V.; Pipislc, T.; Piapi, T., V.

AZIUA if OVA Blanco. *(Salvadoracece.)* A shrub.

Casnfit-cSbag, T.; Camut-cabag, T.

B.

BAMBVSA. (OnN«*i«t.) "Bamboo." Several genera and many species of bamboo are found in the Philippines.

Anas, Pamp.; Inos; Balto, T.j Boho, T.; Bocav, T.j Oalba^g. T.j Caila, Sp.; Cauayan-pana; Qurting. T.| Tamanac; Taguls., T., Osiu, T.

B. ARUNDINACEJE Retz. Cautlyang-tot6o, T.

B. BLANCOI Steud. Taiufinac, T.

B. BLUMEANA R. and S. Cauayan-tinfc; Caudyan-gufd, V.; Cauayan-tobo.

^ DIFFUSA Blanco. Bocaui,T.; 6siu, T.

B. LAEVIS Blanco. - Caufiyang-bOo, T.

B. LONGINODIS Miq. Cauilyan-finos.

B. LUMANPAO Blanco. Lumiinpao, T.

B. LUZONICA Munro. Cauflyan-balicao, T.

B. MOXOCYNA Blanco. Cauflyan«r-qniHn?. T-

BARLERIA PRIONITIS L. *(Acanthacece.)* A small shrub with straw-colored flowers.

Culánta, T.; Cócong-manóc, T.

BARRINGTONIA. *(Myrtacew.)* Trees or shrubs, with racemes of large pink or white flowers, the petals and stamens falling early.

Bayfig cabáyo, T.; Cban, T.

B. BAGEMOSA Blume. A shrub or small tree with a long drooping raceme of white flowers.

Botát; Putád, T.; Potát, T.; Putát, T.; Pulát; Malaputád, T.; Túba-ttiba, V.

B. SPECIOSA Forst. A tree usually found near the sea, with very large pink fragrant flowers and large angular fruits.

Bótong, T., V.; Bótong-bótoiTg, T; Bit6on, V.; Bftug; BonStes; Bl-tung, V.

BASELLA RUBRA L. *(Chenopodiacea\)* A much-branched twining fleshy herb, wild or cultivated.

Alugbáti, V.; Ilaibfiquir, II.; Libfito, T.

BAUHINIA. *(Leguminosece.)* Unarmed trees or vines with simple leaves, which are usually deeply cleft at the apex.

Atcúy, Pamp.; Agpoy, Pamp.; Bamblng, T.; Bodb6d, T.; Ltipid; Sali-gangbáng, V.

B. BINNATA Blanco. Aliblhil; Alihfzo; DCis.

B. BLANCOI Baker. Alibánban, P. T.

B. GUMINOIANA Benth. Ban6t, T.

B. GBANDIFLOBA Blanco. Boñgálon.

B. MALABABICA Roxb. Alibángbang, T., V., Pamp.

B. PURPUBEA L. Alibánban, T.

B. TOMENTOSA L. AliMnban, T., V., Pamp.; Alibfhil, V.; Ahihfro, V.; Alamblhor, V.; Balibánban, V.; Dfia, V.; Lfnas, V.; Marulfnao, V.; San-Antonio.

BEAUMONTIA. *(Apocinacew.)* Climbing shrubs with large flowers.

Hingúe calabo, T.

BEDDOMEA LUZONENSIS Vidal. *(Meliacea:)* A tree.

MalacamCte, T.

BEESHA RHEEDII Kunth. *(Qraminece.)* A bamboo.

Bocáui, T.

BEGONIA BHOMBICARPA A. DC. *(Bcgoniacece.)* Succulent herbs, valued for ornamental purposes.

Llifgat, T.; Pfngol-bat6, T.

BEILSCHMIEDIA CAIROCAN Vidal. *(Lauracecp.)* Evergreen trees or shrubs.

Cair6can, T.

B. MADANG Blume. MalabOfiga.

BENINCASA CERIFERA Savi. *(CurcurbitacecB.)* A climbing herbaceous vine, cultivated.

Cond6l, T.; Cand6l, V.; Maliñga, T.; Tibiáyon, V.

BERCHEMIA PHIUPPINENSIS Vidal. *(Rhamnaccoe.)* A shrub, with armed branches.

Qdaą6deg, Ig.

BERBYA. *(Tiliacea:)* Trees.

Pacpác-bálang, T.

BIDENS PILOSA Linn. *(Composites.)* Herbaceous, a kind of "Beggar tick."

Túbac-tíbac (lloilo).

BIOPHYTUM SENSITIVUM DC. *(Geraniaeew.)* An herb, with sensitive leaves and yellow flowers.

Dam6ng-hfya, T.; Htiya-húya, V.; Mahihlin, U.j Macahfya, T.

BISCHOFIA JAVANICA Blume. *(Euphorbiacece.)* A lofty tree, valuable for timber.

Canárem; Dúeg; Dampdl, T.; Quitaqufta, 11.; Tóob, T.; Tóog, T.; T6oc, T., V.; Tufl, Ig.j Toá, T.j To6gan, Cag.j Tfia.

BIXA ORELLANA Linn. *(Bixacea.)* A shrub, introduced from America and now very common in the Philippines, the red seeds being used for coloring food, etc.

Achfote, Sp. Fil.j Achfletej Achúte; Atsfiiti, T.; Anáte; At6la.

BLECHUM BROWNEI JUSS. *(Acanthacece.)* An herb of American origin.

Calabóa, Pamp.; Dfiyang, T.; Sapinsapfn, T.

BLUMEA BALSAMIFERA DC. *(Composite.)* A tall almost woody herb, 5 to 8 ft. high, very common, and extensively used by the natives in the practice of medicine.

Ay6ban, V.j Alibun, V.; Alibhon, V.; Gábuen, V.j Guftin-guftin; Gfn-tin-gfntin, V.j Guintin-gulntin, V.j Hamllbon, V.j Lalacdan, V.j Lficad-búlan, V.j Lacdán-bfllan, V.j Samb6n, T., Pamp.j Samb6ng, T.j Sambúng, T.j Sobs6b, II.

B. CHINENSIS DC. Cataray (Balabac).

B. LACINIATA DC. Dllan butiqul, T.

BOEHMERIA NIVEA Hook, and Arn. *(Urticacece.)* A small shrub, the leaves white beneath, yielding the valuable commercial fiber, ramie.

Ap<Soj Amlray, T.; Arfmai, II.j CanWnj Cagayán, II.; Lapnfs, C; Labrfisj Labnfs, II.j Pampañgpáfigon, V.j Kámi, Sp.

B. WEDDELIANA Vidal. Ngflluy, Ig.

BOERHAAVIA REPENS L. *(Nyctaginacew.)* A prostrate spreading herb, with very small pink or red flowers, common about towns.

Paanbalivfe, T.

BOLETUS. A genus of fleshy fungi, with numerous pores on the under side, but no gills.

Culápo, T.j Cabúti, T.; Payong-pay6ñgan, T.

BOMBAX MALABARICUM DC. *(Mcilvcicece.)* A tree with digitate leaves and very large red or white flowers.

B6buy-gúbat, T.j Bubóy-gtibat, T.; Malabúlac, T.j Quesfroj Sálay, V.; Talfitu, V.

BOOTIA CORDATA Wall. *(Hydrocharidets.)* Submerged fresh-water herb.

Gábi-gábi, V.

BRACKENRIDGEA FASCICULARIS F. Vill. *(Ochnacea.)* Trees or shrubs.

Aniátan, T.

BREYNIA ACUMINATA Muell. Arg. *(Euphorbiacev.)* Shrubs or small trees.

Atfluag (Abra).

B. CERNUA Muell. Arg. Matâng-ulâng (Tayabas); Sfifigut-olâng, V.

BRIDELIA. *(Euphorbiacece.)* Shrubs or small trees.

Lândo, T.; Javili (Zamboanga); Qufnay-qufnay, T.

B. OVATA MuelL Arg. Manâsa, T.; Tarân (Zamboanga).

B. STIPULARIS Blume. Bancoflan, T.; Cutocfito, T.; Carabâ, II.; Calondâgni; Dugâron, T.; HinĝoiTg6to, T.; Lobfilob, T.; Lubâlub, T.; Sinc6y-lang, V.; Sañgc6y-lang, V.

BRUCEA SUMATRANA Roxb. *(Simarubacece.)* A shrub with large pinnate leaves, the bark, etc., very bitter.

B6go-b6go.

BRUGUIEBA. *(Rhizophoracew.)* Constituents of the Mangrove vegetation. Petals 8 to 14. Useful for tans and dyes, much cut for fire wood.

Busfrn; Suâl.

B. CARYOPIIYLLOIDES Blume. Bacfiuan, T.; Busâin, T.; BJuas, T.; TâiTga-babâe.

B. ERIOPETALA W. and A. Bafo; Bfiiao, V.; Calibâyoan.

B. GYMNORRHIZA Lam. Bâcan (Tinago); Bacânun, T.; Bâcao, T.; Bessln, T.; O6iĩgon, II.; Petûtan, T.; Tañgâl, T.; Tigasfin, T.

B. PARVIFLORA W. and A. Lanâray (Tayabas); Tanagâyay (Dinagat).

B. RITCHIEII Merrill. Hangâray, T.; Lang^ray, T.; Magâlay, T.; Pototfin, T.

BUCHANANIA. *(Anacardiacece.)* Trees.

Malalfgas-na-lalâque, T.; Palinlln, T.

B. FLORIDA Schauer. A variable and widely distributed tree valuable for timber.

An-an, Mang.; Anam, V.; Baliñghâsay, T.; Balinhâsay (Morong); Balinhâsa, T.; BaleiTgâsoy, T.; Bagullbas (Mindoro) ; Balihud, T.; Balig6hot, B.; Balay6hot, T.; Baliñgâhood, T.; Beobayâno, V.; Bancaláuan, T.; Cocâtmon, V.; Diláan, V.j Hûpong-htipong, V.; Magûlioc, T.; Malaibdhod; Pusopfiso (Mindoro).

B. LUCIDA Blume. Pâsig, V.

BUDDLEIA ASIATICA Lour. *(LogcvniacecB.)* A shrub, the leaves grayish, pubescent beneath.

Lagtindi-salâsa, V.; Sambûng-c61a, T.; Tugnâng, II.; Talicn6no, T.

B. NEEMDA Hamilt. Hâya-hâya, V.

BURSERA. *(Bmrseracece.)* Balsamiferous trees.

Calamansânai, T.

B. JAVANICA Baill. Polyfigan, T.; Pulayfigan.

Buxus ROLFEI Vidal. *(Euphorbiacece.)* Evergreen shrubs or trees.

Pincabânao, T.

BRYOPIIYLLUM CALYCINUM Salisb. *(Crassulacew.)* A tall, erect perennial herb.

Catacatacâ, T.; Caritâna, V.

C.

CAESALPINIA. *(Leguminosece.)* Trees, shrubs, or vines.

Baiĩg6n, B.

C.BONDUC Roxb. Flowers yellow, leaflets 2 to 3 inches long. Pods with spines on the valves.

Bfigtong, V.; Câmot-cfibag, T.

C. BONDUCELLA Flem. Flowers yellow, leaflets } to 1 inch long. Pods with spines on the valves.

Bayâg cambing, T.; Calambitij Calambibft, T.j Dalugdfig, V.

C.NUGAAit. A vine. Pod naked on the valves.

Cámit cfibag, T.j Cabît-cabag, T;; Sapfoit, T., V.

C. PULCHERBJMA Sw. A small shrub with striking red flowers, common about towns, introduced from America.

Caballe*ro, Sp. ML; Rôsas caballero, Sp. Fil.

C. SAPPAN L. Shrub or small tree. Pods unarmed. The red wood of this species yields an important dye.

Sapfing, T., II.; gibucáo, V., T.

CAJANUS INDICUS L. E. *(Leguminosew.)* Erect, herbaceous, 4 to 6 ft. Flowers yellow.

CagyCsj Cfid-yos, V.; CagnGis, T.

CALAMUS. *(Palmar.)* Extensively climbing palms, which yield the rattan of commerce. The Philippine species not well known.

Apfs (Zambales); Baliniinay, T.j Bficton (Masbate); Bejfico-sipa, T.j COnag, T.; Cûrag; Lamb6tan, T.j Lfigni, Pamp.j Locóan (Masbate); Limorân, T.j Yantσc, Calamus.

C. ALBUS Pers. Bacfipie, V.j Caldpi, V.. B.; Boiigân labnf, Pamp.j Labnft, B.j Lapntf, Zamb.; Labnf-iiuay-na-mal6to, Pamp.j Labn^i, Pang.; Parfisan, V.

C. BUROENSIS Mart. Oe*y, Pang.; Tal6la, T.; *tiyo,* T.

C HAENKAENUB Mart. Baŕit, 11. j Ditâan; Dit-lin, T.

C PISICARPUB Blume. Amlls, T.? Ofiy, II.; Oufiy, II.; Yantσc-limorlin, T.

C. RHOMBOIDEUS Blume. Alfnao?, II.; Bunflgan?, Cag.; Lurfit, Cag.

CALLICARPA. *(Verbenccw.)* Shrubs or small trees with small usually pale blue flowers.

Aptilo (Paragua); Aling hottingasj Allnao, T.; Daĩigltñgan, T.j Inaiĩgd6n, T.j Malatabfi, T.j Malarjcondflron, Pamp.

C ANGUSTA Schauer. Tfgao, B.

C BICOLOR Juss. Bay6g; Pftlis, T.; Papalsfs, T.j Tfibang dalfiga, T.

C CANAL Tambalabâse.

CAWPHYLLUM. *(Guttiferece.)* Trees, valuable for their timber.

Bilangt6n, B.; Ctilu-cûlu, B.j Falumorta, T.j Malabocbóc, T.j Pannil-tasqufn, 11.

Ç.cu$_N$EATUMVidal. Balâgnan,V.

Li ^{LIF}PHYLLUM L. A large tree usually growing near the sea shore. The wood is exceedingly hard and durable, while the seeds yield an oil.

^{B}ftog, II.; Bitanhfll, T.j Bîtocj Bfrog; Bitfioi, Z.j Bancfilan, T.; ^{Bi}^og, V., II., p$_{am}$p.j Dancftlan, T., V., B.j Dingcfilinj Dincfilin, T.; Palo-marfa, T., Pamp.j Palo-marfa-de-playaj Pamita6guen, IL; Pamitlat^n, II.; Tamauian, T. j Tîtam.

Ç. VIDAIU F. Vill. Balâgnan.

^{u} ^{WAL}WCIIIANUM Planch and Triana. A species found in the mountains, distinguished by its rusty-tomentose branchlets.

Batfnan-nmo, T.j Palo-marfa dc mfintc.

CALOTBOPI S (; I I ; A N T BA K • Br. (.'I sefepton&l oeQJ.) A ^ ll ru I) or tree, flowers medium, in cymes.

Capol-capol. 1.

CALYITBOCALYX SFICATUS Blume. *{I'alma\}* Banga, V.; Bnhi, V.

CANANQA ODORATA Hook. f. et Th. *{Anonaceee,)* A tree very common in the vicinity of towns; the flowers yield a valuable perfume.

Ailjvihuig (Jolo); Alang-rlang, T.: QflBg-flaug, I.. V.. II.

CANABIUM. *(Bitriscracea[1].)* Largo trees, many species being found in the Philippines, several species being of special importance as they yield the odorous gum known loeally as "brea," which in commerce is known as Manila elcmi.

Addas, T.j Anagalti; Anttag (Abra) ; AnAfigi, T.; Basiae, T.; Basiftd (Tayabas) ; Baft; Bulao, T.; Catfm-maehfng (Zamboanga) ; Fe*sa, T.; Hagushus, B.; Jatsahengfini, T.; MalaUSgun, B,; Mayacyat, B.; • Malacalantto, B.j Mfli-pHi, V.; MalapiliSnay, B.; Pasafngin, T.j Palsanguinguln, T.; PaehafiTgan, T.; Palsanhinguin. T.j Pildui. I'.: Salung (Paragua); Tibftng, Z.; Zfilldfig, V.

C. COMMUNE I*. A source of elemi.

Ffli-pilfluay, T.

C. CUlilNGil Engl. Alagfitli, T.; Anagfitli, T.; Anten, II.j Baefiyan, V.; PalsaMohlm, T.

C. i.i'/.nMci II MU]. This species yields unosi of the elemi exported from Muni la, and is locally known as "Brea blanea."

Anten, IL; B^lis, T-j Pagsaingfiin, T.; Piluni, T.; Pinali; Pfli, T.; Pisa, T.

C. \fULTTPiNNATUM Llanos. Salong, V.

C. OVATI M BSngl. Aten; PUi, V., T.

CANAVAUA ENSIFORMIS DC. *(Lcgvtninosca:.)* A twining glabrous perennial or biennial.

Magtambo*eao (Leyte) ; Pataning-dftgat, T.

C. OBTVSIFOLIA DC. A prostrate vine with purple flowers and rather huge hard seeds, common on sandy sea shores.

IMlang-pfllang, V.

CANNA INDICA Linn. *(Scitiminecc.)* Erect herbaceous, with showy red Ilowers, growing wild; and commonly cultivated for ornament. The canna.

Balunsayfng, V.j Colintfisan, V.; Cacuertasan, T.j Cuintas-cuintfis.... T.; Saguiug-saguing, V.; Tfcas, T.; Tlcas-tfeas, T.; TitpdB tiqnis, X.j Tticas-tticas; Tapurfliiga, V.

CAN8C0RA DlFFtSA R. Br. *(Gcntianacece.)* An annual dichotomoiifjly branched herb, with quadrangular stems and rose-colored tlowers.

Cobftmba, T.

CANTUILM. *{Rub-iaaeat.)* tJsually»spinous shrubs or small trees, with amali whitisli or greenish llowwi*.

Culing-main'ii', \.; Tamauyan-pulfl (Tayabaa) ; Tir6ron, It.

0. ABBOREUM Vidal. Miilatadiang (Morong).

C. OXFERTUM Korlji. Dllig, 11.; Malapat6pat, T.

*'. msuitini M Blume. Culin c-dagã.

C. MITE Bartl. Alanghfdan it bánug, V.; Calin-man6g; Pamalatangüe*n, II.

CAPPARIS. *(Capparidacece.)* Trees, shrubs, or woody vines, usually armed with spines.

Casuft, Pamp.; Dánag, T.; Ilalugübat; Lagufno, V.

C. AURANTIOTDES Presl. Cam6ng-cámoṇg.

C. HORRIDA Linn. A climbing shrub, with stout thorns.

Dfiuag, T.; Lagufno, V.; Talactfic, II.

C. MICRANTHA DC. A shrub or small tree, with small thorns.

Alagting-ung, V.; Dduag, T.; Halugábat, T.; MararAyat-cAhoy, T.; ṢalimGmo, V.

CAPSICUM MINIMUM Roxb. *(Solanacew.)* A stout herbaceous plant, with red fruits which have a very pungent taste, universally cultivated and used as a condiment.

Chile, Sp. Fil.; Chfli-plcante, Sp. **FiL;** Chfleng-bund6c, T.; LAra; Malfsa; Pasftis, T.; Quitfcot, V.j Sfli, T.

CAPURA. *(Sapindacew.)* Shrubs or small trees.

Dfrig, II.; Onáoa, T.; Paloflhan, V.; Talinofino, Pamp.

CARALLIA INTEGERRIMA DC. *{Rhizophoracew.)* A small evergreen tree, with small white flowers and ovate leaves, found in dry forests.

Bạcáuan guba (Mang.); Dflan usa, T.; Macaásin, T.

CARDIOSPERMUM HALICACABUM L. *(Sapindacew.)* A small herbaceous vine, with inflated fruits, found in waste places about towns.

Barcúlon; BaiTgc61on, T.; Caña, V.; Pal tug-pal túcan, Pamp.

CARICA PAPAYA L. *(Passi oracete.)* A tree commonly cultivated for its edible fruits, introduced from America. The Papaw.

Capáyas, T., V.; Papáya, Sp. Fil.

CARTHAMUS TINCTORIUS L. *{Compositw.)* An herb with orange-red flowers, commonly cultivated, the flower being used as a condiment to color foods. The Safflower.

Casabhá, V.; Catsúmba, T.; Cachfunba, Pamp.; Casubhfi, T., Pamp.; Castfnnba, Pamp., T.; Bfri, T.; Lfigo, T.

CARUM COPTICUM Benth. *(UmbelliferecB.)* Herbaceous, the leaves finely pinnately compound, flowers white. Commonly cultivated for **its** seeds, which in form and taste resemble anise. Caraway.

Dam6ro, T., Pamp.; Lamúdio, T., V.

CARYOTA. *(Palmw.)* The sheaths of various species of this genus produce a very strong black fiber.

Y6ro (Mindoro).

C. CUMINGII Mart. PugAhan, T.

C. RUMPIIIANA Mart. Bágsang, V.; Calálios, V.; Ltimang. Cag.; Malantiig, Cag.; Paticán, V.

C. URENS L. Cfibo-negro; Pugfihan, T.j Sagfi; Taguipán; Taquipán, T.

CASEARIA *{Samydacea*.)* Trees or shrubs, with alternate leaves and small axillary flowers.

Calflag, T.; Malatam6yan, T.; Pidpfd, II.; Tapfit-tapAt, T.; Tfllang-nanóc, B.; Inignrn, T.

C. CINEREA Turcz. AnaviiTga; Maraligao, V.

C. MOLUCCANA Blume. Bintoco; Tambóyog usá.

CASSIA. *(Leguminosece.)* Usually shrubs or trees.

Malacatúray, T.

C. A»LATA L. A small shrub with yellow flowers and angular winged pods, probably introduced from America, extensively úsed in the practice of medicine.

Acapúlco, Sp. FiL; Baiyabâsin, T.; Catandá, T.; Casftas, V.; Pacagonc6n-castlla; Palochlna, V.; Sontfng, T.; Suntfng, V., T.

C. FISTULA L. A tree with yellow flowers and long cylindrical pods, used in medicine.

Anche''rhan, T.; Balóyong, V.; Balilyong, V.; Bálay, V.; Caña-pfstola, T.; Caña-flstula, Sp.; lbabflo, V.; LombayGng, V.; Qufna-pe*stula, T.

C. OCCIDENTALS L. A diffuse glabrous undershrub, pods compressed.

Bulfitong-áso, T.; Balótang-áso, T.; Tighlman, T.; Tambalfsa, V.

C. TOKA L. Herbaceous, or developing into a small shrub.

Báho-báho, V.; Balátong-Sso, T.; Catandá, T.; Catandâng-áso, T.; Manimanfhan, T.; Mongononghan, T.

CASSYTHA FILIFORMIS L. *(Lauracece.)* A leafless twining yellow parasite, common on grasses, shrubs, etc., on the seashore.

MalabohOc, T., V.

CASTANOPSIS PHILIPPINENSIS Vidal. *(Cupuliferew.)* A tree, fruits resembling chestnuts.

Livfan; Lovlan, T.; Paunrïgfigan, T.; Talacfitac, T.

CASUARINA EQUISETIFOLIA Forst. *(Casuarinacew.)* Trees with very hard wood, slender cylindrical jointed leaves (not true leaves), and small cones, common near the seashore and along rivers.

Ag6o, T., II.; Ag6ho, T., V., Pamp.; Agfiho, T.; Agfiso, Z.; Agóso, T.; Arrôo; Aro, II.; Ayo, V.; Ant6ng (N. Ecija) ; Cdro, II.; Malaboh6c, V.

CEDRELA TARATARA Blanco. *(MeHaceos.)* This species and the next are known as the Philippine cedar, the wood has the appearance and odor of red cedar, and is used for the construction of cigar boxes.

Sandana, V.; Balongcfiuit, B.; Taratfira, T.

C. TOON A Roxb. Alam (Mindoro); Calantfis, T., Pamp.; CantfiTgen, II.; Danúpra (Cagayan); Danfgga (Cagayan); Lagfni; Lañgpâ; Lanfgda, B., V.; Lanfgpa, V.; Lanfpga, V., B.; Pordc, II.

CEIBA PENTANDRA Gaertn. *(Malvacew.)* Trees with straight trunks and few branches, extending at right angles from the trunk. This species yields an abundance of a fiber known in commerce as "copak" and used for stuffing pillows and mattresses.

B6boy, T.; Búbuy, T.j Bfilac, T.j Bfilac-dondôl (Cebu); BtSlac-castlla, Pamp.; BulacsJno, T.; CApoc (Jolo); Cfipas, II.; Cflyo, B.; Cfipas-sfiilglay, II.; Dald6l, V.; Dondti, II.

CELOSIA ARQENTEA Linn. *(Amarcmtacece.)* An erect glabrous annual herb.

Caday6han, T.; Cudifipa, V.; Quinday6han, T.

C. CRISTATA Moq. An erect glabrous herb, cultivated for ornament.

hPalonpal6figan; Pad6ng-pad6ñgan, V.

CELTIS PHILIPPINENSIS Blanco. *(Urticacew.)* A tree, leavea prominently triple nerved. A valuable timber tree.

Alme*z; Lod6no; Log6g, V.; Lag6g (lloilo); Malafcnio, T.j Malaguibůyo, V.; Malaĭtmo, T.; Magab6yo, V.

CENTRIPEUA ORBICULARIS Lour. *(Composite.)* A very small prostrate herb with small yellow flowers.'

Harfiiĩgan, T., V.j Pissfc, V.

CEPHALOSTACHYMN CAPITATUM Munro. *(Qraminece.)* A bamboo.

Napnáp, V.

CERATOPHYLLUM SUBMERSUM Linn. *(Ceratophyllacece.)* Small herbs found in fresh water.

Inâta, T.

CERBERA ODOLLAM Gaertn. *(Apocinaccv.)* A shrub, found along the seashore, with white flowers and milky sap.

Arbon (Paragua); Baraybáy, T.j Bůto-bflto, V.j Lipâta (Ticao); Marayâbay, T.j Toct6c-eâlo, T.

CERIOPS CANDOLLEANA Arn. *(Rhizophoraccw.)* A constituent of the mangrove vegetation. Petals 5 to 6.

Bâcao, T.; Baeâuan, T.; Bluas, T.j Ligâsan, T.j Pototân, V.j Tafigâl, T.j Tůngung, V.j Tigasân, T.

C. ROXBURGHIANA Am. Tañgfll laláqui, T.; Tailgfil-tañgâl, T.

OESTRUM NOCTURNUM L. *(Solmacew.)* A small shrub with greenish flowers, cultivated for ornament. Introduced from America.

Dama-de-n6che, Sp.

CHAILLETIA GELONIOIDES H. f. *{Challetiacev,)* Small trees.

Cdrong, T.; Bltlag, T.

C. GRIFFITIIII Hook. f. Decdlc, II.

OHAMPEREIA GRIFFITIIII Planch. *(Smtalacew.)* A small tree with alternate leaves and very small flowers.

Malalůcban, T.j Malulůcban, T.j Panalayfipin, T., II.

CHENOPODIUM AMBROSIOIDES L. *(ChenopodiaceoB.)* A tall aromatic herb, introduced from America.

Apos6tis, T., V., Pamp.j Apas6te, T.j Alpos6tes, Sp. Fil.j Apasdtis, T.j Pas6tis, T.j Pars6tis, T.

CHIONANTHES. *(Oleacew.)* Trees.

BayCgo, V.; Sagapsfip, V.

CHISOCHETON. *{Meliacea.)* Large trees or some species shrubs.

Agup&ñga(Mindoro); Agapáñga, V.; Agopáñga (Marinduque) j Balticao, T.j Cflling-bflbuy, T.j Himfimao, T.j SaplOñgan-colorftdo.

C. GERAMICUS Miq. Salaquf, T.

C. PANICULATUS Hiern. Balocftnac, T.

C. TETRAPETALUS Jurcz. Bogol6yac, B.j fbo, V.; Malabâya, T.j Magullve, T.;T6ob,T.

CHLORANTHUS BRACHYSTACHYS Blume. *(Chlormthacece.)* Small shrub, flowers in terminal racemes.

Em-e*m, Ig.

CHRYSANTHEMUM INDICUM L. *(Composites.)* Cultivated for ornament.

Doldntas, T.

CHRYSOPOGON ACICULATUS Trin. *(QraminecB.)* A tufted grass, common in open places.

Am6res secos, Sp. Fil.; C6lot-col6tan, T.; Mariscos, T.

CINNAMOMUM. *[LauracecB.)* Several species of cinnamon are found in the Philippines, the bark of the several species having to a greater or less extent the properties of true cinnamon of commerce.

Canėla de monte; Malasångui; Maragaoe*d, II.; Pâsi, B.; Samllin, T.; Sind6c, T.

C. MERCADOI Vidal. Callñgag, T., V.; Caniñgag, T., V.

C. PAUCIFLORUM Nees. CandarCma, II.; Calfñgad, T., V.; Calfñga, V.; Canėla; Pfita, Ig.; Macalirigag, T.

CISSAMPELOS FAREIRA L. (*Menispcrmacea:*) A vine with a cylindrical woody stem. Much used in the practice of medicine.

Bâtang-bâtang (Cebu); Calâad; Chanchfie; Chinchâo-chinchâuan, T.; Cinchâo-cinchâuan, T.; Calacalamâyan (Batangas); Cuscusfpa, II.; Gulangulamânan, T.; Himpapára, V.; Hampapáre, V.; Pâri, V.; Sampapáre, V.; Sansâo; Sansa6san-sansa6san, T.; Yemoum6han, T.

CITRUS. *{Kutaceco.)* The lemons, oranges, limes, etc.

Calamôndin; Lucbân-gûbat; Malacabfigao, V.; Stia, II.

C. ACIDA Roxb. Dâyap, T.

C. AURANTIUM L. Orange.

Calamansg, T.; Cah6l, T., V.; Cagė!, Sp. Fil.; Cabûlao (Tiagan); Dalandfin, T.; PisOng, T.; Narangftas, T., V.; Sint6nis, T.

C. DECUMANA Linn. CabCigao, V.; Lucbân, T.; Narânja T.

C. HYSTRIX DC. Camûlao, II.; Camuntfty, V.; Camtiyo, T.; Colob6t, T., V.; Cfibog; Cabûyao, Pamp.; Dilânan; Dufĩgurtiflgut, C; Guld (Tiagan); Mayagârin; Sûha (Batangas).

C. MEDICA L. Btfyag, T.; Cfdra; Calamondin, T.; Dalâyap, V.; Lim6n, Sp. Fil.

C. TOROSO Blanco. Calâbot.

CLAOXYLON INDICUM Hassk. *(Etiphorbiacew.)* A shrub or small tree with pubescent branches and variable leaves.

Bflid-bllid (Zamboanga) ; Ságay, V.

C. WALLICHIANUM Willd. Balflang oâc, T.

CLAUSENA. .*(Rutacece.)* Unarmed shrubs or trees with white flowers and small ovoid fruits.

Balucbûc, T.; Lognfg; Pfris, T.; SanquI, T.

C. EXCAVATA Burm. Camafiguiftnis, T.; Calomâta, T.; Maisipafoi, T.; Cayumdnis, T.

C. WAMPI Oliv. Huampft, T.; Uâmpit; Wâmpi, T.

C. WILLDENOVII W. and A. Himûlao, V.

CLEIDION. *(Euphorbiacew.)* Trees with alternate leaves.

Malaputat," T.; Camftisa sa gubat, T.

C. JAVANICUM Blume. Macaisâ, T.; Malatûba, V.

CLEISISTOMA AMABILE T. and B. *{Orchidacew.)* An epiphytic orchid.

Daptf-sa-cauâyan, T.

CLEMATIS GOURIANA Roxb. *{RanunculacecB.)* An herbaceous vine.

Calũpad. V.; Tolâng-sang-bânug, V.

CLEOME VISCOSA Linn. *(Capparidaccw.)* An annual erect, softly pubescent herb with yellow flowers.

Apoy-fipoyan, T.; Balabalan6yan, T.; Hulåya-sang-fiyam, V.; Sili-silfhan, T.; Silisfan, T.

CLERODENDRON. *(Verbcnacew.)* Shrubs or small trees, many of the species with very showy flowers.

Alibficta, B.; Bagåuac, T.j Baggåb; Bagånag, T.; Gogåuac, T.; Casopånguil-na-putf, T.; Casopfingil-sa-gflbat, T.; Malabfiga, T.; Mfiñgha, T.

C. IILANCOANUM F. Vill. Bagåuac na morådo, T.j Balictårin, T.; Sålingouåc-ñga-maftum, V.

C. BLANCOI Naves. Casupafigil gubat, T.

C. BRACHYANTHUM Schauer. Hamfndan, B.

C. CUMINGIANUM Schauer. Dacûtung (Jolo).

C. FRAGRANS Vent. Higant6ng, V.

C. INERME R. Br. Ballseng, V.

C. INFORTUNATUM L. Casupåñgil-gûbat, T.

C. INTERMEDIUM Cham. Small shrub with showy red flowers, common.

Balantåna, V.; B.mtåna, V.; Bol6ng-tåmbal; Alocåsoc, V.; Asnfiñgai, V.; IgfiTga, T.j Igufiñga; Colocol6g, V.; Casopånguil, T.; Calftica; Lar6an-anlto, T.; Macalalånang, T; Pacåpis, V.

C. LANUGINOSUM Blume. Taguipån.

C. MACROSTEGIUM Schauer. A'ctolfgan; Agboligan, II.; Bagfinac; BinufiTga, T.; Magbolfgan, II.; Malapotocån, T.; Nacbolfgan, II.; Sålingouåc, V.

CLETHRA CANESCENS Reinw. *(Ericaceae.)* Shrubs.

Cåmog, II.; MalacWc.

CLINOGYNE GRANDIS B. and H. *(Scitiminece.)* Erect herbaceous plants.

Banbång (Morong).

CLITORIA TERNATEA Linn. *(Leguminosecc.)* Herbaceous vine with large blue flowers, common about towns.

Calocantfng, T.; Colocantfng; PuqufiTgang, T.

CLORIS BARBATA SW. *(Qraminece.)* *A* tufted, handsome glàss, 1 to 2 ft. high, found about towns.

CoroscorOsan, T.

CNESTIS TRIFOLIA Pers. *(Leguminosece.)* A climbing shrub.

Hammabalår; Marindåto.

CNICUS JVALLICHI DC. *(Composite.)* A thistle.

Pågat, Ig.

Cocos NUCIFERA Linn. *(Palmw.)* The coco palm, the natives distinguish many varieties.

Adiåvan, T.; Anlbong, V.; Bonotån, V.; B6tong, V.; Cayomñnis, V.; COco^Sp. Fil.; Dahfli, V.; L6bi, V.; LuMcan, V.; Nfog-ñga-potf, V.; L6bi-figa-hinbåon, V.; L6biiTga-pilfpog, V.; NgGñgot, Pamp.; Limbåon, V.; Lubf; Nlog, T., C, II., B., V.; 6iT.J>ot, Z.; Pam6col, T.; Paiigosfn; Pot6t, V.; Pafigosfn, V.; Pilfpog, V.; Tapiasln; Tam-fs, V.; Tam-isån, V.; Tayomåmis, V.

CODIAEUM VARIEGATUM Muell. Arg. *(Euphorbiacece.)* A small shrub with exceedingly variable variegated leaves, extensively cultivated for ornamental purposes.

Buena vfsta, Sp. FiL; Calipáyang, V.; Plla; Saguilalá, T.; San-Francisco, Sp. Fil.

COFFEA AttABiCA L. *(Rubiacew.)* A shrub or small tree. Coffee, universally known to the natives as cafe*.

Cahána (Jolo); Cafe, Sp.

Coix LACHRYMA-JOBI Linn. *(Graminew.)* A stout grass with very hard globose fruits, which are used for beads. "Job's tears."

Adláy, V.; Agdá, Ig.; Tegbe*, T.; Tigbl, T.

COLDENIA PROCUMBENS L. *(Borraginacece.)* A prostrate scabrous herb with alternate crisped leaves.

Tapiasfn, T.; Ore*gano-laláqui, T.

COLEUS. *(Labiatece.)* Commonly cultivated herbs, ornamental.

Sugánda, T.

C. ACUMINATUS Benth. Albaháca mor&do, T.; Daponáya, V.; Laponáya, V.; Malamayána, T.; Taponáya, V.

C. AROMATIUS Benth. Oregano, Sp. Fil.

C. ATROPURPUREUS Benth. Badiára, T., V., Pamp.; Mayftna, T., V., Pamp.; Marayápa, T., V., Pamp.; Malifina, T., V., Pamp.

COLOCASIA ANTIQUORUM Schott. *(Aroidew*)* Tall, coarse herb from a tuberous root, extensively cultivated for its edible root, very variable.

Abálong, V.; Apfpi, V.; Badfang; Bfga, V.; Dágmay; Dágmay-iiga-quinson, V.; Dfigmay-ñga-inftlog, V.; Digmay-ñga-bolflao, V.; Dfigmay-ñga-apfpi, V.; Dágmay-ñga-tapól, V.; Gávay, T., V., Pamp.; Gábi, Cag., T., V., Pamp.; GAbing-morâda, V.; Gandfls, T., V., Pamp.; Galfang, V.; Gáby-na-sibóyas, T.; Gábing-polá, T.; Gfiby-iiga-guinútos, V.; Gábing-silftñgan, T.; Gfiby-na-sinib6yas, T.; Guinfitos, V.; Lagváy, T., V., Pamp.; Quimp6y, V.

COLUBRINA ASIATICA Brongn. *(Rhamnacece.)* An erect glabrous, unarmed shrub.

Cabalfti, T., V.; Uatftic, T., V.

COLUMBIA. *(Tiliacece.)* Shrubs or small trees with 3 to 5 winged fruits.

Anflao-uan, T.; Barid-an, Pang.; Namáued, T.

C. SERRATIFOLIA DC. A very common shrub; the bark yields a strong bast fiber.

Anflao, T.; Arflao; Baynfld.

CONNAROPSIS PHILIPPICA F. Vill. *(QeraniacecB.)* Shrub.

Balabang quilfng, V.; Malabangquilfn, V.

COMBHETUM. *(Combretaceat.)* Large shrubs, with long pendent or scandent branches.

Malacd6g, II.

C. OVALIFOLIUM Roxb. Pamulaclfiquin, T.

C. SQUAHOSUM Roxb. Malatumbaga, T.

Coji-Viruw BEN0HALEHBX8 L. *(Covimelinacea:)* .\ slender creeping sue-oulent herb, with blue flower-.

Uicbftfigon, T.j Bias-bias, Pawp.; Cabflao, V,; Sabilao, V.; Sabilfio-ñga-laba-án, V.; Uligbóñgon.

C, couinrtfxe Linn. Sambflao, V.

COMMERSON iv PLATTPHYIXA Andr. *[Sicrculiacca!.)* A tree with broad pubescent leaves, white flowers, and 5-valved capsules which are covered with * ft bristles.

Bago; Benoang, T.; CuliUi; Labfiya (Tayabas); Mayamagar, V.; Patttlo, T.; Potolo, T.

CON HABW9. *(Connaracete.)* Trees or shrubs with odd pinnate leaves.

<'miiagsn-tayiiflis. T.j Kanmababao, T., V., Pamp.j Gufcos-gufeos, T.

C, raautconncus Jack. Sal-l.iday.

Cosot i;i'ii.M.t s. *[l/Ttioaceas.)* Climbing shrubs with alternate entire Leai es.

Citaj (Albay),

C. AcmoHATOa Turez. AnOpol (Albay).

C. KKECftrs Blanco. HanCpol, T., V.

C. OVATL^S Tree. Tobfiyan (Tayabaa).

C. SUAVEOLKNS Bltuiie. Lftgna, T.

COBOHOBUS AcrTANiiii.rs !.,,ini. *[Tiiiacew.)* An annunl herb with elongated 6-angled capsules.

Pasao-na-habe, T.

C. CAPSLT^INS I.. An annual with sub-globose i capsules.

Larahay, V.j Pasao; Pfisao-na-bildg, T.j Pofiglo pdfigloan.

COBDIA BLANCOI Vid. *(Borraginacew.)* Shrubs or snuill trees with alternate Leaves and "rather large flowers.

Anong, T.j Anünang, B.; Bibfli. V.; SnlOyong, T.; S^nalfgan, II

C. suBcoaDATA Lam. *kg&i* ut> \. Banalo, ^r.; Sigftn-dftgat, B,

CoBDYLINE TI:I;MI\ALIS Kurtli. *{Liliacece.)* Stiruh ;\ith distichous lined r leaves.

Quilaa, V.; Saguilalft, T,j Toncdd-oblspo, T.j TOeor-pari, Parop.

CORIANDR\M SATIVUM Linn. *{V,nh, tllfcrew.)* An aroma tic stout, smooth herb with white (lowers, curorated. Coriander,

Culflntro (Manila); 6i7gsay (Manila).

CORYPIIA. *(Pnlma.)* Ajiahao, T.j Maeasflad, T.

C. UHBRACULIFERA L. Bull, T.; Bafiga; Buri, T.; Buli-burf; Balong-lnyon, Pa up.; Sllac, II.

COSTUS. *{Soitiinincn:,)* Ijeafy eret-t herbaceous plants.

[bmoc&un.

COUTHOVIA CE 11 liiCA Koorden. *{Loganiacecr.)* Tree.

Balt-balT, V.

'I:\IAEVA RELKJIOSA Forst. *(Capparadacea.)* Tree with 3-foliate leaves and large yellow or purplish flowers.

Balal-lamdo, II.; Balay-namfic, H.j S-iling-bfibog, V., T.

CRATOXYLON. (//:// eriaceel.j Trees.

GoyGn-goyGn, T.j Pap'ftca, Z.; Dariya, T.j Lflyong-1 flyong, V.

C. BLANCOI Blume. Bfiga-tiibang (Samar); Cansflan, V.; Guyón-guyón, T.; Pañgurfñgu, V.

C. CELEBICUM Blume. OlfiTgon, V.

C. FLORIDUNDUM F. Vill. Cuëlang (Benguct); Pagurfrigon. T*.: Satfng-gágan, B.

C. FORMOSUM Benth. and Hook. f. Camantáyo, V.; Malarfiyal, T.

CRESCEXTIA ALATA H. B. K. *(Bignoniacece.)* A tree, introduced from America, sometimes cultivated for ornament.

Hoja cruz, Sp.

CRINUM. *(Amaryllidacew.)* Succulent herbaceous plants with long leaves and large white fragrant flowers.

Lfrio, V.

C. AMOENUM Roxb. Báeong-bácong, V.

C. ASIATICUM Linn. Agubáhan, V.; Bácong, T.; BAcung, V.; Palagficon, V.; Salibangbáng, V.

C. PBATENSE Herb. Bácong sa s6log, V.; Bácong iñga dulão, V.

CROTALARIA L. *(Leguniino8ece.)* Herbs or small shrubs with yellow flowers and simple or 3-foliate leaves.

Catandá, T.; C6lung-c6lung, V.; G6rung-g6rung, V.

C. LINIFOLIA L. f. Gûrung-gfirung, V.

C. QUINQUKB'OLIA L. Stisoi, T.; Susosusóyan, T.

C. VERUUCOSA L. Bûlai-lâva, T.

CROTOX. *(Euphorbiacece.)* Shrubs or small trees.

Can6nay, T.; Camáñga, T.j Malabágna, T.

C. CONSANGUINEUS Muell. Arg. Malatúba, B.

C. LEIOPIIYLLUS Muell. Arg. Cátap (Zamboanga).

C. MURICATUM DC. Balánti.

C. TIGLIUM L. A small shrub, the seeds yielding the croton oil (Oleum tiglium) of commerce. Used by the natives in the practice of medicine and for poisoning fish.

Camáisa, T.; Camandág, V.; Macásla, V.; Túba, T.; Túba-camaisa, T.; T(iba-sa-búquid, V.

CRUDIA BLANCOI Rolfe. *(Lcguminosece.)* Shrub or tree with odd pinnate leaves.

Calatumbága; Hintot6or, T.; Malatumbágo, T.; MalustSñgay, T.; trlud, Z.

CRYPTERONIA. *(Lythracew.)* Trees with opposite entire leaves and small white or green flowers.

Caman6c, V.; Salásan, T.

C. PANICULATA Blume. Quilámo, T.

CRYPTOCARYA. *(Lauromr.)* Evorgroen shrubs or trees.

Banftan, **Pamp.**

C. DENSIFLORA BluiUC. A(.'d;Ul, T.

C. ILOCANA Vidal. Camfgay, 11.

C. VILLARII Vidal. Balfctan?.

CUBILIA *Kvimin* Blume. ***(Sapindacetv.)*** **Tree,**

Cubli (Bnlacan); Lubilubfli (Bataan).

CULUMIS MELO L. *(CurcurbitacecB.)* The melon.
Atfmon, V.; CatimCn, V.; Melón, Sp. Fil.
C. SATIVUS Linn. The cucumber.
Cábul; Calavága, V.; Cohómbro; Pepino, Sp.
CURCLRBITA MAXIMA Duch. The squash.
Calabázang bilóg, T.; Calabázang pulá, T.
C. PEPO DC. The pumpkin.
Calabáza.
CUDRANIA JAYANENSIS Tree. (*Urticacece.)* Shrubs or small trees.
Tal6long, L, II.; Tahád-labtiyo, T.
CUMINGIA PHILIPPINES sis Vidal. *{Malvacew.)* A shrub or small tree.
Libáto-putf, T.
CUPANIA. *(Sapindaccce.)* Shrubs or small trees.
Anácu, T.; Balasábis, Z.; Bagonfto B.; Cúyos-cúyos, T.; Cusibeja, II.; Guirfo-gutfn, B.; Sausaúli, T.; tjyos; Sálab, T.; Balasábis.
CURCUMA CASSIA Roxb. *{Scitiminew.)* Herbaceous plants with large leaves.
Lanjptiyang-tápol, V.; Lampdyang-dorftc, V.
C. LONGA Linn. Añgai, Pamp.; Caláuag, V.; Calavfiga, V.; Cullao, II.; Culfilao, Pamp.; Dilão, T.; Dúlao, V.; Cñnig, II.; Lisáñgay, Z.; Páiigas, Pamp.; Quinambdy, V.
C. VIRIDIFLORA Roxb. Caláoag, V.; Tarrln.
C. XANTHORRIIIZA Roxb. B6lon, T.; Lampfiyang, T.; Támo, T., Pamp.; Tumahlba, T.
C. ZERUMBET Roxb. Barác, T.
CYANOTIS AXILLARIS Roem. and Schult. *(Commelinacea.)* Prostrate herb with small leaves and small blue flowers.
Bilang-bflang?, V.; Hafili? (Jolo); Sabilfto, V.
C. CRISTATA R. and S. AlicbaíTgcm, T.; Luya-luya, V.
CYATIIEA INTEGRA J. Sm. *(Filices.)* Calat6ndon, T.
CYATHOCALYX ZEYLANICUS Champ. *(Anonacece.)* A tree with acuminate leaves and large carpels.
Soál, T.
CYATHULA PROSTRATA Blume. *(Amarantacea.)* An annual, prostrate, flowers in small solitary clusters.
Dáyang, T.; Dócat-d^cat, V.
CYCAS CIRCINALIS L. *(Cycadacece.)* Bit6go, T.; Patúbo, T.; Pit6go, T.
CYCLEA PELTATA H. f. and Th. *(Menispermacece.)* A climbing shrub with peltate deltoid leaves.
Abiáb, V.
CYCLOSTEMON. (*tiuphorbiacece.)* Trees.
Btitong-manOc,, V.; Magaranbtilo (Tayabas); Talimúrong, Pang.; Ugfio, V.
0. CUMINGII Baill. Tenáan-banUy (Tayabas).
CYNODON DACTYLON Pers. *(Graminece.)* A low prostrate grass, the "Bermuda grass" of the United States.
Colátay, T.; Cáuat-caufiran, T.; Málit, T.

CYXOMETRA. (*Leguminoscw)*. Trees.

Malapfiyao, T.

C. INAEQUALIFOLIA A. Gray. Batíti, V.; Dfla-dlla, T.; 61od, Pamp.

C. RAMIFLORA L. Balitbftan, T.; 6dling, V.; tilud (Tarlac).

CYNOMORIUM PHILIPPINENSE Blanco. Capfilao, V., T.

CYPERUS. *(Cyperacea\)* Coarse or fine grass-like plants, usually found in wet soils, the sedges.

Alűsang, T.; Bâca-bacâhan, T.; Balaïïg6tan, T.; Bofig6t-bofig6t, V.; Calambő-calambőan, T.; Colabatfan, T.; Gűmi-gűmi, T.; Gufsay calabâo, T.; Manfc nianican, T.; Mfsay-calabfio, T.; Mtita, T.; 6bud-6bud, V.; Pot6c; Páyong-pfiyong, V.; Sud-stid, V.5 Tfcay, T.

C. DIFFORMIS Linn. Bancdan; Bâqui-bâqui, V.; Guildmhon, V.; Tftio, T.; Tfquio, T.

C. ELATUS Linn. C6bong-c6bong, V.

C. ROTUNDUS L. This species is 'somewhat used in the practice of medicine, the "nut grass" of the United States.

Botob6tones, B.; Cflsung, Pamp.; Galonâlpas, Pamp.; Malaap61id, Pamp.; Môta, Pamp.; Mûtha, T.; Onorfln, Pamp.; Omfiding^Pamp.; Omftdiung, Pamp.; Surstir, Pamp.

D.

DACTYLOCTENIUM iEGYPTiuM Pers. *(Qraminew.)* A common tufted grass with digitate inflorescence.

Alam, T.

DAEMONOROPS. *(Palmcc.)* A climbing palm, related to *Calamus* and yielding rattan.

Calâbang, V.; Halamhâm?, V.; Palduan, V.

DALBERGIA. *(Leguminosew.)* Scandent shrubs or trees.

Malaga-hânip, T.; Malunúl-uiïgAyam, T.

D. FERRUGINEA Roxb. Câmut-cábag, T.

D. LANCEOLARIA Linn. Macâpil, T.

D. SEJNOSA Roxb. Balibâgan, V.

DA LEA NICJBA Mart, and Gal. *(Leguminoscw.)* An herbaceous plant introduced from Mexico and now common in many localities in the Philippines.

Agőgo, T.; Camfingi, T.; Dfirang-p&rang, T.; Sampfiloc sampalocan, T.

DATURA ALBA Nees. *(tiolunacece.)* Stout herbaceous plants with elongated large whitish flowers, the "Jimson weeds" of the United States.

Catchuĵbung, V.; Catchfbong. V.; TalampCnai, T., Pamp.; Tatchfibong, V.

D. FASTUOSA L. Tahimp6nai na itim, T.

D. METEL L. Catchflbung, V.; Tarumptinia, T.; Talonpűnay.

DECASPERMUM. *(MyrtacecB.)* Shrubs with white or pink flowers.

Pugfitiy.

D. BLANCOI Vidal. Ualisualisfin, T.

D'. PANICULÁTUM Kurz. Alung-cflgay, V.; Culfisi, 13.; Dugayőn, V.; SaliHhân, V.

DEERINGIA CELOSIOIDES R. Br. *(Amarantacece.)* A climbing shrub with small greenish white flowers.
Ragorflis, T.; Hanlilim6con, V.

D. INDICA Zoll. Babânat (Nueva Viscaya).

DEIIAASIA. *(Lauracew.)* Evergreen trees.
Cas6i-cas(iian, T.; Malacfidios, B.

DELIMA SARMENTOSA L. *(Dilleniacew.)* A woody vine with very harsh leaves, small white flowers, and small red fruits.
MalacatmCn, T.j MSlvas-tagbâlang. T.

DEKDROHIUM. *(Orchidacew.)* An epiphytic orchid.
Sañgumafn, T.

D. LUNATUM Lindl. Pasurlao, V.; Sulfao, V.

DENDROCALAMUS. *(Qrarninea.)* A bamboo.
Cau&yan-tainfinac; Caufiyan-lumanpfio; OauAyan-bfilio; Bfitong, V.

D. FLAGELLIFER Munro. Búlio, V.; B6ho, T.

D. MEMBRANACEUS Munro. Bagficay, V.; Macalbâng, V.

DENTELLA REFENS Forst. *(Rubiacece,)* *A* small, weak, prostrate annual with white flowers.
Dflang-butiquf, T.; Dilan-butiquf.

DERRIS. *(LeguminosecB.)* Climbing woody vines.
Bagflybay, T.; Balflgai.

D. SCANDENS Benth. MalasSga, T.

D. SINUATA Benth. Asiasfmanan, T.; Bfltong, V.

D. ULIGINOSA Benth. Hingasin&n, V.; Hingasfn, V.; Silasfla, T.

DESMODIUM. *(Leguminosece.)* Trees, shrubs, or herbs with jointed pods.
Malacfiro, V.; Manimanfan, T.j Maitğqufet, T.; Masamb6ng; Para-paranfihas, T.

D. LAXIFLORUM DC. A small shrub, the branches angled, pubescent.
D6cot-d6cot, V.

D. PULCHELLUM Benth. A shrub, the flowers hidden in persistent distichous bracts.
Caliiicai (Leyte); Calayficay, V.; Caliacay, V.; Manquft; Payang-paytlng, T.

D. TRIFLORUM DC. A trailing herb, the flowers axillary.
Pạcpắc-lắiigao, T.

D. VMBELLATUM DC. A shrub or small tree found near the sea shore.
Malapigas, T.; Malacflrios, Z.; Ttiyat-bagufo, V.

BEUTZIA PULCIIRA Vidal. *(8axafrq,gacece.)* A shrub with opposite leaves and white flowers.
Quetquėt, Ig.

DICTYONEURA. *(Malphigiacew.)* Tree.
Cữbao.

DIGITARIA. *(Graminece.)* A slender grass with digitate infloresence, the "crab grass" of the United States.
Baludgfingan, T.

DILLENIA PHILIPPINENSIS Rolfe. *(Dilleniacew.)* A tree with very large showy white flowers.
Catm6n, T., V.

D. SPECIOSA Gilg. Malacatmón, T.; Paláti, Paláli, B.

DIOSCOREA. *(Dioscoreacew.)* Climbing plants, usually from fleshy root-stocks, many species being used for food. The Philippine species are very imperfectly known.

Boháyan, V.; Btfdot, V.; Cairóni, T.; Cálot, Pang.; C6bag-na-quir6i, T.; Hampás tagbálang; Pológan, V.; Páquit, T.; Ptigang, V.; Limalfma, T., V.; Quer6e, T.; Quinampái (Cebu); Tamfs, V.; Toqufng-pálo; Tuguf, T.; Togufng, T.; Togufng-p61o; tJbe.

D. ALATA L. tibi.

D. BATATAS Decne. Dulfan, II.

D. DIVARICATA Blanco. Igne''ma.

D. EBUBNEA Lour. Ban&yan, V.

D. PASCICULATA Roxb. BolCt, V.; Borót, V. Corót, V.; Culád, V.; ' Dalfñga, V.; Dalfligng, V.; T6ñgo, T.

D. IIIBSUTA Blume. Cálut, Pamp.; C6lot, V.; Cáyos, V.; Gáyos, V.; *Or6t,* V.; Táquf.

D. PENTAPHYLLA Pers. BayaiTgcán.

D. SATIVA L. Báong, V.; Balafcag, V.; Cóbag, T.; D6gue; Náme; Qui-r6i, T.

DIOSPYROS. *(Ebenacew.)* Shrubs or trees, many species being found in the Philippines, most species having very hard dark-colored wood, and sonic species having edible fruit. The American persimmon belongs to this genus.

Aláhan, T.; Alfintag, T.; Aráhan, B.; Anang, T.; Bantolfnon, T.; Baganito (Morong); Balinñgágta-colorádo (Abra); Banlatináo, Pang.; Bulonñguftan, T.; Busfli, Pang.; Bamtolfco, Z.; Camagahál (Morong); Calimfintao, T.; Calohfldiang, Pamp.; Calamansdnai, T.; Cadapdilp, B.; Catelána, T.; Cam6nay, T.; Camayúan, T.; Coloyánang, Pamp.; Colohfidia, Pamp.; Dambuhála, T.; Laguicdf, Mang.; Malagaitmon, T.; Matobat6, B.; Maravfcal (Morong) ; Marablcat, T.; Malasóro, B.; Malatálang, Pamp.; Ogáo, B.; Pagatpát, T.; Págat-págat (Laguna); Panaguftmon, B.; Tagofsmon, B.; Ugáo, B.

D. BLANCOI DC. Amága.

D. CUNALON A. DC. Cunálon, V.

D. DISCOLOB Willd. Amága, V., T.; Camagúan; Camag6n, T.; MabOlo, T., V.; Malatápay, T.; Tfilang, T., Pamp.

D. EBENASTEB Retz. Sapdte; Zapdte.

D. EMBBYOPTEBIS Pers. Tálang-gfibat, T.

D. MALACAPAI A. DC. Malacápai, T.

D. MULTIFLORA Blanco. Can6may, T.

D. NIOBA Retz. Lúyong; Lfiyan, T.; Zap6te negro.

D. PILOSANTHEBA Blanco. Amága, V., T.; Alintátao, T.; Apoptuyot (Cagayan); Bálatinao; Bantolinao, V_M T.; Batolfnao (Cagayan); Bo-Ionga6ta, T.; Bolongufta, T.; BaloiTgita; Bárlis; Balinñgficta, JL; Dalondóng, V.; Calohádia; Caloyánang.

DIPLODISCUS PANICULATUS Turcz. *(TUiaccw.)* A small tree.

Banfigo, T.; Balcbo, T.; Bar6bo, V.; Balubo, T.; CamiIIiTY: Malrtbo, T., V.; Manáyao; Mullng-mulfng, T.

DTPTEROCARPUS. *(Diptcrocarpacece.)* All large forest trees, valuable for timber and many species producing valuable gums.

Ant6ng, T.; Bfiñga (Cagayanj; Banúyo, T.; Bailfiyan (Mindoro); Baỳrtcan, T.; Dañglfn, II.; Hagadhfid; Láuan-maputf, T.

D. AFFINIS Brandis. Binagûan, V.'

D. GBANDIFLORUS Blanco. Apfton, T.; Apftong, T.; Hapfton, T., V.

D. MAYAPIS Blanco. Mayfipis, T.

D. PILOSUS Roxb. Hagachác, T.

D. POLYSPERMUS Blanco. Tañgufli; Tañgfli, T.

D. VERNICEFLUUS Blanco. Bfilay (Batangas); Bálao, T.; Malápao; Malapáho, T.; Panáo, T.; Pánuo, T.; Pánno; P6figo.

DITTELASMA itARAK Hook. f. *(Swpindacew.)* A tree.

Bayfico, V.; C6be; Ctibi; Dfica, V.; Guishihan, T.

DODONAEA VISCOSA Linn. *{Sapindacecr.)* A shrub, the leaves somewhat viscid with a shining yellow resin. Seacoast.

Alipáta, T.; Calapfnai, T.; Casfrag, Z.; Haguyfiy (Tayabas).

DOLICHANUBONE SPATHACEA K. Sch. *{Bignoniacew.)* A tree usually found near the sea, with large white flowers.

Tûa; Túi, T.; Tu€, T.; Toi, T.; Titii, V.; Tanhfis, V.

DOLICHOS. *(LcguMino8CCE.)* Twining herbs, both species cultivated.

Quibál, T.

D. ECIIINLXATUS Blanco. Tfitao, T.

D. LABLAB L. Btilai (Batangas) ; Bfitao, T., V.

D. SE3QUIPEDALIS -L. Sflao.

DONAX ABUNDASTRUM Lour. *(Marantacew.)* B&ban (Zamboanga); Aláro, V.; Bambán, T.; Banbân, T.; Banbôm, T.; Bayambân; Galfiñga; Manbán, T.

DRACAENA. *(Liliaccw.)* Balinúay, T.

DRACONTOMELUM. *(Anacardiacece.)* Trees. Mala&cle (Tayabas); Malafhao, T.

D. CUMINGIANUM Baill. Alauihao; Batrcan; Dslo, T.j Malaadfias, T.

D. MANGIFERUM Blumc. Bfibur; Bat6an, V.; DAo, T., V.; Lann'o. ⌜l\; Malafyao, T.

DïOSERA INDICA L. *(Droseraceiv.)* Low herbs, the lonvos boing adapted to catching insects.

Hintipálo. T.

DUABANGA MOLUCCANA Blumc. *(Lythraccv.)* A tree found near the seashores.

Cádir, Caddll, B.; BaligáiTgan. B:; CarAuan. *K;* IiOct6n: Luhtflh: Malabanabá, T.

DURTO ZIBETHINUS Linn. *(Malvacecr.)* A tree found in Join and Mindanao, much prized for its edible fruit, the durian.

Durhln; Duian; Dulfan (Jolo).

DYSOXYLUM. *(Mcliacew.)* Trees with straight, nearly utibranched trunks, the long, pinnate leaves being crowded at the top.

Agfis-us (Tayabas); Bnlucflnad, T.; CatubacCilan. T.; Diiifll»t-nn< ftcm; Malabayábas; Pandapshidn. T.

1). JLBBOBESI e s s M i • i. hfalasaguin.

D. BULKCQJ Vkfad. Aguio, T.; **AnMrfgtttg,** V.; Aguiu. Pamp.; .igin. T.; **Aaanftngtang,** V.; Bacugaiij V.j Bin»liu, V.; Basfloag, II.; Bohave, V.J Boliiny **tflmbal,** \\: lliiiii'iniaw. I'.; firiw. T.; Igufo, **Pamp.;** M;iriiin;u7L'r;'i!!^. **V.; Mmlabftfigao,** Pamp.; **Bfocasfli, V.; Klalabftga,** I*K in p.: f ;ilictYui. T., Pump

E.

KCLXPTA ALI:A liassk. **(Composite.) \i: a*d or diffuse** slender **annual with** small **beads** of **white flowers,**

Ilfjruis-maniV:. T.; **TintatTnta,** IK

EHRETIA. *(Borraginaccw,)* **Trees** or climbs with altei'nato **LeaT6B and** nxillary or ttrmina] **pasicul&te** or corymbose inflorescence of small white flowers.

Bagao ; Clitf-dinar Win ; **BalimCmo, T.**

i; KI.WCOI A. DC. **ItraABg-dalfiga,** T.

\-*l* HCXIFOUA Roxb. Alangltiijit, T., V.; Alfiit^iiit-; Buyfic buyflc; Cham- **bflndoc, T.; MaUgft; Mwigflit, T.. \'.:** ***BntptkUj,*** B.

K. ONAVA A. IX!. Ngaiigalta, T.; Onftva, T.

E. mii.iPiMNi.NM- \ **DO.** M.i.-iisft, B.; SiilimOmo, T.: **T«libe1x»g, V**

KI.AEAGNUS LATIFOUA L. *[Eiacagnacect.)* A RIIIUI> **or** small tree, the **Leaves silvery or rusty beneath.**

Ali^g&ro, T.

BLAOOABFCS. *(Tiliacca-.)* Trees **with simple leaves,** tlit **Bowers** in **udQary racemi**

Birtftg, i ; »'iilumacan. V.: **Gaiilftiao (Xayabas) j Qolillnao** (Taya- **D M) ;** H>-onoy **M-l&sang,** \ : TT6ngo, T.: lU'ur-n, **T.; Malacapf,** T.

K. FiJoniniXDLS Blunie. Conaeon; Gusutan.

E. LAXCKAEFOUL'S Roxb. Ciilomftla. T.

K. itoxocKRA t ;iv. Malaealios.

E. MULTIFLOBUS *V.* Vill. **TigUot, V**

K. OBLONGUS Gaertn. Cabalte, \ . **Cabfite,** \

E. OBOVATUS Arn. **Calnsican,** \

ELATOSTEMA. *(Urticacra.* * Herbs or **audershrulM with alternate** leaves iinil niiiuite flowers.

AiT-:ur^.. Ig.

ELEOCHABIS *{Cypeiaccc.)* Glabrous sedge-like plants with simple erect unjointed stems. •

Ab*fe, T.; **Balag-baJaB^iUn, T.j BusUg,** II.; Tfiyoc tflyoc, V.; **Ubo-** dnbod, T.

K. I'KI.I.KIUA Preal. **Q&al-gQmi,** T.

1'inMiii'is MOUJS H. B. K. *{Composite:)* Rigid erect herbs **with** lirid leaves, the **he&da surrounded** by leafy bracts.

t

Dfla-dfla, T.

E. SOABER L. Tabatabacfihan, T.

•latag, V.; Cabcaron, II.; Dllang usa. T.; Habul, V.; *9ig* li'itrnt. T.; Sflmag, Pamp.

KI.KTTAUIA. *(ScHimiitm.)* Leafy erect herbaceous plants.

Paiiflou, \'.

ELEUSINE INDICA Gaertn, *(Gramineai.)* Common in waste places, inflor-es I'nce digitate.

Bnquisqufsan; Sfibo&g-sabOfigUl, T.; Sambalc, T.

KUILIA siiMtiiFoi.iA DC. *(Compositor.)* An aamial herbaceous plant with purple flowers, a common weed.

Lfbrtn, V.; Tagullnao, T., Pamp.

ENGELH.\KRTIA. *{Juylandacea-.)* Trees, the fruit adnate to a three-lobed bract.

Hf)>it, T.; Pfngol, T.

KNIIALUS KOKXIUII Rich. *(Hydrocharidacear.)* A submerged marine herb with very narrow leaves 2 to 3 ft. long.

Isai, T,

ENT.VDA SCA.MUNS lU-ntli. *iLajuminosew.)* A large woody tendril-bearing vine with jointed pods, 2 to 3 ft. long or more, 3 to 4 in. wide. The bark is extensively used as a substitute for soap.

Balogo, V_v Pamp.; Balonos, V.; Bayogo, T_n V., Pamp.; $G6go_t$ T.; Gohong bftcay, V., Pamp.

liii'iiiMM M *ioaaxm* Engl. *(Amide®.)* A scandent shrub, rooting on trees, with distichous pinnatifid leaves.

AmAtang, II.; Balieflpcup, V.j Bisaco, V.; Dafla, V.; Dibfitib, V.; GarhAn, V.: Hfirog, V.: Malapacpfie-balftuay, T-; TibStib, T.; Tirbatib, *V.*

KRAGROSTTS PU7M0SA T.ink. *(Q-ramin&r.)* Slender tufted grasses.

Calirfiorao, T.

E. TESfELLA R. and S. Bugufbuc, T.

ERANTHEMUM BICOIOB Schrank. *(Acanthaccrr. j* A small shmb with entire leaves and spicate inflore^cence.

AlyOpyop, V.; Atay-fttay, V.; < inco-llftgns: Limfing-flfigat; Maladosdds. V.; Mffinlliiflffl (Cebu); M6pio, V.j Panaptrtm, V.: Quiuatuluan. T.; SilisiHl]ftn, T.; Tfhol-tlhol, V.

KKIACHNE. *(Graminc<r.)* Slender tufted grasses.

Game, T.

KRIOCAULON SKXANOIXARP Linn. [*Eriocaulonaccas.)* Slender glabrous sedge-like plants, found in very wet places.

Gfinii-yunii, T. „

KRIOOW>SSUM. *[Sapind-i*cor.] Shrubs or small trees.

Calamayo, T.

R. MULE Blume. Dtica, V.; Malacacao, T.; Malasfiguin-putf (Tayabas)

ERIOSEMA *(mm* OSE Vog. *(Leguminosetr.)* Slender, erect. 1 to 2 ft. high from a woody tuber, flowers short peduncled in the leaf aadls.

Cttti!. Ig.; Cutll. Ig.; Lfnoamas, II.

KRTCIBE. *[ConrnhiiUtcca:)* ScanWit fliffnse shrubs wilh densely hairy coi iilla tni-s.

\|;1]HUI\\ T.

E. PANICULATA Roxb. Saláday, V.

ERYTHRINA INDICA Lam. ***(Leguminosece.)*** **A tree with crimson flowers. much planted for ornamental purposes.**

Bagbfig, II.; Bfibug; Cabrfib, B., T., V.; .Carapdfip, T.; Casindfc, T.; Cosindic; Dapd&p, T., V., Pamp.; Dapedfipe; Selbfing; Sulbfing, Pamp.; TelbCng.

E. OVALIFOLIA Roxb. Anfi, T.; Ctfrong-cȏrong, V.

ERYTHROI'ALUM. ***[Olacinew.)*** **Climbing shrubs with alternate palnri-nerved leaves.**

BaliiTgfiyo, T.

EUGENIA. ***(Myrtacew.)*** **Small or large trees with white flowers, some species with edible fruit, others valuable for timber. A very large • critical genus, the Philippine species, 50 or more, very imperfectly •known.**

Aguis, V.; Anúbing, T.; AraíiTga bianco, T.; Aráiĩgan, T.j Aráua, B.; Bagábac, Pamp.; Bágui-lómboy; Balacánog, T.; Baligán-nin-gáñgan. B.; Balfscup (Zamboanga); Bal6bac, Pamp.; Balúbat, Pang.; Bansalfiguin, T.; Baranhányo, V.; Bil6lo, T.; Bin6lo, B.; Bislȏt, T.; Bitbfd, B.; Cabfihoy; Cabftjuy; Cabaó-y, V.; Cabitong, Pang.; Calocfigo, B.; Calfibcub, T.; Calfigcog, T.; Calfipcup, T.; Caracóhbutiguf, V.; Carobcób, B.; Caróbcob-butiquf (Camarines); Coloj)-c6p, T.; Corobc6b, B.; Cfiloc-cfiloc, V.; Cupcfip, Pamp.; Dalocnásan, B.; Dingliis; Dinlfis, T.; Dolocnásan, B.; Ductűlan, T.; Diigan, T.; Guenáyang, T.; Guislhan, T.; Hagiiho, V.; Husuhfisu, B.; Igűt, V.; Libas; Lfnas, B.; Lipdte, T.; LutCman (Zamboanga); Mabfitbot, B., V.; Macafisin; Macaflsin-pulfi, T.; Macâsin; Macâsin-mulâto, T.; MalabAguis, B.; Malab&hi, B.; Ma la bay˙abạs, T.; Maladťuhat. B.; Malagarâyat, T.; Malarfihat, B.; Malaságing-putf. T.; Malatampóy, T.; Malatnbig, T.; Malayámbo, T.; MiAgus, V.; Náiigos, V.; Paglumhfiyen; Palo-dtiro (Zamboanga); Palumbfiyen, Pang.; Pamlombóyan, II.; PaiTghfng-búyen (Abra) ; Panlambúyen, 11.; PaiTgIomb6yan, 11.; PapOiĩga, Z.; Potfan, T.; Pulanbaľat; Puso-pflso, T.; Putlan, T.; Salarádan, B.; Tanibfa; Tambft (Dinagat) ; TámbuhsiiTguin, 11.; Tftmpűc, T.

E. CYMOSA Lam. Malariíhat-na~pula, T.

E. JAMBOLANA Lam. Fruit edible.

Dűat, T., V., Pamp.; Dfihạt, T., V., Pamp.; Lombóy, T.; Lumb6i. T.. Pamp., V., II.

E. JAMBos L. Fruit edible.

Bul&cbac, T.; Balóbar, Pamp.; Barábag; Baratbác, 11.; Calobc6b, T.; MacApa, T.; Manzána-rósa. Sp. Fil.; Tamp6i, T., V.; Yámbo, T.; Yambolfn; Yambósa.

E. JAVANICA Lam. Manqufl, T.

E. LINEATA Duthie. Bacflnis (Zamboanga); Lfigi-lfigi, V.; Macalisin. T.

E. MACKOCARPA Roxb. Darob-c6b, T.

E. MALACCENSIS L. Macűpa, T_M V.

K. AIONTANA Blanco. Copcóp, T.; Malacaropcóp (Bataan).

K. OFKfiCUlATA Eoxb. Barong? (Cagayan); Malarilhat, T.

E. TETKA60NA Wi.L'hL. Dfiiui, T.

El i.Di'iuA ESUHTOATA !!]imie. *(Orchidaccw.)* Terrrsi i ial horbe.

I.i'ilii-Ii'ilti. V.

Ern.svMi s, (Ceiostroowp.) Trees or shrubs.

Sárang-puti, V.

El PATOMITIM ATAPANA Vent. *(Compunita-.)* An American herb, introduced, cultivated) and spontaneous, used in the practice of medicine,

Apani, T.; \ya[)ilna, T.

EUPHOKWA ATOTO t'orst. An erect Erute&ceat b«rb with abundant milky sap, common on sandy seashores.

Btrto-butonfsaa, T.

K. NKHHKOI.IA L. *{Ewphorhiacece.) A* small ersct glabronti. ileshy shrub.

Baft, l'.. Pamp.j Carambnaya, H.,; Leagua-de-perro, 8p. PiL; Sorog-sArog, T., Pamp.j Suro-s6ro, T., Pamp.

B. i'i(.i I.IKKUA L. A small prostrate berb, densely pubescent, much nsc.l in medicine.

Batobat6nia, i.: BolobotOnes, Pamp.; Botobfltones; Bflvi, V.; Buya-yava, V.j *. i:is-gata«, T., V.; Golandrma, Sp,; Magatas, Pamp.; Matisinalis, Pamp.; Saylcan, T.j SisiOhan. Pamp.; Sislwhan, Pamp.; Tavftva, V.

K. ct t.ciiKL'.uiMA WiUd. fntroduced from America, cultivated for ornament.

Pascuas.

E. TiittXALij. An ered unarmed *ilnul>. the branches green, leafless.

Catuft, T.

EI'HYA JAPONIC* Tlinnli. *[Ternstroemiaoam.) A* ahrob, the flowers small, in axillary fascicles of two each.

itjrim- V.

Ki BTOIES AMBO•- Serb. *(imaryUic* \\«*n*\. V.; Abud, V.; I tangfil, \'_: CSatflngal, T.; Crtsol. \' ; Daftstun, \ : Panfihor, V.: ralafinor, V.*; Tambal, T.j Tanfinl V i Xonti^r, *V,*

E. svi *y* Balisbi Ainu , \r.

-11>i:uoxYIX)X. *IL<nitinea:)* 01 i\ *u-*. S[\ Fi 1.

EVODIA. *{I'nia<•'-<!•.* Trees *ui* shrubs with small flowers in axillary |>aii icled eynies.

Bar,-.\\ banay; Cahoj inlaga, X.; Calimftntao (Uniaan); Oamalón, T.j M.il.miul'imn, T.; Toncapan, V.; Tnnco-tfinco, T.

E. ATIKOLIA *DC.* liinli'iid. I!.; Tancfipan, B.

E. MIXDAN.M ,.i i ill. Malfco, V.

E. BOXBOBOHIAITA Benth, MatJin-. diablo, I i Plraa, T.

**E. Tltli'MYIXA DC. lIii!tn<;i]a. **

K \ \ . I M TKTRA GONUM Etoxb. *[Gentiamaoete.]* An ered branched herb wiili blue Sowers.

Canto-canto, T.

K\. <n< .Mii.v AdALJLOcilA L. *(Euphorbiacccc.)* A small evergreen tree of the tidal **forests,** ***with*** **alternate** *hmg* putioled leaves.

Ali, Ig.; **Alipfita, V.; Bfita, T.j** B6ta-b6ta, T.; Butabuta, T., Panip.: **Dtfa-dfla** (Marinduque) ; **Sunb&bao,** V.$_t$ Pump.; Lipata. V.; Sfac, V.

R.

PAORAXA. ***(LoganiaawB.)*** Trees or shrubs with opposite entire leav.

Bujucan {Albay); Gatasan, T., V.; Malasiiiflro, B.

W. **CBABsiPBS** Benth. Cacao-fta (Balabac).

F, **rBAOBAlfa Boxb.** Orung {Para^ua).

F. MOI«NDEAFOI,IA Blump. Bftiao, T.; Cabal. T.; Gataaan, V.j Magustl-yar, V.

F. VOLUBLLIS Jack. Mangasinfiro, T.

FEKONIA KLiifiiANiiM Correa. *(Rutaceae.)* *A* spiuuue **tree** with alternate **leaves, with** the odor of aniseed.

Fonoau, V.; **Pftmtmofin,** V.

Fious. (*Urticacaa-.)* Shrubs or trees with milky **sap,** ihr inflorescence a hollow, fleshy, globose receptacle on the trunk, branches, or branch-lets. A very **large critical** ^enus.

Aga (Nucva **Eeija**); **Ballting** payfipa. T.; Biyiki, v.: Cani-m (Abra) ; Cat6n (Albay); Cayanton, *'/..;* Dalaquit, V.; Esesinaya. T.; Uagosds, T.; Hagufnut, V.; HagCipit, V.; Handle, T.j Haulii. I.; llawtli, T.j Lae-ha; Lagn6b; LagnOb; LIo-Ho. Ig.; Lon6e, V.; **Lubj** tfib; Malaisfa, T.; Maranmitrang, V.; Nftbo, V.; Noc-n6c, V.; Opll. T.; Op]fng-in/iya (Tiiyabas) ; **Pagaplacbn, 11.; Pagnfling, T.; Paqni ling,** l'anip.; **Paslda,** 11.; Pasfipla, 11.; Pilen, V.; Pflic (Gebu); Ray-yaray-ya, **II.: Tagulsan-bayauag** (Unisan); Tagulauay; Tall-cot. V.; Talteut; **TaltJetoo** (N. Eeija); Tandadaguy; TaiTgfsan, T.: Tangfsang-bayuae, T.j Taqufnes. V.: **Teb-beg,** Ig.; Teb^e; TecbA-. II.; Tipfg; UpK (Tayabas).

F. AMPELAS J3urm. Malaftpli; **Palltic.**

F. ASI'EHA **Blanco.** A shrub with very **barsh leaves.**

Alflaaa, Pamp.; Is-is, T., V.. **Painp.**

K. cAtLOCARPA Miq. LUIL:'I.

K. ('[J'SIOIDKS Miq. A **fcree,** finit **re(C**

Balfite, T.; Baliti **pida,** T.

P. <TMIV;II Miq. A shrub **with linear** *U'iw<*

LaTiT^ning. T.

F. CUNEATA Mirj, **Dafigarugi** V.; Tailgufsan-bayauae, T.

F. i;i.oirEitATA Roxb. A small tree with the green fruit in **greal massea** on the trunk and larger **brancbes, very common,**

Ainiit, V.: Ann sun; Aymit; Tibfj^. T.j Tibfg-na-la]fit|ui, T.

K. IIKTI:I;OI'HVLI.A L. A **small shrub** with green or **red** fruit, **leaves** ex-ceedingly **variable.**

K T.: Uplfta, II.

F. imp'A Vahl, Btri.

F. HISPIUA Blanco. Agosoc, T.; Ag6»-os. T.; As-fs, T., V., Pamp.; Isiol-
rio, T., V., Pamp.

F. I.VDICA Linn. A small tree #ith small purplish receptacles on the uH i-
mute branches,

Brtlfti, ri'., Pamp.; DalaiTgull; Dalfiguit, V.; Uiyfuniit; N'onoc, V.

P. LLZOMAMS Merrill. Malananca.

F. liiNNAHAss.u: Miq. A ti-e, the fruit purplish on long specialized branches G to 10 ft. long, from the trunk and larger branches.

Aymit T.: \\ limit, T.

F. PAVAI'A Blanco. Payapa, T,

I*. 1'SKuuoi'Ai.iiA Blanco. *A* slender onbranened shrub 10 to 15 ft. high, the large liiiws al] crowded at the apes uf the stem, giving the plant a palm-like appearance.

Labs6bj \iug niOgan, T.j Sulamiog, V.

K. QVS&CIVQUA ltoxb. A small shrub with harsh, variable leav<
Agflpit; Dayagi

F, HADicANs Roxb. Bale^e-gapang (Marinduque).

WntBBJBTTUS Mil i\(i \ Vahl. *[Oj/peraoea.)* Low, tufted, grass-Hko plants.
A-or. T.

P. SCIIOENOIDES Vahl. Qttmi-gtimi, T.

FLACOHIMKA. *[BiaaoetB.)* Trees or shrubs with toothed or crenate leaves.

Palapil.

F. CATApmiACTA Itoxh. Bitanhfil, T.

F. SEPiARiA Koxb. Bit6figol, T. Sdua-saua, V.

hi.\<;i i.i.MiJA INDIL'A Linn. (*Flatfellariaccce.)* *A* long slender vine with linear parallel-veined leaves, climbing by means of the prehensile leaf tip.

Arttyan, '[',-, Balffigayj Ballfignay, *T.* -. Baletfguay; BalWguay, T.j Hoflg. V.; Ihiilc, V.; Uilc$_f$ V.; Yngiila, T.

I''I,KMIN«IA. *(Leguminosetr.)* Shrubs. Laclfly-gulnan, T.; Malabalrtt ng. Pamp.; Payfliigou (Bulacan).

!•'. s[i{oi;ii.ii'"KiiA It. Br. Gan-gan. V.

WXXOBXA iNTERBfPTA Qaud. *{UrHoaoea.)* An aniraal herb with atingi ng hairs.

DaJfimo, V.; Damoro, V.; Daodflua. V.; Lafigala, V.; l.ipfi, T.; Lipfifig-ftso; Ldp&ng-castHa, T.; Lopa, Pamp.

FLC ,...i:.\ IKIOVATA Wall. *(Svphorbiacece.)* BotAlan, T.; Butftlan (Taya-bas); Ma gasping. V.

)'<n;sicvLVH VULQAHE Oaertti. *(Utnbelliferea >* At aromatic, stout, smooth herb, cultivated; "fennel."

An 9, Sp. Fil.

FRAOABIA IMHCA Andr. *(Rosucca.i* i itrawbcrry. Dagulnot, \

FRETCINETIA. *(Pa, danaeea.)* A cliinliinj; shrub, the l<-;ues spiral y ar-ranged.

SJasaa, T.

F. IXSIGNXS Blume. Malapangdfln. T.

P. r.i /MM:NSIS Presl. Pajftgdftni T.

G.

GANOPHYLLUM FALCATUM Blumc. *(Burseracew.)* PandapAnda, T.; Tapfiyay, V.

GARCINIA. *(Guttifcrecc.)* Trees, usually with yellow juice, with evergreen coriaceous leaves. Several species yield gamboge.

Alipáchao, II.; Bágo-bágo, V.; Gaguinfinbang na pulfi (Negros); Balticot; BanJigo, T.; Banfti, T.; Battian, V.; B6nog (Paragua); Cavál. T.; Culambfsan, B.; Dolftan-putf, T.; Gatfisan dilao (Tayabas) ; Jfiras; Pfigla, B.; Paitfin, T.; Pildfs, Pamp.; Pfris, T.; Tatlficanfic, T.

G. CAMBOGIA Desrouss. Bágo-bfigo (Bohol); Bilfieao. T.; Binficao, T.

G. CORNEA Linn. Gatdsan, T., V.; Mangostán, V.

G. COWA Roxb. Hâras, V.; Sadfiñgan, V.

G. DUODECANDRA Pierre. Gatfisan, T.

G. MANGOSTANA Linn. Fruit edible, highly prixwl. Tho maiigosteen.

Mfinggis (Jolo); Mangufs (Jolo).

G. OVALIFOLIA H. f. and T. Malabåt6an, T.; M«ngostflna, V.

G. VENULOSA Choisy. Bábo-bAgo (Bohol); Gatfisan pulfi, T.; Gúta-gAmba, Macambôjo (Iloilo).

GARDENIA. (*Rubiacew.)* Shrubs or small trees, the white flowers very fragrant.

Calanfgi, V.; Tayácan, Mang.; Mayâno (Paragua).

G. OBSCURA Vidal. Caraglf, T.; Baya-bayabfisan. T.; MalabayAbas. T.: Pagbdt, Pamp.

G. PSEUDOPSIDIUM Blanco. MalabayAbas, T.; Sulfpa.

GARUGA. *{Burscracar.)* Trees with alternate leaves and globose fleshy drupes.

Bagiillbas, T.; Bógo; Gabflo, T.; Taqulp-asin, T.

Q. FIX)RIBUNDA Decne. Abildo, T.; Abflo, T.; Avflo, T.; Bag6; Bfo, II.; Bfigo, V., T.

GAULTHERIA. *(Ericacecv.)* Low herbs in the mountains.

Calumfñga, Ig.

GELONIUM. *(Euphorbiacecc.)* Evergreen glabrous shrubs or small trees. Pfli (Zamboanga).

G. GLOMERULATUM Hassk. Pañglanca^n, II.; Saiïgftan?.

GEODORUM SEMICRISTATUM Lindl. *(Orchidaccm.)* Terrestrial herbs.

Camftog, V.; C6la. T.; C6las, T.; C6lang-bund6c, T.; Farfqtan, T.; Lubl-lubf, V.; Nfog-nJog, T.

GEUNSIA CUMINGIANA Rolfe. *{Verbenacew.)* Shrubs or small trees.

Magullic, T.; Sobs6gan-b6go, B.

OIRONNIERA CELTIDIFOLIA Gaud. (*Urticacecr.)* Evergreen unarmed shrubs or small trees.

Amam&ngpang (Albay).

OTJRICIDIA MACULATA H. B. K. *{Legumino8ecp.)* A small tree of American origin, with white or purplish flowers.

Cacahuâte, Pamp.; CacauAte; Cfipang-bund6c, B.; Bal6c-bal6c, T.; Mftdre-cacAo, Sp. Fil.; Marieaeâo, T.

GLOUBA MAIIANTINA Linn. *{ScitiminecB.)* Lampûyang-figa guinat61a; Lamptiyang-ñga-mapulá, V.; Panitan.

O. PAEVIFLORA Presl. Ltiya-lûya-it-áyam (Iloilo); Malalúya, T.

G. STROBILIFERA Zoll. Dûlao-babfiye, T.; Tamohflan, T.

GLOCIIIDION. *{Euphorbiacece.)* Slirubs or small trees, a large and critical genus, of littlé or no economic importance.

Antobáng, T.; Bagfing-bagfing, B.; Bágna, T.j Baling câhoy, V.; Bfigna, V.; Cạlfan, T.; Carmái, T.; Damp61, T.; Malafites, T.; Malacafe", T.; Uanuána-na-puti, B.

G. LITTORALE Blumc. Câyong, V.; Ságsa, V.

GLYCOSMIS. *(Rutacew.)* Shrubs.

Malamoláuin, T.

G. PENTApnYLLA Cori". GufiTguen, T.

GMEIJNA. *(Verbenacew.)* Shrubs with showy yellow flowers.

Allpung, T.

G. ASIATICA L. Bága-báboi, T. V.; Balabaláyan, T., V.

G. VILLOSA Roxb. Bága-baboi, V.; Boh61; Talflñgun, V.

GNAPHALIUM, *{Composite.)* Small, herbs, found on the higher mountains.

Buqufñgan.

G. INDICUM L. Bádoc, 11. .

G. LUTEO-ALBUM L. Onânat, lg.

GNETUM GNEMON L. *(Gnetacew.)* Small trees or vines, rather common in forests.

Bag6, V.; Bágo-slli; Baitgfil, T.; Coliát, T.; Culifit, V., T.; Itm6ng-ouác, T.; Lamparáhan, T.; Malaftmo, T.; Nábo, B.

G. SCANDENS L. Biás, T.; T6val, T.

GOMPHIA. *(Ochnaccce.)* • Glabrous shrubs or trees with yellow flowers in axillary or terminal racemes or umbels.

Bansflai, *T.;* Bulánan, V.

G. ANGUSTIFOLIA Vahl. Bulocánan, V.; Caranyfin, V.; Postalágon; TaloctOn, Z.

(iOMPHRENA GLOBOSA L. *(Amarantacew.)* Hirsute or villous herbs with thickened nodes.

Botoncfllo, T.; Buqulfigan, T,

GONIOTHALAMUS. *(Anonacew.)* Small trees or shrubs with a solitary or fascicled flowers.

Lan6tan, T.

G. GIGANTEUS Hook, f. and T(k. Landtan puti.

GONOCARYUM. *(Loganiacew.)* Malapandacáue, B.; Malasitufn, Pamp.; Pamulaclấquin, T.; Tailgfli (Tarlac).

G. TARLACENSE Vidal. LOnas, T.; L(inas-na-itlm.

GORDONIA. *(TernsWoemiacem.)* Trees with evergreen leaves, flowers usually axillary, large.

Suriln-surán, V.

G. LUZONICA Vidal. Suransurán.

<iOSSYPIUM AHBOREUM L. *(Malvaccce.)* Cotton. Several species and many varieties of cotton are cultivated in the Philippines, but little attention is given to the industry.

Bfilac-na-bfindoc, T.; Bûlac-na-totơo, T.; Bfilac-ñga-bisáya, V.

iJ. **BAgmaanac** L. Canton; Pernambueo, Sp. Fit.

G. HEKBACE LM **Linn,** iBalac-ea-uia, **Pamp.; Bttlac, T,j** Lliilag. **T.; Gadaba;** Candiiba, V[T].; Gapas, V.; Gapas costa; Gaspas-cu-Oni.

G. PERKNNK L. lli'ilae-cillioy. T.j Bulac-na-montr, T.; **Btilae-na-totdo,** 1.

GOUAIVIA. *[Mham* **Banned** elimbing shrubs with alternate Iea\es.

Leterân, **T.j Pahaifipao,** Pamp.

GRArroruYLLLM noun\SK Nees. *{Aemnthaeees.)* A glabrous shrub; the leaves **purple, <>r sotnetimea variegated;** commonly cultivated for ornament,*i\ pvrpOG*es.

AirtXMffTig, I.; Ataittai, T.; Batasbas, V., T.j Balasbas-mal6may, T.; **Blorftdo,** Sp. Fil.; Moradong-maputf, T.j Morandong-maputi; **PJ**sao, V.; **ScrftBa,** i . **Terette, T.j YOvae, T.**

GbEKWA. *{Tihocem.)* Sbnibs or trees, more or less **Btellate-pubesceQt BalAbo,** T.; Balibiigo, T.j DaiTgoy, T.j Iriug, **T.j Ugaoj Malatapay,** T.

G. LAEVIOS LA Vahl. Dfuigli **(Tayabaa);** Danglin, II.; **Danylin, T.**

G. UMCEI.LM[1] \ **Rood).** Danloy.

G. TANK i l.MA **Koxb. Ban^lad,** \'.

GI'ETTAitUA 8FECI03A Linn. *(Rubioccti.) A* **small** evergreen tree witli broadly **ovate leaves and woody** globose **druses, ooounon** in lit!oral **and** iiilal Forests.

Bagaôlan, **r.j** IJalair-ij:aii. \'.; **Balibagan,** \.; Hanaro, T.; Caliun-puiigin, T.; **LagbftSgan; MaUaftmt,** B.

GYMNOSPORIA. (*Gymnosporiacea* i Shrubs or small trees, with **alternate** leave*, the **branches often spiaeseent.**

Caniayinin. T.j Jauianyan-piitf. Z.

•H-iif \ **7idal. Tamattyan.**

i;. MOMVM **Boxb,** Malari**iyap,** T.

GYNANDROPSIS I'IM Ai-ii vi.i.A DC. *[Capparid* **An** annual herb **with** 5-fc-liate leaves and **white or purplish flowers in** glutinous racemes; coi union **j oaed** in medicine.

ApAiapayan, T.; BalabalanAyan, T.j Ilulaya. \'.; **Otooe-ol&ooj** Sili-sttuin.

6. HMBC1OSA DO. An **American** species so **metimee** cultivated for **orna**mental **porpOA**es.

Arana **(Manila**).

GYNOTHOCHE» Blume. *iJlhizopho.* A small tree **with** oblong eoi ia-eeous leaves mi>i **nnnteroofl small axillary loi**vers.

Malarutaii i-bian, T. *

C. **CUXABI8** Blume. Bayashaa, V.; Doyoc-doyvV, V.

GYMIIA AjrouLOSA I"', *{Co*mposifc'.)* A robust, glabrous, coiymbosely bra n.lieil iK^rb, **with** 1arge sessile leaves.

Sam]âga-de! mftnte, T.

G. SARMENTOSA DC. A glabrous climbing plant.

Camâtigi,

r,

OCARPUS J

long-petioled

plate caly

rim \< y< INF Rovh. *{Combretacat.)* A tall tree with alternate leaves, the nut bony, crowned by the elongate apath-\: lobes; common near tli. te.

Handgdong, T.; Lapolapo, II.

H .

llAHKwnu s. *{Amaryllid* Ajos-ajo> figs Dtapotf, V.

H. VERSICOLOR Herd. Lfrio, T.

HAKPLXLIA ARBOKEA Radlk. *{8apindact»* Shrubs or trees.

Magalat.

H. UI.AXOI F. Vill. lofis. T.j Pftas, T.: PU

HARRISONIA i:i.v.NKni Ik-nth. ami Hook. f. *[Bimcmtbiacect.)* A glaitrous shrub with short recurved spines in the lower parts of the branches, and pinnate leaves, used in medicine.

A-unao, T.j Bacflit, Pang.. T.j Cfimot-ptisa, T.; CamfirTgui (Zamhoanga) ; Lufya; ICamagael, T.j \fmitfini, V.

HKDYCHRM. *[Sdttmineuf.)* Herbactotw plants with distichous oblong or lanceolate leaves.

Banai, V.

11. *oaaojSAsnm* Koenig. Bfiim. V.; Cateäta, V:; *i* atatan^ V.

H, HASSELTII IJlump. Banfi- ag. V.

Hi:i.n IA I I MIN(,I\SA I'resl. *[Proteaeeer.)* Trees or shrubs witli all ernate leaves, the flowers in terminal or axillary racemes.

out, t g.

HELICOXIA. *(Scitiminea:)* AgOtai, V.: Agfttsai, V.

HELIOCOSIOPSIS AMIMJI NENSIS Ma naif nid. V.

9ELICTEBB8. *I8tercttliacc<r.)* Trees or shrubs, more or !• ss stellate pubescent, with simple leaves and axillary solitary or I asicled Bowers.

Büntut-ûsa, V.; I'aronapjn. U.

H. 9 ICATA Co linb. Bfiquin-baquft, 11.: Bontoi usâ, V., T.; Daûgling-âso, \•.. T.j Tal6san, T.

Hi i IOTROPH M INDICUM i Linn *(Borraginaccæ.)* A low herbaceooe plant with densely flowered spicate inflorescense. A common weed, used in the practice of meili'in*[1].

Cäbra-cftbra, \'.= Cambra-cambra, *V.*\ Con1 ing-cotîngtn, T.; Côtingcol ûgan; Hilalny <*n*\: Bfimlalay-tfit, T.j i cog-leog-sang-euti, V.; Trompalipatitc, V.

! It MICRAi'iu.s REPt:_vs Bhutco. *{Actmt!* An herb with opposite leaves, 'he lltiw ers ses it<' in) eads or spikes.

Pâlad-palad, V.

li MIGYROS \. »,s'i pindaccæ.) Trees with alternate abruptly phuute pallid lefl^ es.

M tlaeattyan, Z.

U. - ANESC BUS Thw. Minmi gbâga, V.; Sâlali. T.j B&lag,

HEXSLC HIU~ *(Santabi* ccæ.) Parasi; ie shr aim witt spreading, .rect, or twintnp t ranche i, alternat*[1] thick leaves, and ininute flowa s.

Camfia, Z.

Hi i*TAPLErw;M. (Ara/iocpar.) T>arge *hrub« or tTeea, glabrous or totnen tose, with dijntate leaves.

*Car;i!lr:'l[). \'., B.; Tagi iflltia.

It. CAt t'\i i *M* Vidal. Limaltma. T.. \'.. Pamp.; Limoltmo, T.

II. si KLLATI M Seem. **Calangc&Qg, V.**

II, VBKULOSui Seem. **Carafigefiny, V.: CayangeaBj** V.; Galainai-amo, T,, V.i Tuglfnui, V,

HKRITIKUA UTTOUAUS **Diy.** (*SirrrnHnrj-ff.* i A small tree with oblong **Leaves,** white beneath, ami **oblong, woody, boat-shaped** fruits, 2 to 4 inches long. Common along the **seashore.**

J5uiT»oii-];lte, T.; **Ettlfgon, T., V.; Dugon-late, T.; Dongon, T.j Dftfigun, T.j** V,; Liosfn **[Zambales) j Maladutfgtm, T.j Malardngon, T.j Palonfipoy, 2,; ParonSpin,** 11.; Palmigftpoy, 11.

1l M:\AMUA PEI.TATA **Meissn.** *[Eernandiae&B.)* **\ tree** with **rounded-** (.ivatv *ncnii-* or obtuse peltate leaves, eomiuon on the seashore.

Colonc6gon. I!.: **b^alatafigan-tafigan,** B.; Tahag.

HEtEBOPOaorf"TOKTORTCH Room, and Selutlt. *(Qramine<r.)* A tufted grass. **Tigbfto, V.**

HxrtEaDS&aatA **ODSECDATUM** r)et.'in'. *[Aaolepiadaoea.)* ***A*** **twining,** neatly **giabxoas ahrub.**

Bini^uasan, T.

Hibiscus. *[Malvaceae.)* **Herbs, shrubs, "j trees,** with **usually** showy flowers.

Cayaligar6sa, II.; Lanotan-itfm: Mnlibiigo, T.j Malubiigo, B.; Sap^not, I".: Sa|iinit, \.

H. **ABELMOSOHUS** I-. An iimiua] his]iid **herbaceous plant with yellow Sowers** :tn<l **polymorphous leaves.**

Castio, T.; (Castio-**ustiOgaiij T.j Castidgftn, T.; Casio-csstoliaii,** I'anip.; **Gaatoli, T.j Caatftli, I: OasttUi, T.j** Dalfipan, T.; Ducum, V.; **Uarapoto, V.; Mariotim, V.; Maropoto, *V.*-, MarucOm, V.; Putu-** can. **r.**

M. BXJBATIKNSI8 linn. A weak-stpmined trailing plant, the stem **with recurved prickles,** the flowers yellow with a dark-colored **center, Lftbog,** V.

li. c;un\\ iAnrui.il s **Basek,** Lanuian. T.

II. \u lAitiMS **Linn.** A **small tree** withoni prickles, the (lowers pink or white, turning red nt **night,** cnliivated for ornament..

MapoUL

II. I:IK\SI\!-\SI> |,. A shrub with ovate actmticate leaves and large red **flowers. Commonly** cultivated for **ornament.**

Antolaiifjan. T., ***V.;*** Ai-ogfin.nn. T., Tamp., **V.j** CV**Cayifiga,** T., \ .. Tamp.. II.: (Jomamfla. T., *V.,* Pamp.; **Onmamela; XftBOlft] T.. *V,,* Pampj Tapulaga; Tapijrafiga, V.j Ti a, T,, V., Pamp.**

H. HLIA< *tn s* 1.. A imieh-bnincln'il **tree** with **cordate** leaves **and** yellow flow (i-. common near the **seashores.**

Balabago., \".; Balibago, T., Pamp.; Malabago, V.; Malabftyo; Ua- t|iu'ri(ii. **Pamp.**

111!', I'M. UmarjfHid irftn. T.

•-IFOUA Koxl., (Celastraceae.) A **dimbing** slivui aiy branches oftt-u **qnadraagnUr.**

r.<tl"iiig-pftlad. T.

HoLAKiiiii:.\A. *(ApQcitute&xi.)* Trees œr shrubs **with** opposite **leaves** and **white Bowers** in many **flowered corymbose** cymes,

olfiguin, T.

H. MACMOCAin'A Ilassk. (iingufn. **T.j Malayantoc, T.**

HUM AI.AXTTIUS. *(Euphorbtni, 'i .<* Glabrous trees or shrubs.

Butafig gnbat, T.

I! IAVII **OSl** s l\ Vill. **Leaves** peltate.

BalflHti, T.j Balftnti, V\j Botang-gHbot, T,

Iln\i \i,n \i I.I7HMI:\SK \<\ Vill, *[SamydapWB.)* **A tree with alternate** leav**ea and** MU:III **bairy flowers** in slender **racemes.**

Arftfiga, T.

M. i-AN.wAMi M **P. Vill. Ampupoyot,** V.

II. \ IIJ.AKIAM **u** \ iiial. **Ooela,**

I IIAIAI.OCENCHUS HEXANURUS O. Ktxe. *it: mm hen'.* i \ **slender gra**ss, eommouly cultivated in paddies near **Manila** for forage.

lliirit. **T.j BufigalOB,** V..; Zacate **Bp.**

I1 oMAi.<)MK,\ \. < *Amidece.)* Herbs.

AJipflyo, \.: Aiipftyong, V.; *Btga,* T.

H. ingi'KLiANA **Behott OapaJAuan,** V.; Palaoan, V.

[IOHOXOIA itii-AiiiA **Lour.** *(Eupfmrbiaoea.)* **A** .-mid! **shrub with the appear-ance** *at BaHfc, very* **common along** river banks, bars, etc.

&g6y*oy, T.; Agftcne, T.j Balflnti, T.; Dinnlbuii, T.; Lumftnni, **T.; LumonAjaj Uayfigos, V.j ftfaydyos, V.: Kfifigoa,** V.; Mlinbre.

HOPKA. *[JHpteroearpacete.)* **Large forest trees** with winged fruits, valuable timber trees.

Bfllint, Pang.: **Bangle's,** *VL;* JiarincueCiron^. 11.; I**Cûliot,** Pang.; Uinglfiat, II.: Qarofigfint, Cag.; Ginlagase (Mindoro) ; Sambulflan i Miinl'no i.

If. iMUi.ii'riKEKsis Dyer. **Baguitftrim, T.**

11. I'LAUATA Vid. Banutnn (Nueva Viscaya) ; CfiHot, Pang., II.; X&cal, T.; **SapIAfigan, T.j** Sapolfirigan, **T.; Bfgg&T, II.; Patoa, T.j** Yfical, T.

HOYA. *iAsclepiaducetv.)* **Twining penduloufl** slirniis **with** milky ^ip. the flowers in iiniln'Is, tin- **te&vec** coriaceous.

QuenalttscOs, T.

H. DIVKKSIFOLIA Bhinie. **Balic-bftlfc, T.**

II. **in** [TiFr/3BA Blume. Capal, **T.j** Dapong-baba, **T.j** Mangagao, V.

liYKNOCAKPLS UETKltOL'llYIXA **Blume.** *(li'uxirrrr.)* **Tree.**

Buttifig-manfc, Ii.

HYDSOPHYTUM. *(Jlub'uiaea'.)* **ICpiphytic glabrous shrubs,** with **opposite** leathery obtuse leaves, the swollen base inhabited by air**s.**

B**ftag-h6y,** V.

HYDRII ii.A. *{Hydn* ichariden.) **Jubmerged leafj** 4ii**ecious ^erb, forming large** masses **in** still ov **slowly running** waters.

fnfita, T,

II. ii{H'[[,i.M\ **Casp. l.fimot-loinOiun.** i

Hvi,. **i. [1** *mbtllif,* **ow prostrate hero used in medicine.**

HOCOTYLE ASIATICA rem.) A

Taguip sôso; **r;,,|,n,1.ll',h<>l. 'T':** i**ftbol; Taqnf]** sôso, T.; Yi**fton-**yâhor: V.

liYI.I:UI'IIILA SAUCXKOLIA Nees. *{Aoanthac&B.)* Drills **with** opposite leaves and bluish **flowers.**

CAngon eftngon, T.; ManiTtir, T., V,

HTUEtfOGAixxs. ' i *mm i/lUdaccor.)* AjoH-fljos **figa mapotf,** *V.*

flvMicNOBiciTON, *(Rubiacew.}* **Trees** or shrubs with thick **branches** and bitter **bark.**

Halig&figa, T.; lliiligi'iiifjo. T.

M. i:\CELSUS **Wall. Leaves ovate, pubeseeat, panicles large,** often **drooping.**

Cuctm-banno (Masbate) ; Huligaiiga, T.

HYPOESTES *{Aoamthaoew.)* **Herbs or shrubs with entire i>i toothed** leave-.

Aguitmgan {Cagayan) ; **Dflan-aao, T.**

H. LAXIFIX;RA Neea. **Branches** herbaceous, diffuse, **minutely pnbesceni** ; corollrt pink, ov **white.**

Cuntbar, Pomp.; Panaipanaf, T.

11. iT:AN<>('KvirxEi Miq. **Cogon-cogon, T.**

HvrTAUK MATIABOTA Gaertn. *(ftfalpiHgiacece.)* **Climbing or subered shrub; floweffl** fragi'nnt; fruit whijimi.

('**omimp6l,** \ .

HYPTIN **BBKTTPES Poir.** *(Labiatece.)* **An erect** annual, **flowers** in **beads** ' inch in diameter.

CombarooniMran, T.

H. CAPITATA -l.H'q. **Combarcombfiran, T.; Ungalinngfihan, T.: PalapasA--ni.** V.; Turuean, T.

H. SUAVEOI>ENS Poir, **Flovers** blue, plant **aromatic,** *very* **common.**

L.x'O-luen, V.: **Pansipansfan, T.j B6ob-eabftyOj T.**

1.

ICHNO**CABFUS** FKUTESCKNK K. \h. *[ApGoinacett.)* An **extensive climber** with variable leaves and rusty-pubescent axillary and terminal cymes.

Copralfn. **T.; Bingulo,** T.

I. ovATiFOUUS A. IK', Hipgti, V.; Sadac, Ig.

li.i'\\n:.\. *(i'dlmir.i* **Blender unarmed** palms.

Oasibainlfing (Paragna); Lumbifie (Taynbas).

ILKX. *(IKoinea).)* Shrubs or small trees **with** alternate **simple glossy. often** *pinous, leaves.

I.[lottVon f Benguet),

I Lin-!:, i *S'lputamr.)* TreeB **witb** milky sap.

Tagatoi, T.

1. incus Merrill, A **Luge** tree, the timber of much value.

Bacftyao, Pang.; BanUi, B.; Bais, T., Pamp,; Betis lalAqne. T.; **Bftis, T.: Pagplgas,** Cag.; Pailan; **Pappfigay, Cag.**

InrtSWtB I'.AI.SAMINA L. *{Geraniacece.)* *A* succulent glabrous or **pubescent** herb **with** rose-colored flowers, commonly **cultivated** for **onu** IIIIIII.

amftottgui, T., Pamp.; Sol<>irga. V.; SiirAiTga, V.

JMPKKATA ARUNAINACEA Cyrill. *(Grcminea\)* A perennial grass 1 to 3 ft. high with narrow silvery-silky panicles; common.

Balfli, Pamp.; Cfsca c6gon, T., V., B.; flib, Pamp.

JNDIGOFKKA. *(Lcftaminosecr.)* Small undershrubs. the source of the dye indigo.

Tágum-tágum, V.; Tâyum, T.

T. ANGUSTiFOLiirs L. Tâyon-tâyon.

I. TEYSMANNI Miq. BalabalatfiiTgan, B.; Tágum, V.

T. TINCTORIA L. Añil, Sp. Fil.; Tágum, V.; Tâgung. V.; Tayáng-tayúrigan, B.; Tâyom, T.; Tâyung, Pamp.

IPOMOEA. *(Convolvulacew.)* Twining, usually herbaceous vines, with large, usually white or pink flowers.

Báguin-castlla, T.; Cebõlli-cebollfsan, T.j Halobạgbtig, T.

I. BATATAS L. The sweet potato.

Camôte, Sp. Fil.; Tigsf. V.

J. BONA-NOX Linn. Oalacamôte, V.; Camocamotfhan, T., V.: Malacam6te, V.

I. HEDERACEA Jacq. Cultivated for ornament and spontaneous; flowers pale blue, turning pink.

Bulacfin, T.

T. MARIANENSIS Chois. Tuguf-tugufan, T.

I. MURICATA Jacq. Tunqufn.

I. PANICULATA R. Br. Hfmag, V.; Puntaspuntfis, T.

I. PELTATA Choisy. Bulacfin, T.; Bdlac-bulácan.

I. PES-CAPRAE Roth. Flowers purplish; common on sandy seashores.

Arodâyday, T., B.; Bagas6a, T., V.; Canfgang, T., V.; Cãtang-cfitang. T.; Cãtang-cãtang, T., B.; Darfpay, T., B., V.; Lagfiyrai, T., B.; Lampay6ng, T.j B., V.; Lambay6ng, T., B., II.; P6lang-p6lano (Iloilo).

I. PES-TIGRIDIS Linn. MalasandJa, V*; Salasandia, V.

I. QUAMOCLFT L. Flowers crimson, leaves incised. Introduced from America, cultivated for ornament and spontaneous.

Agao; Ag6ho, T., V.; Malabocb6c.

I. REPTANS Poir. Common in stagnant water and very wet soils.

Cañgc6ng, T., Pamp.; Tanc6ng, V.; Tâñgcong, V.

ISGHAEMUM ciLiARE Retz. *(Qraminew.)* A low grass.

Tinitrfgo, T.

ISOLEPIS BARBATA R. Br. *(Cyperacew.)* A small tufted grass-like plant. common on sandy seashores.

Culflis, T.

ITEADAPIINE CONFUSA Blume. *(Lauracea.)* Malabóñga, T.

IXORA. *(Rubiacew.)* Shrubs or trees with white, pink, or red flowers in corymbose cymes.

Bagufr, II.; Balfii-tocâc, Ig.; Balinâonao (Unisan); Bantâna; Bislts (Tayabas); Dfihatman6c, T.; Malafgot, B.; Pamayugsûcon; Quintasln, B.

I. AMBOINICA DC. Lipatât-gtibat, B.

I. eoL'ciiVEA L. A .shrub, l'lt-qiR-iitly **cultivated** for **ornament.**
Naiitan, T.J TajTupupo, V.

1. FUIA1ENS Roxl). 'liihu<l-ii7L';i-il;'iii;i>. V.

I. LANCKOLARJA Coleb. **AlipOong,** \'.

I M ACROPIIYLLA Billtl. BagO-bagO.

I. BTMOTA Roxb. As-as, T.; Santa Aim: Santan, T.

J.

JASMIIMM, (< *thiinu.* i Scandent or erect shrubs with vcrv fragrant white flowers.
Miirüon-bulnrigdn (Eoilo); Obaldo, *'A.*

./. *LOZOSmSBtBia* Vidal. SiiTprftiui. Ig,

J. MAIIIAM M 0*'. Laiflc-Uifta, V.; Silisili. ')'.: Sifigculcdgos, T.

.i ^AMttAc Ah. Danunonly caltivated for ornament.
Capopat visiiyii. V.; CampOpotj Pump.: Clilfltai, Pamp.j Hnbar (Balabac) : .Mani'il. \'.: PotigBO, Pamp.; Bampfign, I.: Sampftgang, Pamp.; **8ampagnlta,**

JAXBOFHA *aoBDAB* IJ. *{Kuph'irhittrnr.)* A small shrub, introduced *tram* \merica and commonly cultivated for a hedge plant. The *svwi** >icId a purgative nil.
Bol6ng-cfiuii ; Casli V.: Tatatabft, T.; Tavatftva, 11.: Tftwatftwa, 11.; Till,:,.

.). MII,TIFII)A L. Difrprs from tit*- preceding in its incised l©ai es.
M;m'i. T.. II.

JUSSIAEA BESKHS J.. *(Ofutgracew.)* A creeping herb in very wei soils witli small wliite (lowers.
Cangeõttg-dtlpo, T.

• I 8UFFBUTic»SA 1A An civi-i. Imii *wi\)* f parted yellow Sowers,
Balãebac, T.f; Malapftco, T.; Malap6co, T,

JUSTICIA. (A^int^/Kiccrt',) Herbs or shrubs; flowers sessile or nwirl; so in spikes or panides.
Bato (Balnbac) ; Morfidongj Morationg-mapnti, T.

J. ttrtsxioTOMA Blume. Dulai'usi, V.

J. OFMIAIUSSA *I,. A* sbntb, *•!* to 5 ft. high, eorolla white <*u-* rose, witlt purplish spots.
Bnnlfio, V.; Capanitilot, *T.* •. Paritftlot, T.

K.

KAI'.MI'UKIIIA QAXANOA L. *[Soitimineas.)* Cfieolj V.; Gofool^ V.j Cfiaol, Pamp., V.; Cfisul, V_T; D6sol, Z.; Dflso, T.; Dfisnl. T,: GhltBol, T.j (iui-iil. V.; Qnisol. \'.

KALANCHOE LACINIATA DC. *{Oramtlace&.)* Succulent, erect herb, with laciniate leaves.
Cat i.-;ifilvii. T..J Stcrii|>ri'Vl'r;l. S](. Kll.

K SI-MIM i H I DC; Leavea apathulate-oblong, erwiate.
Cariti'iriit. *Y.*

KAYEA. viiniriiMNsis Planch, *{(luttifereuw* A tree.
Malaguinnan. V.

K. BACEMOSA PI. and Tr. Guislan, T.

KIBARA CORIACEA Perk. *(Monimiacew.)* A tree.

Malatambfs; Púlub (Zamboanga).'

KLEINHOVIA HOSPITA L. *(Sterculiacew.)* A tree with palminerved leaves, lax paniculate infloresence, and inflated membraneous capsules. The bark yields a strong bast fiber.

Bign6n, II.; Bftang; Bitn6g, II.; Bitndn; Bitndng, II.; Hamitanfigo, V.; Pampâr; Panampât, Pamp.; Tan-fig, T., V.

KOORDERSOIDENDRON PINNATUM Merrill. *(Anacardiacece.)* A tree with pinnate leaves, tufted at the ends of the branches; yields a valuable timber.

Ambogue"s; Amogufs, T.; Amuguls, T., V.; Calumânog, V.; Manga-t6lay?; Palosánto, T.; Mugufs; Ṣambalabfian; Sambuláguan.

KTLLINGA MONOCEPHALA Rottb, *(Cyperacew.)* Low, tufted, grass-like plant.

Anúang, T.; Barubat6nes, V.; Bolobotónes. V.; Borobot6nes, V.; Bosfcad, V.; B6ton-cflo, V.; Malaap61id, Pamp.; Malabot6nea, V.; Mútha, V.; Sud-sūd, V.; T6bo-t6bo-lâñgit, V.

L.

LAGENARIA VULGARIS Seringe. *(Curcurbitacece.)* A large tendril-bearing climber cultivated for its large edible, bottle-shaped fruit.

Calúbay, V.; 6po, T.; Sfcay, V.; tpo.

LAGERSTROEMIA. *{Lythracece.)* Trees or shrubs with showy flowers.

Mfdla, Pamp.

L. BATITINAN Vid. A tree yielding a valuable timber.

Batitfnan, T.; Bugufiron; Lumâti; Mañglâti.

L. INDIGA L. A shrub with showy bright pink flowers, cultivated for ornament.

Melfndres (Manila). The "crape myrtle."

L. SPECIOSA Pers. A medium-sized tree with large purplish flowers. The wood is hard and durable.

Agáro, Z.; Banabá, T., V., Mang.; Macabâlo, Pang.; Mfttla, Pamp.; Tabáfigan, Gag.

LANSIUM DOMESTIGLM Jack. *(Meliacece.)* A tree with pinnate leaves and sessile or subsessile flowers, cultivated for its edible fruit.

B6boa, V.; Boocân, V.; Buláhan, V.; Lansdne, T.; Lans<3nes, T.; Lanztin.

LANTANA CAMARA L. *(Verbenacece.)* An aromatic shrub with beads of yellow, pink, or red flowers, introduced from America and now common about towns in the Philippines.

B6ho-b6ho, V.; ˙Coronltas, Sp. ML

LAPORTEA GAUDICHAUDIANA Wedd. *(Urticacew.)* Perennial herb with stinging hairs.

Apariágua, T., V.; Búlan-búlan, V.; Lasfigfiton, T., V.; Liñ|at6n, (?) ; Lipâ, T.; Lipáng-d6ton, Pamp.; Llpay, V.

LAWSONIA ALBA Lam. *(Lythracecs.)* A shrub or small tree with panicles of straw-colored flowers, introduced from Asia and cultivated for ornament.

Cinam6mo, Sp. Fil.

LEEA. *(Ampelidaccce.)* Shrubs or small trees with terminal corymbose cymes and red, yellow, or green flowers.

Bâlam-bâlam; Hfira, T.; Tali ant fin, T.; Talostds.

L. AGULEATA Blanco. Mall-mall, T., Pamp.; Pamangquilon, V.; Panang-quflon, V.

L. JAVANICA Blume. Carâdat, V.; Garâdat, B.; Panayañgtag6n, V.; Sfpit-câit; Sûpit-cafg, T.

L. RUBRA Blume. Abâng abâng, T.; Caliantâñg, T.

L. SAMBUCINA Willd. Amamâle, V,; Caliangtâng; Hamamâle, V.; Ma-mâle, V.

LEMNA. *{Lemnacece.)* Minute, floating, green, scale-like plants.

Inâlia, T.

LEONURUS SIBIRICUS L. *(Labiateae.)* An erect, leafy, stout herb, the inflorescence whorled, axillary, corolla red.

Camariâng songs6ng, T.

LEPIDAGATIIIS. *(Acanthacew.)* Herbs or undershrubs, the flowers sessile, usually capitate.

Hâñgut-na-babâe.

L. LUZONIAE Nees. Lipsipân, T.

LEPIDOPETALUM. *(Sapindacew.)* Shrubs or trees.

Dfla-dlla, Pamp.; Hualfs, T.; Malacacâo; Ngisifiglsi, T.; Palo-nfigro.

L. PERROTTETn Blume. Bâhay, T., V.

LEPINIOPSIS TERNATENSIS Valeton. *(Apocinacece.)* Tree.

Cûyon-ctiyon, V.

LEPISTEMON RENIFORMIS Hassk. *(Convolvulacew.)* A twining herbaceous vine.

Batobat6, T.; cfipit-cupit, II.

LEPTOSOLENA HAENKEI Presl. Hagulguit, V.

LEUCAENA OLAUGA Benth. *(Leguminosece.)* A small shrub with globose heads of white flowers. Introduced from America and common about towns.

Agho, V.; Santa Helena.

LEUCAB. *(LabiatecB.)* Woolly or villous herbs or undershrubs with axillary whorls of white flowers.

Maputf, T.

L. ASPERA Spreng. Carucans61i, T.; Paipafsi, V.; Pansipansf, T., V.; Pay-pâysi, V.; Solasolasian, T.

L. LINIFOLIA Spreng. Parnipansf.

LEUCOSYKE CAPITELLATA Wedd. *(Urticacew.)* A shrub or small tree, the leaves white beneath, prominently nerved.

Alaggâsi, V.; Alânggasi, V.; Anagâsi, B.j Haganâsi (Oamarines); Lalâsi, Ig.; Langgâsi, V.; Layasln, T.; Lefisin, T.

L. HtSPiDissiMA Miq. Salagulso (Albay).

LICUALA, *(Palmeas.)* Balâtbat (Paragua).

L. BLEGANS Mart. Anâhao, T.

L. SPECTABILIS Miq. Aṅahao, T., V.

LILIUM PHILIPPINENSE Baker. *(Liliacem.)* **A lily with large white flowers found in the mountains of Northern Luzon.**

Cafi6n, II.; Soy6soy, Ig.

LIMNANTHEMUM CRISTATUM Griseb. *(Oentianacew.)* **An aquatic herb with long floating stems.**

Lfiuas, T.; Loloqufsen, II.

LIMNOPHILA GRATIOLOIDES R. Br. *(SorophulariaceeB.)* **A small herbaceous plant found in swamps and rice paddies. It has the odor of turpentine.**

Inâta, T.

L. MENTHASTRUM Benth. Talatâla, Pamp.; Taramhampâm, T.; Taratfira, II.

L. REPENS Benth. Ore*gano, Sp. Fil.

L. ROXBURGH G. Don. Tâla, T.

LIMNOPIIYTON OBTUSIFOLIUM Miq. *(AUsmacea.)* **An erect succulent marsh plant.**

Locfiy?, T.

LINOCIERA. *{Oleacece.)* **Shrubs or trees with opposite entire leaves and axillary or terminal inflorescence.**

Bal6c-bal6c, T.j Carocsân, T.; Ca^ant6l, Z.; Dalâyat, Z.; Putêng, T.j Urutfin, T.

L. CORIACEA Vidal. Aṅatao, Tij Pulfit, T.

L. CUMINOIANA Vidal. Culilfsiao (Tayabas).

L. LUZONICA F. Vill. Caropsfin; Guruguanâbao, V.

LIPPIA NODIFLORA Rich. *(Verbenacew.)* **An annual, creeping, much-branched herb with numerous heads of pink flowers.**

Chachachachâhan, T.; Corocarcfldan, V.; Sirfc-pfiyo, V.; Taatsatsa-tsâhan, T.

LITSEA, *(Lauracece.)* **Trees, some species being valuable for their timber.**

An6nag, T.; Arfina, B.; Bfican, T.; Batlno, T.; Batobat6, T.f V.; Bito-colfng, T.; Calaftic, Mang.; Calambâe, V.; Hópong-hópong; Libâcan, T.; Magullic, Z.; Malabilúcas, T.; Malacalubcûb, T.; Malamánga, Gag.; Malapflso, B.; Malasfco, T.; Maracûlan, II.; Mârang. T.; Nolaláqui, T.; 6pong-dpong, B.; Paimalbai, T.; Paloal, B.; Pasasa-bltit, II.; Paúhan (Mindoro); Saripongp6ng, B.

L. ALBATANA Vidal. Arâhan (Albay).

L. CHINENSIS Lam. Lâuat, V.; Pusopûso, T.j Sablflt, II.

L. OABCIAE Vidal. Pfpi, V.

L. LUZONICA Blanco. Balfbay.

L. MAONIFICA B. and H. Madâng, T.

L. PERROTTETII B. and H. Indâng, V.; Baticulfn, T.j Baticulfng, T.

LIVISTONA. *(Palmce.)* **Aṅahao, T., V.**

L. PAPUANA Becc. Anfio, Pamp.; Bol6ng ltiyoiig, Pamp.

L. ROTUNDIFOUA Mart. Abifin, Pang.; Anafio, II.; Anâhao, T.j Anan, Cag.j Bfihi, V.; Bâllang, Cag.j Lâbig, II.; Labindanâia?, II.; Pfilma-brâva.

LOPHOPETALUM. *(CelastracecB.)* Trees or shrubs.

Bůyun (Zamboanga).

L. TOXICUM Loher. A tree, the bark used by natives to poison arrows.

Abtitab.

LOBANTIIUS. *(Loranthacew.)* Small parasitic shrubs.

Basfir-basár, II.; Cfsip, Ig.; Gácca, Ig.; Pañglonbdyen, Ig.;- tibic-fibis, II.

L. AMPULLACEUS L. Dapó-sa-pfijo, T.

L. BLANCOANUS F. Vill. Malabáchao (Cebu).

L. PAUGIFLORUS Blanco. Binblñguay, II.

L. PENTANDRUS L. Mamp6l, V.

L. PHILIPPINENSIS Blanco. Dápo-sa-cáhuy.

L. SPICIFER F. Vill. Catůfigao, Ig.

LUCUMA MAMMOSA Gaertn. *(Sapotacea.)* A tree introduced from America and cultivated for its edible fruit.

Chico-mame*y; Mame''y, T.

LUFFA ACUTANGULA Roxb. *{Curcurbitacew.)* An herbaceous vine, fruit elongate, 10-angled.

Sayctia, V.

L. AEGYPTIAOA Mill. Cultivated for its edible fruit.

Pat61a, T., V.

LUMNITZERA PURPUREA Presl. *(Gombretacece.)* A slnub or small tree with crimson flowers, common along the seashore, borders of mangrove swamps, etc.

Agnfiya, T.; Culfisi, T.; Dalůru-babáe, B.; Dobl^sa, T.; Libflto, T.; Libáto-pulá (Tayabas); Ma6ro, V.; Sagásа; TóiTJog, B.

LUNASIA. *(Itutacece.)* Shrubs.

Cacâo-cacâuan, T.; Malallgaa-na-babâe.

L. AMARA Blanco. Bonlaf, B.; Lfinas, T.; Ltinns-buiidóc, T.; Macabnhai, T.; Palt, T.; Paitán, T.; PaJt-palt (Zamboanga)*;* Pa tan, V.; Saguit.

L. GRANDIFLORA Muell Arg. Malacacáo, T.

LYCOPERSICUM ESCULENTUM Mill. *(Solanaccw.)* The tomato, introduced from America; cultivated and spontaneous.

Camâtis, T., II.; Tomâtes, Sp. Fil.

LYCOPODIUM. *(Lycopodiacew.)* PacayCmcon.

LYQODIUM DICHOTOMUM SW. *(Filices.)* Twining ferns, the stems being used by the natives in the manufacture of hats, etc.

Nfto, T., V.

L. SCANDENS Sw. Nltong-putl, T.

M.

MABA BUXIFOUA Pers. *(Ebenacew.)* Ebony, the wood black.

£bano.

MACARANGA^ *(Euphorbiacece.)* Shrubs or small trees.

Anltap, Ig.; Belúñga, T.; Biltia, Pamp.; Bilfian-laláque, T.; Bflung, *T.;* Ginábang, 11.; Malab6ñga, T.

M. BJCOLOB Muell. Arg. AmůbJit, V.; Hamfndan, *V.*

M. MAPPA Muell Arg. Cam&isa, T.; Bil&un; Biñg&bing, T.; Binufing, T.; Boñgábong, V.

M. TANABIUS Muell. Arg. Bllan, Pamp.; Bin6figa, T., V., Pamp.; Binfian, T.; Bilúñga, T.; Binúñga, V.; Guinfibang (Abra); Malabfifiga; Mim6figa, T.; Samfic, II.; Taqufpasfn, T.

MAESA. *(Myrsinacece.)* Shrubs or small trees.

Dagang-dfing (Jolo); Palipal, T.; Pate*put, T.; Patipol (Morong).

M. GAUDICHAUDII, A. DC. Solímao, T.

M. HAĘNKEANA Miq. Maguttfita, V.

M. INDICA A. DC. Calf cot (Tayabas); Catlcot, T.

M. LAXA Mez. Baguma6niao, B.

MALACHRA BRACTEATA Cav. *(Malvacew.)* An annual or perennial coarsely hairy herb with angled leaves and yellow flowers.

Anfibo, V.; Lfibog-lfibog, V.; Lapnls; Lapnis na bolohfin, T.; Vocfibul, T.

MALAISIA TORTUOSA Blanco. *{Urticacece.)* Hiñguén, T.; Malaisfs, T.; Sab*, T.

MALLOTUS. *{Euphorbiacew.)* Shrubs or small trees.

Dfiha; Mah6tay, V.; Malambfing, T.

M. FLORIBUNDUS Muell. Arg. Tfila-túla, B.; Tflyartúya, B.

M. MOLUCCANUS Muell. Arg, Ahling, T.; Alim, T.; Aling, B.; Cfihoy dalfiga, T.; Taguip-asfn, T.

M. PANICULATUS Muell. Arg. Halaúmo, V.

M. PHILIPPINENSIS Muell. Arg. Fruit red, medicinal.

Apfiyot, Z.; Banftto, T.; Banfito, T.; Buils, II.; Silla, T., V.; Vúas, II.

M. RiciNOiDES Muell. Arg. Alem, II.; Alim, T.; Alum, V.; Arum; Balacbfilac, T.; Búntot-púsa, T.; G&-ga, T.; Malaachu^te, Pamp.; Pacácal; Pacalc&l, Pamp.; Pilfpud, V.; Sfila; Tambón-tamb6n (Tayabas); Tapft, B.; Taqulp-asln, T.; Tob6gor, T.; Tres-pflntas, Sp. Fil.; Vilos, Pamp.

MANGIFERA. *[Anacwrdiacece.)* Trees.

Malapfiho, T.; Paupafltan, T.

M. ALTISSIMA Blanco. Appan (Cagayan); Magat&di (?), €ag.

M. ANISODORA Blanco. M&nga-anls.

M. CiESiA Jack. BalCinut; Bayúno, V.; Ufini, (Jolo).

M. FOETIDA Lour. Paopfiuan T.

M. INDICA Linn. The mango.

Mampfilan (Jolo) ; Mdnga, T., V.; Mftngga, T., V.

M. LONGIPES Griff. Pftho, T., V.; Pfiho-seco (Cebu); PA jo, T.; Pfto, II.; Paopfinan; Papoh6tatf; Pap6nya.

M. ODORATA Griff. Pahoh6tan, V. T.; Pftli, V.

MANIHOT UTILISSIMA Pohl *(Euphorbiacew.)* An erect frutescent plant from large tuberous roots. The tapioca plant.

Cam6ting cfihoy, T., V.

MAOUTIA. (*Urticacece.)* A shrub.

Ar6e-m&may, B.

M. PLATYSTIGMA Wedd. Pinúan, Ig.

MARLEA BEGONI^FOLIA Roxb. *(Cornacece.)* A tree.

Bagal6an, T.; Baga6lan, T.; Calumpagln, T.

MARSDENIA TAGUIMNJA Blanco. *(Asclepiadacece.)* **Tayomtfiyom,** II.
M. TiNCloitlA R. Br, A tall climbing **vine.**
Arffigrt, V.; Payanguft, V.
MELASTOMA. *{Melastomacea:.)* Shrubs with **Bhowy purplish Sowers.**
Boslog-amo, T.; Buyong, V.; **Gtranfftesj Hantntufigao, T.**; Lf-iigay, **T.j** Malatu-uo, Cag.; TuiTgao, B.
M. UIIIBICATUM Wall. Agfisip, V.
M. lIALABATKICUM L. tiraililitis, T.
M. OBVOLUTUM Jack. Bofida, Ig.; B6ta-b6ta, II.; Tunantunan, V.
MELIA. *(MeUacecc.)* Trees.
M:il:itil»f (Morong).
M. AZEDAKACH L. A shrub, cultivated for ornament
Paraiso, Sp. Fil.
M. CANDOLi-tii lu-.s. BalagiiiTgo, **T.j** MilniJuL, T.j Malongfiin, **T.j** Malu-ilyayen; Quintana, T.
M. DUBIA Cnv. Bngaltiga, V.
MELICOFE TEHNATA For.^i | *i'litacew.)* *A* shrub.
Matang-firao, T.
MELOCHIA. *(Sterculiacea.)* Herbs or shrubs.
SaniAc, Pamp.
M. AKBOKEA Blanco. A shrub or small tree, the herbaceous portions stellate-**hairy. The baxk** yields a strong liast fiber.
BuifLrit<ni. V.; Balftnon, V.; Bunftlon; BinrtiT^a, II.; **UEalaaohntite,** T.
M. coRCiioitFOLiA L. An erect, much-branched herb.
CiUfilgan, V.
MELODOHUM FULOENS Hook. f. & Th. *(Anonacew.)* A large woody climber or (?) a small tree.
Amrtyon; Amdyong, Pamp.
MELOTHRIA INDICA Lour, *{Curcurbitacea'..)* A nearly glatnuns **climbing** vine with globose fruits.
Mil6n-daga, T.
MEMECYLON. HJ*elastomacew.)* Glabrous shrubs or trees with opposite leaves and small flowers.
Anatan, **T.j** Dfac, Pamp.; Hftgon, B.; Malabalifo, B.; **Panaypfiy;** Pani 1 ("jIJ>a- bA ca ; **Sfnit,**
M. EDULE Roxb. Cachui **Oanddn, 11.; Coles, T.j Cfilea, T.; Cttlis,** T.; Saguinsin, V.
M. I*LORIBUNDA Blume. Babflgion.
M. PANICLTLATUM Jack. Paaagult, T.
METROSIDEHOS VEBA Rumph. *{Myrtacem.)* Barit, V.
METBOXYLON *[Valmcc.)* AmbOlong, V.; Arnbiilong. V.; SaesSc, V.
MEUSA FEBBEA Linn. *(Outtiferea.)* *A* glabro us tree with yellow flowers.
MalabocbOc, Malabucbdc (?}, T.
MEZONEUBUM 1*Lcgumino8e<p.)* Robust woody, prickly climbers with bipin-**nata teavea** and paniculate inflorescence.
Camot-pflsa, T. j Cfmus-cabag, T.
M. QLARBOTI Desf. Oalrftrcfibagj T.j Sagnlt, T.; Sapnlt, T., Pamp.; Slit, V.; Tugfibang, V.; Ugflbang, V.

MICHELIA CHAMPACA L. *(Magtioliacece.)* A tree with pale yellow or orange very fragrant flowers. Cultivated for ornament.

Sampfic, T.; Sampáca, T.; Champâca, Sp. Fil.; Champâga, T.; Tsampâca, T.

MICROMELUM. *(Rutacew.)* Shrubs or small trees.

Ayo-âyo; Ayu-âyu; Câhoy dalâga; Malalûpay, Pamp.; Matâares, T.; Part.

M. TEPHROCABPUM Turcz. Bintfng-dalâga, (Tayabas) ; Calimbahfn, T.; Malacâdpo, T.; Maytimus; Palt-palt; Tulibas, T.

MILLETIA PULCHBA Benth. *(Leguminosew.)* An erect tree, the branches and leaves beneath clothed with a grayish silky pubescence.

Bfitong, V.

M. SERICEA W. & A. A woody climber.

Bfltong, V.

M. SPLENDENS W. & A., Tfibli, T.

MIMUSOPS. *(Sapotacew.)* Trees.

Pisangdâya, T.; Postalflgon, Z.

M. ELENGI L. A tree with fragrant straw colored flowers, frequently cultivated for ornament.

Bansalâgue, T., V.; Cabfqui, T., V.; Bansalâgin, T.; Bansalágon, T., V.; Bârsic, T.; Pasâc, T., Z.; Talip6po, V.

MIMOSA PUDICA L. *(Leguminosew.)* A prostrate spreading plant with numerous heads of pink flowers and sensitive leaves. Introduced from America.

Dam6-hfa, T.; Hûya-htiya, V.; Macahfya, T.

MIRABILIS JALAPA L. *(Nyctaginacew.)* A somewhat succulent herb with white, or more often, red flowers. Introduced from America and cultivated for ornament, also spontaneous.

Guilalâs, T.; Diégode-n6che; Gilal&s, T.; Maravtllas, Sp. Fil.; Oraci6n, Sp. Fil.; Suspfros, Sp.

MITRAGNE. *{Rubiacew.)* Shrubs or trees, the flowers-in globose heads.

Mamb6g, T.

MITREPHORA RETICULATA H. f. & Th. *(Anonacew.)* A tree.

·Talimûrong, T.

MODECCA CARDIOPHYLLA Mart. *{PassifloracecB.)* A shrub with long petioled cordate-ovate, acute leaves.

Salâpong, T.

M. HETEROPHYLLA Blume. Meltfng-ouâc, T.

M. PALMATA L. Leaves glandular, palmately lobed or entire.

Binoy6c-boy6c, T.

M. TBILOBATA Koxb. Leaves three lobed.

Lfbas.

MOLLUGO. *(Ficoidcw.)* Herbs.

Amargfiro bâbi, Pamp.; Marg6so damulog, Pamp.

M. HIRTA Thunb. Prostrate, stellately wooly.

Lobfo, T.

M. OPPOSITIFOUA L. Sarsalfda, T.

M. PENTAPHYLLA Linn. Malug6so, V.; Salsallda, V.

M. STRICTA L. Often a foot high, glabrous.
Malag6so, T.; Molug6so, T.

MOMOBDICA BALSAMINA L. *(CurcurUtacecB.)* A slender herbaceous vine, the rough, elongated fruit edible. Cultivated.
Amarg6so, Sp. FiL; Ampalâya, T.; AmpalSa, T.; Apalâya, T.; Apâlia, Pamp.; Marg6so, T.; Palla, V.; Pálla, T.; Parfa, II.; Sampalla, V.

M. COCHINCHINENSIS Spreng. A large vine with ovate, muricate red fruit.
B6yoc-bóyoc, T.; 13uy6c-buy6c, T.

MONOCARPIA BLANCOI F. Vill. *(Anonacecs.)* Câlai, T.

MONOCHORIA HASTIEFOLTA Presl. (*Pontederiocece.*) Aquatic herbs.
C6sol-c6sol, V.; Gâbi-gâbi, V.; Gabinan, T.; Páyao-pâyao, V.

M. VAGINALIS Presl. Calabâo, T.; Calabda; Hifiguion.

MORINDA BHACTEATA Roxb. *(Rubiacew.)* A shrub.
Abegáste, V.; Aliâma; Anfno, V.; Apâtot, II.; Apâtut, T.; Banc6ro, T.; Bañgc6ro, T., V.; Bañgctido, V.; Câhoy-dalâga, T.; G6les, T.; Cfllit, T., V.; Lino, Pamp.; Mamb6g, T., V.; Nino, T. V.; Panctido, T. V.; Sicâleg, V.; Taliantár, Pamp.; T(imbong-âso, T.

M. OITRIFOLIA L. Banctido, T., V.; Bafigcfldo, V.; Lino, V.; Nino, T., V.; Tombóng-âso.

M. TINCTOWA Roxb. Halon, T,; Tflmbong-âso-hápay, T.

M. UMBELLATA Linn. Tûnbon-âso.

MOBINGA OLEIFEBA Lam. *(Moringacew.)* A small tree with soft white wood, white flowers, 9-ribbed capsule and winged seeds.
Baltiiiggay, V.; Bé*hen; Caldgay, T.; Calfifigai, T., V., Parop.; Camalûñgue, Pamp.; Camal6iiğay, T., V.; D6ol, V., Pamp.; Malflñgay, T., V.; Malflfigit, V., Pamp.; Malflgit, V., Pamp.

MOBUS ALBA Linn. *{Urticacea.)* A small tree, the mulberry, introduced from Asia and occasionally cultivated.
Morâl; M6ras.

MOSCHOSMA POLYSTACHYUM Benth. *{Labiatew.)* A slender, much-branched herb, 2 to 4 ft. high, the angles of the stem frequently rough.
Lod6cong, Pamp.

MUCUNA ATROPURPUBEA DC. *(Leguminosew.)* A woody climber, the pod covered with yellowish brown irritating bristles.
Nlpai, V.

M. MONOSPEBMA DC. A woody climber with a 1-seeded pod.
Buiqulquit, T.; Llpai, T.

'M. NIVEA DC. An annual climbing vine, the pods glabrous when mature.
Calabant6s, V.

M. PBUBIENS DC. An annual vine, cultivated.
Lfpay, V.; Nipay, T.

MUEHLENBECKIA. *(GraminecB.)* Slender grasses.
Alupihan, T.

MUNTINGIA CALABURA Linn. *{TUiocecB.)* A small tree with small edible dark fruits. Introduced from Mexico.
Cerfeas, Sp. FiL; Dfttiles, Ratiles.

MUBRAYA EXOTICA L. *(Rutacew.)* A shrub or small tree with glabrous 3 to 8 foliate leaves and small globose berries.

Banaâsi, 11.; Banâot, Z.; Banâsi, Pang.; Banâti, V., Pamp.j Bannaasi, II.; Camunlng, T.; Camunîn, V., Pamp.j Molâuin, T.; Molâvîn, T.

MUSA. *{Musacew.)* The bananas, plantains, Manila hemp, etc.

Agûtay, V.; Alatânay (Cagayan);" Aua, 11.; Batabla, figa potl, V.; Bûy, 11.; Canûla, V.; Canâra, V., T.; Oulubting, Pamp.; Lisflhan, V.; Pâcol, V.; Quilalâ, V.

M. PARADISIACA L. The plantain. Many varieties are recognized by the "natives.

Afapñyan, (Cagayan); Afflyan, (Cagayan); Alimúquen, 11.; Anuiing, T.; Aricfindai, V.; Aricrtndal, V.; Bfiloi, V.j Bfiloy, T.; Binaláton, V.; Biñgtic6hol, T.j Bfsco, T.; Botohfin, T.; Buñgfilan, T.; Caract6n, V.; Dalivi-dalága; Dinugdan, T.; Goyôran, T.; Lantûndal; Machfn; Matfivia, T.; Plátano, Sp.; Quinanâyan, T.; Sabâng-visftya; Sâguing, T.; Tinálong, T.

M. SAPIENTUM L. The banana. Many varieties are recognized by the natives. Probably not specifically distinct from the preceding.

Ampâl, V.; Anon6o; Anuâng; CarnAte, V.; Balâfigun, V.; Balâyang, II.; Batâvia; Benticahol, T.; Binâto, V.j Bot6an, T.; Bunn6c, II.; Butne*g, II.; Butn^ng, II.; Buttian, T.; Dinugûan; Lacatân, T.; M6co, (Iloilo); Pampâng, V.; Plátano, Sp.; Sabâ, II.; Sftging, T., V.; TampuMng, T; Tarnâte, V.

M. TEXTILIS Nees. The plant that produces.the fiber known in commerce as Manila hemp.

Abacâ, T., V.; Lânot, V.; Lan6tan, V.; Pâgua, V.; tJtta (Cag.).

MUSSAENDA. *{Rubiaceoe.)* Shrubs with yellow flowers, each flower with a large white leaf-like bract.

Bayâg usâ; Bota, Ig.; Bûyor, V.; Tâlic-harâp, (Tayabas); Tinultiangâtas, T.; Tenoluâng gâtos, T.

M. ANISOPHYLLA Vidal. Bflyon, V.

M. FRONDOSA L. Bûlaclac-na/ig-dal<1ga; Matinggafn.

M. GBANDIFLORA Rolfe. Agb6y, V.; Balâi-lam6c, II.; Buye"n (Balabac); Câhoy dalflga, T.; Malacafe* (?), V.; Matang-ftran, V.; Taba-tabfl, V.; Tinga-tinga, T.

MYBISTICA. *(Myristicacea.)* Trees generally with hard wood. The nutmeg belongs in this genus.

Alanfgni (Zamboanga); Banabanâlo, T.; Bitanh6l-na-babâe, B.; CartSgu, T., V.; Dug6an, B.; Durflgu, T., V.; Hindurûgu, T. V.; Lftho, V.; Malacâdios; Oyfsan, T.; Oy6c, Ig.; Saguing-nang-c&lao, B.; Tâmbao, T.; Ublan (Tarlac).

M. CUMINGII Warb. Dugtian, T.; Malatâlang, T.

M. GUATTERnFOLiA A. DC. Camfts, (Zamboanga); Tâlang-bund6c, T.j Ttigan, T.

M. MINDANAENSIS Warb. Duhâo, (Zamboanga).

M. PHILIPPINENSIS Lam. Ants cfthoi, T.; Anfs moscflda, T.; Balinttla, (Zamboanga); Dug6an; Tfilang-tâlang, T.

M. SIMIARUM A. DC. Anfiping, (Zamboanga); Manumbaga, (Zamboanga).

N.

NABAVELIA. *(Ranunculacecc.)* Climbing shrubs with flowers in axillary 1-flowered peduncles.

Câuad cauâsan, T.; 6vai-na-paiĩglâo, 11.; Parâpit-hâñgin, T.

M. LAURIFOLIA Wall. Bánai-bânai, 11., T.; Ductûng-âhas, T.

NAUCLEA. *(Rubiacew.)* Shrubs or trees with white flowers in a dense globose inflorescence.

Bagarflao na itfm, T.; Bancâl, T.; Bancalânan, (Zamboanga); Bañgal, T.; Hambabfii, V.; Himbabâlob, T.; Hambâlod, T., V.; Hambabâyod, V.; Lisâc, T.; Magarflao, T.; Oisâc, T.

N. BLANCOI Vidal. Mambôg, B.

N. GLABERRIMA, Blanco. Bangcâl.

N. OLABRA DC. Bagalfrat.

N. OBTUSA Blume. Ambabâlud, V.; Ambâlod, T., V.; Babâlod, T., V.; Bâlod, T., V.; Hambabalod, T., V.

N. PURPUREA Roxb. Caluntfñgan-ĩiga-itim, V.; Caluntlñgan-figa-muldto, V.

NEESIA ALTISSIMA Blume. *(Malvaceae.)* A lofty tree.

Libato-na-putf, T.

NELITRIS. *{Rubiacew.)* Alungcágay, V.; Granâtes, T.; Malatumbâga, T.

NELUMBIUM SPECIOSUM Willd. *(Kympheacece.)* An erect, large water herb with peltate leaves and white or pink flowers.

Bafno, T.; Bayn6, T.j Sûcao, II.

NEPENTHES. *{NepenthacecB.)* Usually climbing plants, the midrib of the leaves produced into a peduncle which bears a pitcher of various forms.

Arân-câlao, V.; C&ca, T.; Inûmang-câlo, T.; Jarrlto, T.; Pichfil, T.

N. ALATA Blanco. Batbatiddr, Ig.; Batiddr, II.; Cadfing, Ig.; Gorgor^ta, II.; Jârro, II.

N. ORAGILIS Korth. Sogons6gon, V.; Suludsûlud, V.

N. VENTKICOSA BIanco. Saludsalôd.

NEPHELIUM. *(Sapindacew.)* Trees, some species valued for their timber.

Apâtong, T.; Aytipag, T.; Bacâlao, Pang.; Sambuâlau, V.

S'. GLABRUM Noronh. Alfpai, T; Allpay; Alpay, T.; Alûpag, T.; Alflpay; Baccâlao; B6boa, V.; Guislan, T.; Guisfhan, T.; Lechfas, T.; Tinaiñguf, T.

N. LITCHI Camb. Fruit edible.

Hal(3pag-âmo (Tayabas); Lechfa.

N. LONGANA Camb. Alfpai, T.; Alpâi, T.; Alûpag, T.; AlGpai, T.; Lechfas, T.

NICOTIAN A TABACUM L. *(Solanacew.)* Tobacco. Introduced from America.

Tabâco, Sp. Fil.

NIPA FRUCTICANS Wurmb. *(Palmcc.)* The leaves of this species are extensively used for the purpose of thatching houses.

Ldsa; Nipa, T.; SAga, Z.; Sasfl, T.; Tfita, Cag.

NYMPHVEA LOTUS L. *(Wympheacew.)* Large equatic herbs, the pond lilies.

Gâvai-gâvai, V., T., Pamp.; Gâway-gâway; Lâvas, T., V., Pamp.; Lflnas; Talaflo, T., V., Pamp.; Tlinas, T., V., Pamp.; Talâylo.

N/ SIEĹLATA Willd. Lâuas, T.

O.

OCHNA SQUARROSA Linn. *(Ochnacew.)* A shrub or tree with alternate serrate leaves and yellow flowers.

Bansflay, V.; Basllay.

OCHROCARPUS. *(Guttiferece.)* Trees with coriaceous leaves and axillary flowers.

Malabúnao, B.

0. PENTAPETALUS Blanco. Namacpácan, II. (?); Pamitlâin, II.; Pamitlatfn, II.

OCIMUM BASILICUM L. *(Labiatece.)* A strongly scented herb witli pink or purplish flowers.

Bonâc, V.; Calóoy, V.; Canda, V.; Solâsi, T.; Sulâsi, T.

0. GBATISSIMUM L. Strongly scented, shrubby. Flowers yellow.

Coloncógon, V.

0. SANCTUM Linn. Strongly scented, herbaceous.

Albahfica; Balfinoi, T.; Blday, II.; Camañge, V.; Coloc6go, V.; L6colóco, T., Pamp.

OCTOMELES SUMATRANA Miq. (*Datisacece.)* A tree.

Banuilng, T.; Bilúa, T.; Bilúan, T.; Bin6nang, T.; Binufing.

OLAX. *(Olacinew.)* Trees or shrubs, often scanderit, sometimes prickly.

Lâgu, T.

0. IMBRICATA Roxb. Scandent, unarmed, leaves ovate-oblong, racemes many flowered.

Malabflguio, T.

OLDENLANDIA. DIFFUSA Roxb. *(Rubiacece.)* An annual glabrous diffuse annual with linear leaves.

Agtiho, V.; Danfri, V.

OLEA. *(Oleaccce.)* Trees or shrubs with small flowers in axillary or terminal panicles.

Bafiso (Central Luzon); Dflan-bâca, B.; Malabútong, T.; Malapúad, Pamp.

ONYCIIIUM AURATUM Kaulf. *(Fitices.)* A fern with finely dissected leaves, yellow beneath.

Dfla-dfla; Pâcong-anúang.

OPHIORRHIZA. *{Rubiacecs.)* Erect, creeping, or decumbent herbs.

Cayob-c6b (Cebu).

OPILIA JAVANICA Miq. *(OlacinecB.)* A low, scrambling shrub with alternate entire distichous leaves.

Aragofroy, V.

OPUNTIA COCHINILLIPERA Mill. *(Cactacea.)* A cactus introduced from America, occasionally cultivated for ornament.

Dapal, V.; Dllang-bfica, T.

ORANIA RLGALIS Zipp. *(Palmes.)* A palm resembling the cocoanut palm in habit, but with numerous small globose fruits 2 inches in diameter.

BaraTgoi (Bulacan); Palindfln. T.

ORCHIPEDA FOETIDA Blume. *{Apocinacea\)* Small tree with rather large flowers.

Bayâg camblng, T.; Bayâg usâ, T.; Pant6g-sang-usâ, V.

OKMOSIA CALAVENSIS Blanco. *(Leguminosece.)* A tree, the pods with small red seeds.

Bfihay, T.; Malaamfiyon, T.; Malasága, T.

OBOPHEA. *(AnonacecB.)* Trees or shrubs.

Maquitarfn (Tayabas); Palosánto, T.

0. ENTEROCARPOIDEA Vidal. Pañganáua, Cag.

OBOXYLUM INDICUM L. *(BignoniacecB.)* A small tree with large pods, 3 ft. long.

Abáng abáng, T., V.; Ab6ng ab6ng, V.; Balflang oác, T.; Pincapfnca, T.j Pincapincáhan, T.

OBTZA MINUTA Presl. *(Graminew.)* A variety of rice.

Capfltol, V.

0. SATIVA L. Rice, of which many varieties are recognized by the natives.

Bígas, T.; Binambfing, T.; Boláhan; Bolohán, T.; Dumali, T.; Lamflyo, T.; Malagqult, T.; Nil6mot (Tayabas); Palfiy, T.; Quinandá, T.; Tañgi, T.

OSBEGKIA CHINENSIS L. *{Melastomacece.)* Changpárang (Angat).

OSBORNIA OCTODONTA F. Vill. *(MyrtacecB.)* Sagása, T.

OSMELIA. *(Samydacew.)* A tree with alternate glabrous leaves and terminal panicles. Flowers white, tinged with red.

LubMubf.

OSMOXYLON. *(Araliacece.)* A tree.

Nfog-nfog, T.

0. PULCHERRIMUM Vidal. Apálong; Apúlong, V.

OTOPHORA BLANCOI Blume. *(Sapindacece.)* A small tree.

Balinfionao, T., V.; Dfrig, II.

0. SFECTABILIS Blume. Paloáhan.

OTTELIA ALISMOIDES Pers. *{Hydrocharidece.)* A submerged fresh-water herb with rather large white flowers.

Calabáo, T.

OXALIS ACETOSELLA L. *(Geramacem.)* The common sorrel. Mistaken by Philippine authors for the next species?.

Ayo, Pamp.; Cuñgf, Pamp.; Cfiñgui; Darásig, V.; Lujfila.

0. CORNICULATA L. A small herb with an acid taste, flowers yellow.

Congf, Pamp.; Malabaltigbug-dflgis, Pamp.; Susocayóhi, T.; Taiganddga, T.; Taifiáng-dagá; Yáyo, Pamp.

P.

PACHYRHYZUS ANGULATUS Rich. *(Leguminosece.)* A climbing herbaceous plant from a turnip-like tuber, which is edible. Cultivated.

Hicamás, T.; Sincamás, T.; Ticamás, V.

PAEDERIA FOETIDA L. *(Rubiacew.)* A climbing herbaceous vine with foetid flowers.

Cantiitac, T.; Cant6tai, T., Pamp.; Canttitan, T.; Cantótan, T.; Cant6tay$_r$ T.; Dicfita, Ma.boloc, Pamp.; LiHtan, V.; Matabáng-dlcut, Pamp.; Taftai, V.

PALAQUIUM. *(Sdpotacew.)* Trees, all of which produce gutta-percha, the leaves of most species glistening beneath. Flowers on the branches below the terminal leaves.

Anflsep, T.; Calapla (Mindanao); Dulftan-pulâ, T.; Macaâsin-putf, T.; Malaputât, T.; Malasaputf, Pamp.; Malaputfitan, T.; Rfrao, B.

P. BABNESII Merrill. Leaves obovate obtuse, pubescent beneath.

Náto, V.

P. CUNEATUM Vid. Leaves small, glabrous beneath.

An6sep, T.

P. LANCEOLATUM Blanco. Bagaláñgit, T,

P. LATIFOLIUM Blanco. Leaves large, densely rusty tomentose beneath.

Alacâac, T.; Alácao, Pamp.; Alficap, T.; Pacancâl, Pamp.; Pftlac-pálac, T.

P. LUZONIENSE Vidal. Leaves long petioled, glabrous beneath.

Bagaláñgit, T.; Bitocollng, T.; Dolttan.

P. OLEIFERUM Blaneo. Similar to P. *latifolium,* but leaves acute, not obtuse.

Dalácan, II.; Daracán, II.; Malacmác, T., Pamp.

PAN AX FRUTICOSUM L. *(Araliacew.)* A shrub 3 to 6 ft. high, with tripinnate leaves. Cultivated for ornament.

Macán, V.; Papúa, T., V., Pamp.

PANCRATIUM ZE^LANICUM Linn. *(Amaryllidacece.)* Ajos-ájos figa mapotf, V.; Bâcong sa Persia; Bâoang-baoang, V.; Cat6ngal, T.; Hagobâoa, V,; Lûnas; Rdsas-de-p^rsia, Sp. Fil!

PANDANUS. *(Pandanacece.)* The "screw-pines," so called from the spiral arrangement of the leaves. The leaves are much used for the manufacture of mats, baskets, etc.

Carahûmai, T.; Pandân-sabotân, T.; Sal6go, V.

P. DUBIUS Spreng. Bâlio, V.; Bañgc6ang-bond6c, T.; Bfiren, V.

P. EXALTATUS Blanco. Alâsas, T.

P. FASCICULARIS Lam. Arqulg, (?) Cag.

P. ODORATISSINUS Linn. f. Láha (?) (Jolo); Paddân, Cag.; Pandfin, T., V.; Pañgdftn, V.; Panhâcad, V.

P. RADIGANS Blanco. Olâñgo, V.

P. SABOTAN Blanco. Sabotân, T.

P. SYLVESTRIS Rumph. Lal6go, V.; Lan6go, V.

PANOIUM EDULE Reinw. *(Biwacew.)* A tree.

Pâñgi, T.; Pfifigui, V.

PANICUM. *(Oraminew.)* Coarse or fine grasses.

Bisaclât, T.; Canubsûban, T.; Cduad-cauâran, T.; Damting-pâsig, T.; Damûs-âpi, T.; DuaduAran, T.; Hagusnây, T.; Lûya-lûya, T.; Malacaufiyan, T.; Mfilit-calabâo, T.; Tuadtufiran, T.

P. COLONUM L. Tiribtihan, T.

P. CRUSGALLI L. The "barn-yard grass" of the United States.

Dâua-dfiua, T.

P. FLAVIDUM Retz. Sab6ng-sabtiñgan, T.

P. INDICUM L. Sangfimay, T.

P. BEPENS L. Ltiya-luyâhan, T.

PABAMEBIA PUILIPPINENSIS Radlk. *(Apocinacew.)* A woody vine with white fragrant flowers, the bark producing an abundance of milky sap, which on coagulation becomes rubber.

Bůlao-bůlao, V.; Dugt6ng-áhas, T.; Gam6t-sambíili, T.; Itlban, T.; Parogtóng-áhas, T.; Pasác; Sagld, V.; Sagft, T.; Tagfic-tagůc, V.; Tagulâuay, T., V.; Tayulâuay (lloilo).

PABASPONIA. (*Urticacea.)* Tanagd6n.

PABASTOMON. *(Rosacece.)* Shrub or small tree.

Inoyâban.

PARINARIUM. *{Ro8ace<B.)* Trees.

Alâmag, Bltai-bfilang, Pang.

PABEIA BOXBUBGHII G. Don. *{Leguminosece.)* A large tree bearing long dark-colored pods.

Bag6-oen, II.; Bagůen, II.; Balây-oâc, 11.; Ctfpang, T., II.; CQpang, T.

PASPALUM *(Graminece.)* Tufted grasses, usually found in wet places.

Paragfs, T.; S&bung-sabůfigan, T.

PAVETTA. *(Rubiacea.)* Shrubs or small trees.

Cåhoy dalâga.

P. ANGUSTIFOLIA R. & S. Alipdong, V.

PAYENA. *(Sapotacea.)* Trees, yielding gutta-percha.

Lisong-insfc, T.; L6no-l6no.

PEMPHIS ACIOULA Forst. *m (Lythracecs.)* A shrub or small tree, common along the seashore. Flowers small, white.

Bantigui, V.; Pantlgui, V.j Pllit, B.

PENNISETUM NIGRICANS Miq. *(Qrominew.)* Agulñgai, T.

PEBISTBOPHE CONTOBTA Blanco. *(Acmthacew.)* An erect spreading herb.

Sapinsapfn, T.

PH^ENTHUS CUMINGH Miq. *(Anonacew.)* A small tree.

Bignây-pfigo.

P. NUTANS Hook. f. & Th. Lan6tang-itfm, T.; Lanůtan itim.

PHALAENOPSIS AMABALIS Blume. *(Orehẋdacecc.)* A very striking epiphytic orchid.

Dâpo-Maripdsa.

PHALERIA PEBBOTTETIANA B. and H. *(Thymeliacece.)* A tree.

Salâgo, V.

PHASEOLUS CARACALLA Blanco. *(Leguminosew.)* A twining herbaceous vine.

Caracâlla.

P. LUNATUS Linn. A twining biennial, everywhere cultivated for its edible seeds.

Hfiba, Sp.; Patâni, T., V.; Zabbâche.

P. MUNGO L. Cultivated.

Balâtong,.T.; Bolâton; M6ngos, T.; Mtingo. V.

P. VULGAKIS DC. Cultivated.

BirliTgi, T.; Btitifig; Butlñga, T.

PHOEBE. *(LaurinecB.)* Evergreen trees or shrubs.

Malacâdios, T.

P. UMBELLIFLORA Blume. Malabtifiga, B.

PHRAGMITES ROXBURGHII Nees. *(Oraminece.)* A very coarse reod-like grass found in wet places.

Tamb6, T. •

PHRYNIUM. (*ScitiminecB.)* Hagnichlc, V.

PHYLLANTHUS. *[Euphorbiacew.)* Trees, Bhrubs, or herbs.

Agay, T.; Asac-tfilong; Būto-but6nis, V.; Carâmay; Lagâri; Murūgna, V.; Tañglsan-púnay, V.; Tenâan; Tinâan, T.

P. ACIDUS Muell. Arg. A tree, fruit edible.

Cagufnd; Calutpâmo; Lañgufgi.

P. DISTICHUS Muell. Arg. A tree, fruit edible, very-acid.

Banquflin, T.; BaiTgqufling, V., T.; fba, T., Pamp.; Lay6han, V.; P6ras, V.; Yba, T.

P. NIRURI Muell. Arg. A small herbaceous plant much used in medicine.

Hiérba de San Pe*dro, Sp.

P. RBTICULATUS Muell. Arg. A small shrub with black berry-like fruit; very common.

Malafba, T.; Malatfnta, T.; Matâng-olâng, V.; Nfpin (Zamboanga); Sûñgot-olâng, V.; Tinatfnan, T.; Tintatintâhan, T.

P. URINARIA L. A small herb used in the practice of medicine.

Ibaibâan, T.

PHYLLOSTACHYS BAMBUSOIDES Sieb and Zucc. *(Oraminew.)* A bamboo.

Cauáyan-ñga-itūm, V.

PHYSALIS ANGULATA L. *(Solanacew.)* An herbaceous plant, common in waste places.

Aslsio, V.; Camâtis; Slsio, V.; Tuttullâcac, T.

P. PERUVIANA L. Similar to the preceding, but the fruit edible; cultivated.

Capfili; Potocfin, T.; Pot6c-potocân, T.; Slsio, V.;

PICRASMA JAVANICA Blume. *(8imarubace(B.)* A tree with large unequally pinnate leaves.

Lan^te, V.; Nfilis.

PIERARDIA?. *(EuphorbiacecB.)* Shrubs or trees.

Banftlong (Zamboanga); Tincâl (Zamboango).

PINUS INSULARIS Endl. *(Coniferece.)* A pine tree found in Benguet, etc. Three leaves in a fascicle.

Alal, Ig.; Bal^bo, Ig.; Bariât; Bâta; Bâtang (Bontoc); B6be; B^beng; Bo6-bo6, Ig.; Paloplno; Pârua, II.; Sflgin, T.; Sâleng, II.

P. MERCUSII J. and de V. Pine from Zambales, two leaves in a fascicle.

Palosâpis, T.; Sâlong, Z.; Tapfilao, Zamb.; Tapûlao.

PIPER. *(Piperacece.)* Herbaceous vines.

Chlleng-bund6c, T.; Litllt; Salimâra, T.

P. BETLE L. The leaves of this species are chewed with the nut of the Areca palm.

Bûyo, V., T.; Canfsi, V.; Hojas de buyo; Itmo, V., T.; Mamfn, B., T.; Mam6n, V.; P6ro; Sâmat, Pamp.

P. CANINUM A. Dietr. Bûyo-bûyo (Albay); Bûyo it âmo, V.; Bûyo it âyam, V.; Bûyo it lintl, V.; Sâbia, T.

P. COKYLISTACHYON C. DC. Haras, V.; Le"Uet-tfibuy, T.; Litbit, V.; Litli V.j Napan, B.; SaiTgrto, V.; Saog, V.

P. NIGRUM L. Yields the black pepper of commerce.
Malfsa, T.; Piinie"iita, Sp.

P. PHILIPPINUM Miq. Pimientang-bundfic, T.

P. SUBPELTATUM Willd. Tabayac (Iloilo).

PIPTUBUB ASPEB Wedd. *(TJrticacew.)* A small shrub.
Alanglsi, V,; Dalonoban; Dalonot, T., Pamp.; Dalon6tan, V.: D&ltoot, T.; Handalamay; Handaramai, V.j Himaramay, V.; Hindalsimni, V.

PISONTA ACOLBATA L. *{Nyctagmacew.)* A tall woody climber wiili uxillary recurved prickles.
Digquft-digqult, T.; Pficat-aro, T.; Panficla (Bulacan) ; Puriquet, II.

P. INEBMIS Forst. A tree, unarmed.
Coles malueo, T.j Maltico, T.

P. UMBELLATA Seem. A tree 40 to 50 ft. high.
Malagasaha, 11.

PISTIA STRATIOTKS *Linn. [Aroidew.)* A floating stem less herb, the leaves forming an erect cup.
Alulflan, Cag.; Cayapo, V.; Loloftn, Tl.; Louan-Ifiuan, V.; Quiapo, T.

PITHECOLOBIITM. *{Leguminosea[1]..)* Trees.
GOgo-casay, T.; Tfique, T.

P. ACLE Vidal. _A large and valuable timber tree.
Acle, T.

P. DTJLCE Benth. A medium or large tree now common in the Philippines, introduced from America. The fleshy aril surrounding the seed is edible.
Camanchfle, T.; Camanchfles ; Camachllis, T.; Camanslle, T.; Camantirfa, II.; Camaste'les; Camochlle; Camochlles, T.; Commons!!, V.; Camonsfles, T.; Damortfa, Ig.

P. LOBATXJU Benth. A valuable timber tree.
Alobahai, T.; Anagab; Anagap, T.; Anagat; Anague"p; Anflrep, II.; Bintffig-dalaga, T.; CuKcul, V.

P. MONTANCM Benth. Anagap, T.; Cflsai, T.; Casay, V.; Malacanionsile, T,; Tiques, T.

PITTOSPORUM. *(Pittosporaeeaz.)* Trees or shrubs.
Buhthuig, B.; Malambangcabas (Zamboanga) ; Mamalis-babfie, T.; Ote-6te.

P. FERNANDEZII Vidal. Mamalis, T.

P. FLORIBUNUUM W. &, A. Balungcanayan, V.

pLANCiioNiA. *[Malacca:.)* Trees with the alternate leaves crowded at the ends of the branches. Racemes short, terminal, flowers greenish yellow or white. *k*
Ahnhn. B.j Alitaptap, B.; Malanban, T.j **MaaUK T.**

PLANTAGO EfioSA Wall. *(Plantaginuceae.)* Lantfn, *1.*

PLECTOCOMIA ELONQATA Mart. & Blume. *(Palmce.)* Scundent palms.
Nfiilga, V,

PLECTRONIA. *(Rubiacew.)* Unarmed or spinous shrubs, erect or climbing.
Cutcůran, T.; Subian-dagá; Sullac-dagá, T.

P. HORRIDA H. & T. Stems with many hooked spines.
Dáyap-dáyap.

P. MOLUCCANA Merrill. Silisfli.

PLUOHEA INDICA Less. *(Compositece.)* A low shrub, growing in the salt marshes.
Lagůndi láti, T.; Tůlo-lalfiquHIloilo).

PLUMBAGO ZEYLANICA L. *(PlurnbaginacecB.)* Herbs or undershrubs with diffuse branches, the rachis of the spike pubescent or glandular.
Bangbáng, II.; SaiTgdigēquit, T.; Talancáo, II.; Talangcfiw, II.

PLUMIERA ACUTIFOLIA Poir. *{Apocinacew.)* A tree with very fragrant white flowers, introduced from America and cultivated for ornament.
Calachůchi, T.; Calastisi, T.; Calatstitsi, T.; Calattiche, V.; Carachů-cha, T.

PODOCARPUS. *(Coniferece.)* Large trees found in the higher mountains.
Dflag-butiquf, T.; Salupfain (Bontoc).

PONOOATHERUM CRINITUM Trin. *(Graminece.)* A delicate grass found on damp ledges along rivers, etc.
Damůng-gtibat, T.

POGOSTEMON CABLIN Benth. *(Labiatev.)* Herbs or undershrubs.
Cadlln, V.; Cadlóm, V.; Carlfn, T.; Sároc, Ig.; Catlu6n, V.

P. HEYNEANUS Benth. Cablin, T., Pamp.

POINCIANA REGIA Bojer. *{LeguminosecE.)* The "fire tree," commonly planted in the Philippines for ornamental purposes.
Arbol de fuego, Sp. Fil.

POLLIA SOBZOGONENSis Endl. *(Commelinacece.)* Large herbs with lanceolate leaves, the stem erect, viscid.
Loh6d-loh6d, V.

POLLIA THRYSIFLORA Endl. Sapllco, Ig.

POLYALTHIA. (*Anonacece.)* A tree.
Dalinhás, T.

P. LANCEOLATA Vid. An6lang, T.

POLYANTHES TUBEROSA L. *(Amaryllidacece.)* Azůcena; Nárdo (Cebu).

POLYGONUM. *(Polygonacew.)* Herbs with alternate entire leaves, inflorescence a spiciform or panicled raceme.
Malabalánte, T. '

P. BARBATUM L. The nodes furnished with long bearded stipules.
Canubsilban, Pamp.; Subsfiban, T.

POLYPODIUM. *(Filices).* A large genus of exceedingly variable ferns.
Agnfiya; Dilimán (Manila); Hagnáya.

P. DIPTERIS Blanco. Cádco, Ig.; MaraJ&co, II.

P. QUERCIFOLIUM L. A | epiphytic fern.
Cabcńb, V.; Cabcában, V.; Cabcábun, V.; Capcfipa, II.; 66na, Pamp.; Pacpdc-láuin, T.; Paipal-fimo, T.; Tibátib, Pamp.

PoT.vpoitrs. A genus of pore-bearing woody fungi.

Cabuti, T.

PourscIAfi NorioMA Seem. *{AraUacea.)* .\ glabrous shrub with panicled umbels and pinnate leave-.

Bias-bias, T., V,; ltiiiglfn. T., V.; Bofigliu, V., T.j Bonlfn. T.; Bufigltu, T.; BtuTTr-i.'.y. *V.*\ Walapapay*, T., V.

PoMKTIA. I*Siiftiiuhifi* if. i T;iH trees with pinnate leaves and simple 01 panicled, elongated, slender racemes,

Ouya qula, /.; Quiaqufa, Z.

Po.\t;,\M[A OIABBA Vent, i *Lit/inninww.)* An ereci tree with odd-pinnate leaves and woody, Battened, indihiseent pods, common near the seashore.

BaUc-balfc T.; Bftloc baloe, T.; Bal6t-balot (Tayabas) ; Bilni, T : Bayoc-bayoc, T.; Bfltong, V.; Caddol.

PORTLI.ACA OLERACEA I*. (/*orf«/ncar«E.) A prostrate sueculeni weed, the "purslane" of tlie United States.

Anslman. B.] Colaa&nan, T.j (Jolasrnian, T\; Olaatman, T.; Saylcan, T.

P. QtrADRXVXDA L SiLyfciin. I .

l'oTAM0«ATON JAVAKKTOfl lhi~^k, (\«(«*./«pctr.) Suhiiierpctl water plant with floft tin^r leaves.

L6mot, T.

P6THO9. *(AroidecB.)* Climliing branched shrubs, the branches rooting Apfs. T.

P. CYUMHIICL H t'ITS], H61og-lt£ll-i£&, V.

POI:ZOI//IA IHDICA Gaud. *(Urticaccn.)* A slender, erect or prostrate herb with ii\ill;uy wiiiii> Bowers.

Tufa, T.

PREMINA. (Fwfienttoeaj.) Shrubs or .small trees with corymbose or panicled cymes of rathe? smaU greenish or yellowish flowers,

Adfo (Tayaliiisi ; Agdflo, T.; Alfiga. T.; Alagfta dfigat, T.; Al.gba grtnit, T.; Aiigbet. T.; Anoaang; Aragilo. V.; Bfalafipi, T.j kfanaba, B.j MiiliMiin ;'i-n, I.: Tanaua, T.; tban.

1'. VKSTITA Scliauer. 'l-t'i:ivcs *«<ii]y* pubescent.

Aagfio, T.; Adgfto, V.: Aiagflo, T.j Algoa, T.; Anobrftn, II.; Argflo, \ .: Mnl.inin ;'iso. T.j Pamuhat, V.; TaiT^lfiy-irialnto. Panip.

PROSOPIS jiiii.oiEA DC. *[Leguminosea.)* A shrub or small tree introduced from America and now very common along the seashores in certain places. Thorns stout, flowers yellow.

Ar6ma$_T$ T.

PSIDH M '.i AVAVA].. i *Hyrtaeea.)* A shrub or small tree, native of America ami BOW very common in th« Philippines. The Fruit is ediblej

Array an; Bayabas, T.; Calinagtn, T.j Gua*fibaH, Sp.j Guayflboj Guyaba. Sp.. t;uy(ibas, Sp.; Tayabaa, T.

PSOPHOCARPUS PAXi'sTHis D«sv. *(Lvtiumhmsctv.)* A twining herb from a large tuberous root. Pod :; to 4 inches long. Cultivated,

Balligay, V.

P. TETRAGONOLOBUS DC. Similar, but with a pod 6 inches long or more, square, winged. Cultivated.

Calamismfs, T.; Calamfsmis; Camalftson, V.; Pal-lfun. II.

PSYCIIOTRIA. *{Rubiaccw.)* Shrubs or small trees.

Tatanfc, T.

P. MALAYANA Jack. L&io, T.; Sagómay; Tagp6, T.

PTERIS OPACA J. Sm. *(Filices.)* Dagfibas, T., V.; Dal'las, T., V.

PTEROCARPI'S. *(Leguminosece.)* Trees with yellow flowers and orbicular pods which have a rigid wing. Valuable timber trees.

Danápra; Daytánag, Pamp.; Idfao; Tagpá, C.; Udiáon, T.

P. BLAXCOI Merrill. Leaves acuminate, pods glabrous, wing broad, wood odorous.

Sanque*, V.; Urfan, Apfilit, Pamp.

P. INDICUS L. Similar to preceding species but leaves acute and wing of pod much narrower.

Agilna; Antfigan; Asâna, T.; Dait&img, Pamp.; Nfiga, V.; Nárra, T., V.

P. VIDALIANUS Rolfe. Pods covered with stout spines.

Nárra pula (Unisan).

PTEROCAULON CYLINDROSTACHYUM Clarke. *(Composite^)* A tomentose herb with alternate decurrent leaves and sessile heads of yellow flowers.

Sambóng-galfi, T.

PTERocYMinifM JAVANicuM R. Br. *(Sterculiacco!.)* A tall tree, the seeds wing'ed.

Bang6t, T.; Buafiin (Leyte) ; Dfiha, (?) V.; Fañgfnhan; Malasapsflp, T.; Taldto, T.; Taltito.

PTEROSPERMUM. *(Rterculiacew.)* Scaly or stellate-tomentose trees, with leathery oblique leaves, woody-angled capsules, and winged seeds.

Baritian, 11.; Bayfig, V.; Bayóg-bayóg, Pamp.; Calatfñgan, T.; Cantfiigan (Mang.) ; Qufnay-qulnay, T.; TaligAna, Z.

P. ACERI FOLIUM Willd. Leaves roundish or oblonjr, on tiro or coarsely toothed.

Bayóc, T.

P. BLUMEANUM Ktli. Bayiic, T.; Bayóc, T.; Bay6g, T.: Bayugtfn, T.

P. DIVERSIFOLIUM Blume. Leaves horary beneath, acuminate.

Bágud, T.; Balây-bâyan, Z.; Bfiroy; Bayóc. T.; Bfiñga, Cag.

P. OBLIQUUM Blumo. Calocatiiigan. f.; Panaliitgiien; Tlngan-tlngan, T.

PTYCHOSPERMA PUNICEA Miq. *{Palmte.)* Salflag, V.

PUERARIA JAVANICA Benth. *{I*gumino8ece.)* Stems twining,, covered with dense, spreading brown hairs.

Sincamás-áso, T.

P. PIIASEOLOIDES Benth. Bilhay, \T.

PUNIC A GRANATUM L. *'{Lythracew.)* A shrub, the pomegranate, cultivated.

Dalfma (Jolo) ; Granáda, Sp.

PUP ALIA ATROPURPUREA Moq. *(Amarantacece.)* A slender, erect horb. with acuminate loavrs and lon^r spikes.

D6cot-diicot, V.

PYGEUM. *(Rosacev.)* Evergreen trees or shrubs.

Amfigan, T.; Bfihay, T., V.; Cagatúñgan, T.j Duñg6n-duñg6nan, T.; Guflit, T.; LuytSsin, T.; Malacmác, T., Pamp.; Malapúyao, T.; Talocnási.

P. ARBOBEUM Endl. Pasác, T.

P. LATIFOLIUM Miq. Cambál.

Q.

QUEBCUS. *(Cupuliferece.)* The oaks. Many species are found in the mountain forests in the Philippines.

Babaisáan, T.; Bagmán, T.; Baymán, T.; Bayúcan, T.; Manl6ab, T.; Maúring, T.; Pacnán, T.; Panganán; Ticl6b, Ig.; Uyáyan, V.

Q. BLANCOI A. DC. Uayfin, T.

Q. CASTELLARANAUIANA Vidal. Pusopfiso (Marinduque).

Q. JOBDANiE Lag. Palfiyen, Ig.

Q. LLANOSII A. DC. Alâyan, T.; Hay6pag, T.; Macabfñgao, T.

Q. PHILIPPINENSIS A. DC. Mangasirfqui (Bulacan).

Q. SOLEBIANA Vidal. Cacâna, T.; Olâyan.

Q. VIDALII F. Vill. Sirique.

QUISQUALIS INDICA Linn. *(Combretacew.)* A rambling, subscandent shrub with slender, elongated fragrant white, pink, or red flowers.

Babebábe, Pamp.; Balitádham, V.; Nfog-ni6gan, T.; Pinónes, V.; Tal6lon (Marinduque); Tangálon (Marinduque); Tañg6lon, T., V.; Tañgfilon, T.; Tartarão, II.; Tortoráoc, T.

R.

RANDIA. *(RubiacecB.)* Shrubs or small trees.

Bayábar áso, Pamp.; Malabacauan, T.; Malacafe'', T.; Malacârpa; Táñgo-tfiiiigo.

R. CUMINGIANA Vidal. Palo-pálo, B.

R. DUMETORUM L. Sinampâga, T.

RAUWOLFIA. *(Apocinacew.)* Shrubs or small trees.

Curcane*la (Albay) ; Lipáta, T.

R. AMSONI/EFOLIA A. DC. Mai adit a, T.; Pandac&que lalaque, T.

RAPANEA PHILIPPINENSIS Mez. *{Myrsinacew.)* A small tree.

Calum&nay, T.; Tanfgad (Dinagat).

RATONIA MONTANA B. & H. (*Bapinddcece.)* Shrubs or trees.

Guislan, T.

RHAMNUS. *(Rhamnaceoe.)* Shrubs or trees with ultonnte loaves and small berry-like drupes.

Bical, II.

R. wiGHTii W. & A. Cabatlti, T.

RHAPHIDOPHOBA. *(Aroideoe.)* Amfilung, Cag.; H6log, V.; H6tog, V.

R. MONTANA Schott. Dap6ng-tibfitib, T.

R. PERTUSA Schott. Dayta, V.; Mámao (Jolo) ; Pacpác-lâuin, T.

RIIAPIS FLABELLIFOBMIS Ait. *(Palmw.)* Anáhao, T.

RHIZOPHORA. *(Rhizophoracẽw.)* A constituent of the mangrove swamps. Petals, four.

Biuas, T.

R. CONJUGATA L. Bacâuan lalâqui, T.; T6iTgog, V.

R. MUCRONATA Lam. Bâcao, T. V.; Bacâuan, T.; Oóiiïgon, 11.; Parâcan, II.; Pel6tan; Pototân; Tañgâl, T.; Tigasân.

RHODAMNIA GLABRA Vidal. *(Myrtacece.)* Small tree or shrub.

Gas-gâs, V.; Guis-gfiis, T.

RHODODENDRON ROSMARINIFOLIUM Vidal. • *(Ericaceae.)* Small shrubs, found on the higher mountains.

Vicbfqui, Ig.

R. VERTICILLATUM Vidal. Lopfing, Ig.

RICINUS COMMUNIS L. *(Euphorbiacew.)* The castor oil plant.

Lansma, T.; Lifigaslna, T.; Tâñgan-tâñgan, T., II.; Tavatavangsfna, II.; Tawatawasifiga, II.

ROSMARINUS OFFICINALIS Linn. *(Labiatew.)* The rosemary, introduced from Europe, cultivated and (?) spontaneous.

Romero, Sp.

ROTTBOELLIA MURICATA Retz. *(QraminecB.)* Stout coarse grass.

Timsm, T.

ROUREA. *(Connamcem.)* Trees or shrubs, sometimes scandent, with odd pinnate leaves and axillary paniculate inflorescence.

Ibaibân, T.

R. HETEROPHYLLA Planch. A scandent shrub with small white flowers and red capsules.

Camâgsa, T.; Camfigsa taguflis, T.; Camûmin, T.; Gulcos gufcos, T.; Gurayâcan, T.; Hanmababâo, T., V., Pamp.; Magtâbig, V., Pamp.; Mavindâto, V., Pamp.; Palosânto, T.; Ungâli-na-pulâ, V., Pamp.

R. MULTITFLORA Planch. Malacahuc, T.

RUBUS. *{Ro8acew.)* The raspberry. Several species are found in the Philippines; berries usually rather tasteless.

SabnGt, T.; Sapnft, T.

R. GLOMERATUS Blume. Dagâmit, V.; Sapfnit, V.

R. PARVIFLORUS L. Dagûinot, V.

R. ROSIEFOLius Smith. Sagmlt, T.; Saplnit, T.

RUTA ORAVEOLENS L. *(Rutacew.)* *A* strong-smelling herb, cultivated.

Dûra, V.

RYPAROSA LONGIPEDUNCULATA. *{Euphorbiacew)* Bufigânon (Tinago).

S.

SACCIIARUM OFFICINARUM L. *(GraminecB.)* The sugar cane.

Agbo, Cag.; Cafia-dfilo* Sp.; Quilalil, V.; Tub6, T.

SACCOLABIUM. *(Orchidacccv.)* Epipyhtic orchids.

Manâgo, V.

SACCOPETALUM. *{Anonacece.)* Trees.

Calabûyo, T.

8. LONGIPES Vidal. Daiiglûc, T.; Lanûtan, T.

SAGERETIA. *(Rhamnacew.)* Shrubs with rigid or scandent branches and very small sessile flowers.

Adadfnco (Benguet).

SALACIA I'lUNoihis **DC.** *(CetMtrae&B,)* **A large climbing Bhrub** with **coria-** eeou- **leaves.**

SSftttog-olang, T.

NALIX \/.\ui\-.\ **Blanco. (Quidf) Baileej Tiaun, T.**

SA\i.\»i:it.\ i.MdL'.v **Gaertn.** *Sintur»* \ **small** tree with **fleshy leaves and k>n<r peduncled many-flowered umbels.**

Dai:'r [Htt. V.: **Lin&tog&IHte, V\j LintOn-gfl. . . . i, V.: Mongol,** I'.: .U.'uiun-gfll. **T.,** H.. \.. **Pamp-; MauIng-d&tO) V*; Palagarium, V.; Palfigium, V.; Ponoan,** V,

>\\ii;iirs .I.VVAMIA lilunt»>. *(0aprift* **A straggling shrub with corymbose inflorescence** ;iml sumii white (lowers.

Hagfinoy-sa-bflquid; Saflco. • •

SAITOOBJCI U \ id si.ii Merrill. *{Meliaww.)* Trees with **trifoliate leaves** and fleshy fruit-,

MalaeanWl, T.

s. ***vsmcuu*** **L.** A trot[1] **cultivated tor its edible** fruit.

SantOI, T., ***V.*****\ Bant6r (Zamboanga).**

^wrmiA. *{Burseraoece.)* **Balsaniiferous fcreea** with **alternate** trifoliate **leaves,**

AIKU-. **T.; Bclao, Pamp.; Balao, T.j Paotan, T.**

SAPI Mirs, *(Sapindacea.* i **Trees.**

Atalapflpi, Z.; Baloc; Sansali, T.

S. TL'IW.'ZAM MIWII **Vid. Cas£ben, II.; Catlguis, T.j CSosibdo, II.: MalapalU** |iii. **Pamp.; Malapatpltj Pa]icplc-plto, Pamp.**; Punosib^n (Tiagftj) : **TiqulB fciquls, T.; BawaAli.**

SARCOCEPIIALI'S **OOBDATUS BSiq.** *{Rubiacece.)* *A* tree **with** gloijose heads of white flowers. •

Bancftl, T.; BancjU-cfibog; Bangeal, T.j Bnlala, IL; Cfib«f<; **OAbag bambabaloa, \'.; SambabftlOB, T.j Uab&lot, T.**; Nambabfllo».

SAUBAUJA. *iTernstroeiMac&x.)* Trees or shrubs **with** the leaves approxi- **mate** at the ends of the **branches.**

\£asipOn, (';i^'.; Panoddfas, V.: Pura, B.

SAUROPUS **ANUBOGTin B** Merrill. *[Euphorbiaeece.)* **Binabfan, T.**

SC **EVOLA** KoKMuii V'ahl. *{Goodmoviacew.)* A small shrub **with** -tout **branches, tufted Leaves** mid pale blue Mowers, common **on the** sea-shore.

Baloc-baloc, T.; BocAboc. T.. V.; Bosboron, T.. V.j **B6to, T.. V.; Uflog, Z.j Mo8bor6n, T,, V.: PasabiHong; PanabOlong, T.j V. j Pana-bfllung, \'.; Pang^iilgtfilongj r..** ***V.;*** **fagustUs, V.**

ScHlzosTAOHroM, *{Gramine<B.)* **& bam}**....

Balfcao, \.

S. \«':r'n!•'!,<HUM Munro. **Bocatiay, T.j Cftnflyan-booatdj Cauayan<osul** i **'i IIi \:. 11 tayo-uanae** (Tayaim*t*

18. ::i.r\)i:i {fefes. ('iniayiiii•i-lifna.

SOHIZIC

Dapaft, Pai&p;; UataraatA] B. Carabdap.

SCHIZAN ,,i\ AIIIKAIA **Willd,** *iOruoifentB.)* **Saptnit, T.**

BCXBPUS. *{Cypeiaceq.}* **Usually coarse rushes, growing in wet** soils.
I '1 .ttiii]u\. T.: **Canubsfiban, T.; Ublran, T.**

N. *vast* KOSATA L Bal&dgud, T.

SCT.BRTA. ***{Gyperaoeai.)*** **Slender or coarse grass-like** jiliiuts. in **wei** soils.
Anlr. **T.; BaroqaeTwc, T.: Daat, T.; Dat, *V.;* Daut, T.j Haras, V.**

BOOLOPIA. ***{Biwaceee.)*** **Spinous trees** \\itl> **alternate entire leaveB.**
Payne, T.

S. OSKWATA 0k)8. Bitauhol, T.; Bitfingol, T.

S, 1).\SV.\.\THKK,\ liciltll. Si'lUU s;'iu:l.

S. ROXBiraoHH CIos. Agaa-as.

SCOPABL* mi.cis **L.** *\Sn-></>liul<tn<t<v'<.* A **much-branched** herb with **numerous small** while **Rowers, common in t»|n-Ji places.**
Chacha-chachfichan, r.; MaJaanla, Pamp.; Sa&ng cabftyo, T.

SCYPHIPHOBA HYURoi'iiYM-ACEA C;n-itiL. *(R-tibiacei?.)* A **glabrous tr**ee **found along the Beashore with** poriaeeoua **leaves,** the yomig **branch**es viscid.

Mauilail. T.; N'Hail. T.j Xil»r. T.j Pipislc, T.; Sabasa, T.

SELAdiNiiLLA. *(SeUigiwrll'n••< <r.)* Crocalfisay; Dans6. T.

S. t-Ai•].!•>, i **sg Spring.** Atofttong, Ig.

SRMECABFUS. *(Aiwcardiacra:)* Trees.
Angfls babfie, T.?; Camlriiig, 11.: Lftbidltibid, B.j 1'ahfltan, T.

S. A.\At•Aitini M U f. Anagas.

S. QiQARTiroxJA \iiijil. Leaves 3 ft. long or **more,** crowded at the tnds of the few **branches.**
MaUbftlflbai v. Toeudrlangit, T.

s. MAcMn-n HI A Men-ill. **Leaves obovate, j to - ft. long.**
Pfpi. V.

S. PKKHOTTI.:TIi **March.** Uiijjas; AIULM-. \".: **HulinhAsay (Abra) \ Bftgnao** ; Ingas; **Lafigaa, *.; Legaa, T.; Ligaaa, T.; L%as, I.-. L6figas** (Cebu).

SKIMANTIIES unAMiu.-t.i>i:\ llciith. *i Lciju>»inuxete.)* Unarmed tree witli bi-pinnate **leaves and large yellowish** llowers.
Tonoc.

SESAMUM INDUIM L *\'ti!<iti)n<r,)* An **erect herbaceous plant** with **white dowers,** cultivated and spontaneous. **The** seeds yield a valuable oil, **known in commerce aa Betfamum oil.**
Lana; **Latiga (Cag.) ; Lan^Ts,** Pamp.; JjanftiTjifl. **T.j Lafigols, Lfingn***
T.J Liiiga, **T.: l.fii-.i: L6l!ga, V.**

SESBANIA Al:<,Yl-Ti.u \ **P«Ttt.** >. /,• *•mminns,-,}* .* \ -liruli **with** palt> yellow ll0VVt'l>.
Malacaqulos, T.

S. GRANDIFLORA **Pera** *A* si i in 11 tree with very large white flowers and **slender pods** ;i foot in **length.**
Catnrai, T.j Qfluay-gauay, \ .; i;nuny-gauay iiga pula, V.

SKBUVIIM **FOOT LA)** ASTUI M L. *(Ficoidew.)* A **succulent** branching herb, found along the **seashores.**
Bflang-bflang, V.; Carampalit, Pamp.; Dampalit, T., V., Pamp.; Ta-rumpalit, T.

MJ M; A GLA' CA Beauv. (*Gramineae*) "Pigeon grass" of the United States.

BGntot-pusa, T,

S. ITALICA Beauv. *{(Iramitwce.)* Italian millet; cultivated.

Bicacao, El.j Bordna, Pamp.; Hucacao, II.j Daoa, V.; DAun, T,, V.: Dfivu, T., V.; Mijo (Cebu).

SHOBBA. *[Di/ptoroaarpaoeai.)* Large trees, valuable for their **timber.** Calyx in fruit with **an** obscure- **tube,** two segments enlarged.

Alfi7J>ad, Pang.; Banbayan. II.; Batitman, T.; Binalfuan, T-j Bftie. T.; Bufean, T.; Patindfngan, T.; Danlfg.; Dfiyong. It.; Maeafisin, V.; **MangasinOwj, /.; Palos&pis; Pauhtpi, T.j Tafigfli, T.; Tiaui,** T.

S. *ovisn* **Blame.** Catfipang; Curucat {Nucva Viseaya) ; Curyfio {Nueva **Viscaya)** ; Gitljo, T.; Ouislhang; Gulso, T.; Cruisfie, T.; Samy, Cag; N ;)ltili:'ui. I!.; *7JiIvi,* Cag,

S. MAI-AANO.NAN Blume. Malaan6nan, T,

S. MANGA< **KAFI** Y K. Vill. (Jufsong-ditflo, T.

SIDA CAHPINIFOLIA **L.** *{Maiv&oea).)* An uniifrsiiruh **with** yellow flowers.

Es**eobaghaba, T.;** liigotbalfito, T., V., Pamp.; **Pamftlia, T., V.. Pamp.;** Silliigdn, V.; Wawalisan.

S. FHUTESCENS Blanco. MamOlie, T., V.. Pamp.; Taquing-bnea, **II.; Taqnfng-**bftca-baca, II. j Uaualisfn, T,, V., Pamp.

S. HJIOMMFOLIA *h.* Bfiseng-bflseng, V.; EseGbaiig-liaba, T., V., Pam]>.

SIDEROXYLON. i *Xitpotacece.)* Trees, some species yielding **gutta-pei'dftu**

Acfina; Dolltan-pacfitan, T.; Dol6tan-pulfl. T.; Miiniiunncas, T.: ^^)^^l manefis-na-lalaque, T.

S. i: vurin'iAN niimeo. Balitbftan, T.

S. cltfEREUW L. Duelftan.

S, in CLITAN Blanco. DucHtan, T.

SIN **DORA.** *[Legumino8e&.)* **Tie**

STftoot, Z.

S. WALLlcim Benth. A tree growing near the seashore, calyx beset with soft bristle-like processes. Pod armed with wtout <|ii•:

Malapaho, T.; Manfipo, B.; Paimo; Pamalallan, Cag.; Pancallmi, Cag.; Snpa,T.; Yfical-dilflo, T.

SMM.AX. *ILilifUtea:)* < limbing shrubs with nlterrmte 3 to 5 nerved leaves and small dioecioua flowers.

Eampas-tabalang, T.; 6bat, T.; Rrtnas; Tiglullung, T.; Unclon.

S. oniNA L. Biinag, V. T.; Bftrag, Pamp.; **Cbi-ubfhan, T,**

S. orvAKrcATA Blanco. Himpns-lagbalnng.

S. INDICA Vitm. Banagan, V.; Camagsa, T.; Olfing, T.

S. ***XJUBJKU2A*** Bluiico. Sfpit-olflg.

SOLANTM. (*Sohinacem.)* Herbs, shrubs, or small trees, spinouR or **unarmed.** Kruit a berry.

Talampay, T.: Tal6n7>on, T.

S. FKROX I.. **Tagtltong,** V.; Talong-gflbat, T.; **TaramWlo$_3$** T.

a

MELONGE- \ L. The egg plant, cultivated.

Talbng, T., V.

S. NIGBUM L. A common weed with small black berries, used in medicine.
Bolagtáb, V.; Camacamattean, T\; C6nty, T.; Cfinti, T.; Cûti, B.; Gamagamatfsan, T.; Hulablûb, V.; Lagpfccum, V.; LubMubi, T., V., B.; 6nti,T.

S. SANCTUM L. Tâlañgbûlo, T.; Tfiñgan-tâñgan, T.

S. TUBEBOSUM L. The potato, cultivated in the mountain regions.
Pápas; Patfttas, Sp. Fil.

S. VERHASCIFOLIUM L. N6og-n6og (Cebu) ; Tabáco tnhncôhan; rng-ftii. V.

SONNERATIA PAQATPAT Blanco. *(Lythracew.)* Tree, growing in and on the borders of mangrove swamps, with broad leaves and rather large flowers.
BunAyon; Bufïgálun, V.; Daltiru-laláque, B.; Pagatpiit, T., .V., B.: Palflpad, T.; Palatpát, T.

SOPHORA TOMENTOSA L. *(Leguminosew.)* A small tree with leaves densely tomentose beneath and yellow flowers. Common on the seashores.
Bañgll, T., V.; Barauraftran, T., V.; Cabaicábai, T., V.: CAuai, T., V.; Gufson, T., V.; Mangfiyao, B.; Mantâla, T. V.; 01a6mag, T., V.; Pañgaláfigan, T., V.; Rocnfihan, T., V.; Sandalaitán, T.; Tambala-gulsai, T., V.; Tambalisa, T., V.; Yflbag, T., V.

SOBGUM VULGABE Pers. (*OraminecB.)* Cultivated, "sorghum."
Batad, V.

SPH^BANTHUS AFRICANUS L. *{Compositw.)* A low annual, the branches winged, whole plant fragrant, a weed in waste placos.
Talababáco, V.

S. INDICUS L. Differing from the preceding in its toothed wings of tlio branches and other characters.
Samb6ng-galfi, T.

SPHENOCLEA ZEYLANICA L. *(Gampmulacew.)* An annual erect herb with axillary and terminal spikes, common in rice paddies, swamps, etc.
Silisilfhan, T.

SPILANTHES ACMELLA L. *(Composit(P.)* An annual erect or ascending herb with solitary or panicled heads. Much used in medicine.
Ag6noi, V.; Hag6nog, T.j Hag^noi, T.; Palûnag; Palrtnai, Pamp.

SPINIFEX SQUARROSUS L. *(Gramínea.)* A very coar^o trailing grass with spherical, spiny inflorescence; very common on sandy seashores.
Báqui-b&qui, V.; Damfin-dagat.

SPONDIAS MANGIFERA Wall. *(Anacardiacece.)* A glabrous tree cultivated for its edible fruit.
Alubfhod, V.; Alubllion, T.

S. PURPUREA L. Similar to the preceding, introduced from America.
Cirûllas Sirihfielas, T.

SPONIA. (*Urticacece.)* Hanftrion, T.

fiTOPHEGYNE. (*Rubtocea*.)* Shrubs or small trees with globose inflorescence.
Anftag, T.; Calamansftlai, T.; Calamansfll.in, T.; Calammsflnai, T.; Ch^che (Nueva Viscaya).

S. DIVERSTFOLTA Hook. Mamb6b.

S. SPECTOSA Korth. Mamb6g.

STERCULIA. *(Hterculiacece.)* Large trees or shrubs, with simple, palmately lobed or digitate leaves.

Amlántf, T.; Anahánon, B.; Bácan, T; Balabónot; Busáin, V.; Maglolópoy, Z.; Malabunót, T.; Malacaciio, T.; Mai aut not, T.; Panaquitfn, T.; Tucfm-cAlao, T.

S. BALANGHAS Blanco. Balánghas.

S. FCETIDA L. Leaves digitate. The seeds yield a valuable oil. The flowers have a foetid odor.

Bañgár, II.; Bdbog, V.; Calompán, T.; Calúmpag, T.; CalOmpan, Pamp.; Calfimpang, T.; Calúmpang; Calfingpang, T.; Caumpáng (Jolo).

S. OBLO^GATA R. Br. U6s, B.

S. RUBIGINOSA Vent. Náto, T.

S. STIPULARIS R. Br. Malabonót.

S. URENS Roxb. Banflad, V., T.

STEROSPERMUM. *(Bignoniacece.)* Trees with 1 or '2-pinnate leaves and large lax terminal panicles.

Bfbit-pArang; Macatdray; Malacatúray, Z.

S. PINNATUM Rolfe. Bánai-bfinai, T.

S. QUADRIPINNATUM F. Vill. Ansóhan, V.; Badlán, V.; Bánai-bánai, T.; BAnai-bftnayan, V.; Bánay; Banáyan; Baticulin, T.; Bátlan; B6-tong-man6c, T.; UimbabAon, T.

STREBLUS. *(Urticacece.)* Shrubs with small harsh leaves.

Bflc-bóc, Pamp.

S. ASPER Lour. Alasis; Alddig, II., T.; Am pas, Pamp.; Balañglquin, Cag.; Bócboc, T.; Bógto-tAe, V.; Cacádle, T.; Cálios, T.; Cal6is; Calúis, T.; Malaiptitai, B.

STREPTOCAULON BAUMII Decne. *(Asclepiadacew.)* Twining tomentose shrubby vine.

Dugtting-áhas, T.; Parongtóng-áhas, T.

STRYCHNOS. *(Loganiacece.)* Trees or scandent shrubs. The fruit of several species yield strychnine.

Cabucabulâuan, B.; Malagarâyat, T.; Tâlang-fndong, B.

S. GELEBICA Koorders. Bugájin, V.

S. IGNATII Berg. Fruit large, spherical, medicinal.

Agufison, V.; Cabaltfñgan, T., Pamp.; Catal6ilga, V.: Oitbilonga; Dancági, V.; Canlára, V.; Frúta, Sp; Fil.; Igásud. V.; Mini-nAog, V.; PafTgaguason, V.; Peplta, T.; Pepfta-de-San Iffnácio, Sp. Fil.; Pepfta-sa-catbalonñgan, V., T., B., Pamp.

S. MULTIFLORA Benth. Bfttul, T.

S. POTATORUM L. f. Cam6tin, T.

SUMBAVIA ROTTLEROIDES Baill. *{Euphorbiacece.)* A tree with stellate pubescence.

AlipAro, T.; Quirap, T.

SYMPHOREMA LITZONENSIS Vidal. *(VerbenacecB.)* A scandent shrub with capitate peduncled cymes, with an involucre of 0 bracts. Flowers [1] blue or purple.

'Balfbai, Pamp.; Malabulfion, Pamp.; Malascfyr. T.; Paraulaclfiquin, T.

SYJIPLOCOS. *{Stryaeew.]* **Treea** *or* shrubs, **often** drying **yellow. Species** many in the **Philippines.**

Calomansôla, **T.; Ltba»-Kbas; Uaragahtilo, T.; Matslapay, B,**

T.

TABEKN.J-\\I>\ **I w \,** *{Apooinaeeee.)* **Shrubs with milky sap, white flowers, ;IIKI red fruitsj much used in medicine,**

tris, Man?.; JandaymgoOt, V.; Saplt-usfi (Albay); Talonleay, B.j Tampltpot, T. Ttacal, \.

T. CCMINUJA.VA **A. DC. Salibutbflt, 1!.**

T. OLOBOSA 111 unco. Fruit globose.

Bayag-usa, T.

T. I'AMIACAQUI **l'oir. Fruit** elongated.

Alibi'iiiut. \',. 0amp6pot, T.; Curribiifitbuet, II.: Pandaeâgue, **T.; Pandacaqui, '\\. V.. Pamp.; Pandfiya, V.j Toftr, V.**

TAOCA. *{Taccaoea,)* **herbaceous plants from a** creeping rootstnlk, the scaipe **teafiess; Bowers ambelled.**

Panu^isut-it-niiinatftd, V.; Trtncut-lailguit, T.

T. PALMATA **Blume. Majrsali>ro, V.**

T. PHTKiTTBIDA Forst.

Caafibong, V.; &Iags&l6rofiga.-dacfl, V.; Panarie"n. II.; Pnuniri^n, II.: Tayftbco^, V.

T. ittM iLi ii. Scliauer. Bitgong, V.; Bagong-bagong, \.; CaMloo^, V.

TALAITMA. *{Magnoliacea.)* **Trees or shrubs with large white flowers and larjje fruits.**

An&biong (Tayabas) j ' aeflo-cflaloan: Macalasealaa, B.

T. AM;ATKN^IS **F. Vill. infbong, Pamp.; Anul>l)Ti}r. T.j Anftblisg, V.: Baliciisan, T.. \.; Mtalicaacfisan, V.**

T, VTLi-AitiA.vA Kolfe. AnOblinj^, T.

TAMABTNDCS INI>ICA **Linn.** *(begum inoscr.)* **\ fcree frith straw-yellow flowers. Seeds embedded in an edible pulp. The tamarind,**

Cunalagui, **V.; Macasampiiloc, T.j Salomfigtie, II.: Salumfijjttij II.; Samalagai, V.; Sambac, U.: Sninbs'i^, V.;** Sambâgui, **\.; Baiabalagai, \".; Sampalfigui, li.: Sompftloc, T., H..** *fbmp.;* **SumaUgui, \'.:** TiNiiiu-liido, Sp. RL

TABBIEHA SVIAAIICA **Merrill.** *[Sterouliacea!.)* **TaU tree with leaves white l.wieath, fniii winged. A valuable tutibei tr<**

Oufgfil; Diiir-nn: ihiir-on: lJinigun, T.. V.; DuiTfcrui. V.: Palonapin; L'ulonfipoy, *'A.;* **Puroniipiit. II.**

TAXOTROFIIIS **11.ifiK01.iA V'icUil.** *{VrtigaoetB.)* **A small shrub with glo leaves similar to "holly."**

Cfiyi-cfiyos, **V.;** .\l.il;iiiniu!i.

TEOTOITA OSAKMB **L** *I {Verbenaceee.)* **A** *Uir^t-* **fan late tomenti leaves large ovato, inflorescence paniculate, fi**

Calayâte, *V.;* **DalAnnn. V.; Dwlandnn. V.) Dilondfln,** *V.;* Sagunyate, **\ j r«oa, S|>. Fil.; Tfda, T.; Yate, V.**

TEPHKOSIA. *ILegwninosece.)* **Herbs or t**undershrubs.

Dacundang, V.

T. U ZONENMS Vognl. **Herbaceous,** prostrate.

Dagan **gdang,** V.; Miiasfc, Pamp.; Tagum-tfigum, V.; Tiiyomi ayômaru T,

TKKHIINALIA. *(Combrelacea:.)* Trees **with** loaves and spicate inflorescence **approximate** :it iln- **ends of the** branches.

AritOngtong, 11.; Balitdaon; Bilung-dalaga, T.; BinOlo, T.; **Binfllo,** T.j Cain may on, T.; CalamitUt: **Cal-auttit,** 11.; Dtglfla, T.; DalSnse, T.; **Dal&uin, T.: D&mpftl, T.;** Dinglaa, **T.fj Gat&san, T.; Lifipa,** Z.; Ma[arupfilu. T.j **Magarfl&o, T.j tfalagahftnip, T.j JCalaputat, T.j MalABftcpt, T.;** Malatallsay, V.; N **Ltob, T.:** ***Pait&n,*** **I.. Paitan; Sacftp, /- : Boboaabo,** T.; Tagftgon, Z.; Tafigfsan, T.; Taiigal, B.; **Tug6-gong,** Z.

T. CALAMANSANAY ilultV. A iifie with winged fruits.

Bancalâguan i; **Bajtyftlauagj** V.; Dunculrumn, T.j **Calamajuinai,** i.: Lumâno *l,* V.; Mnlaculfimpit, \i.

T. **c** ATA IT A JJ. **Commonly** cultivated for shade tree, fruit **edible.**

A-ltrnftidro, Sp. Pil.j Banllac, V.; Dalflru: Dalinsf, Fl.: **Callsai, Pamp. j Dallgay** (Mindanao); Hintan; **Hltam,** 7.j Lflgo. II.; Nflto, V.; **Pandfin,** II.; Salaysfty; Salfsay; Talfsay, T., V., Pamp.

T. EIX/LIS Blanco. A forest tree, fruit edible.

Calomplt, T.; Calumfinog, V.; Calumplt, T.; C6tmoc, B.

T. NITENS Preal. Sacat, T_T

TKHNSTROEMIA. *(Tf-rnstronmitKear.)* **Glabrous *evergreen* trees with leath** cry Ipuves.

Bltcae, **T.j** CianbOg-ttlgba.

T. TOQUiAJf P. Vill. Garamansfltay, T.; ToquTan, T.

TETRACKKA MAtKDi'iii i LA **Wall.** *[Ditleniaccw.)* *A* shrub with rigid soabrid leaves.

MalacatmGn, T.

TinsMEDA GIOANTEA L. *(Gramiftea:)* A coarse, tufted grass, common in open dry lands.

Talafiyo, T.

THEOBBOMA CAPAO L. 18*t<rrculiacetr.)* *A* small tree, introduced from America; cacao or **chocolate.**

Cacao, Sp.

TIIESPEHIA CAMPYLOBIPIION **Rolfe.** *{Malvacew.)* A tree with large (lov.ers. Land tan.

T. MACRoi'UYr.LA Blume. A tree with large flowers, found **neax** the sea coast.

Baiiaga-pula, T.; Banflro (Pang.) ; Bannfigo, T., V.; Bulaoan, V.

T. POI'I;LNI:A Corr. **Very** closely related to the preceding.

Bfiboi-gflbat, T.j **Bftbuy,** T.; **Banftlo, T.j** Rrtljoi-grtbat, T.; **Bflbuy-gflbat,** T.; Mill.,,in V.; Malibago, T.; Malusantul, T.

TIMONIUS PHILIPPINENSIS Merrill. *[Ilubiacea:)* A Bm;ill **b**ee.

MayOro; **Payale.**

TINOSPORA OHISPA Miers. *{Menispertn«-* ...) A **cUmbing shrub with** ovate cordate leaves and **single "i fascicled racemes.**

Macubuhiii. T.; Paliftvan, V.; Panavan, V.; PaiTfiriftvan. \'.

TOUBNEPOHTIA. *(Borraginacetr.)* **Patfgas,** Pamp.; **Sallocapo, II.**

T. AI:I.,I,.n \ *It,* f. A small **shrub** with thick brandies, densely pubescent lcavea, and **numerous** small woolly flowers, found **on** the seashores.
Balacbalac, V.; Minii'ml. V.

T. SAKMENTOSA Lam, A **woody,** climbing vine.
Calaguiljv-ng, V.; **Pfttftl-fiod,** V.; Sallauftpo, II.

TRAI in i.<isi-i;i'MiM. *{Apocinaccte.)* Climbing shrubs with white or pur [Wish flowers.
Buyfieto, B.

THEMA AJII;U!\) ,NSIS liiiunc. *(UTticacew.)* Shrub or small tree with tomentose leaves.
Antibfon, V.; Hanfirion, T.; Hinagdfing, V.

THIANTHEMA MONOOYNA L. Aynm, V.; Tost6n, T.

TBICHOCARYA. I *itoNucea:*) Loetdn.

TIUCHODKMMA ZEY1.ANK1 M R. Br. *(BorragiiKwew.)* A coarse hispid **herb.**
M.iltfilo, T.; OlongAin.

TRICHOGLOTTIS itic;in.\ liliinii-, 1*1>rchidacifi.)* An **epiphytic orchid,**
Sangumli, T.

TRICHOSANTHES AMARA L. *{Gurourbitacea',)* Bflyo-brtyo; Caragda; lga-
-.in.

T. ANin IN \ I.. A **herbaoeoufij climbing! vine, cultfvated.**
CueuWtan, T., V., **Pamp.; Ooragdft, V.. Pamp.;** Hfila-hnla, T.j Hothot, T.j **Poodpis,** T.; PocotpOcot, V., **Pamp.;** Pucopucot, V., Pamp.; **Salagsalag, T.** 5 Salimpficot, T.

T. OLOBOSA Blume. Calflnum m \.

TBIPHACEA AUK.W 1 Kti.A **Lour.** ***(Rutaaece.)*** A shrub or small tree.
Limonftto.

T. TKIFOUATA DC. IJIllOllCftO, Sj>.

TaiSTELLATEIA AUSTHALAMIUA A. Ricl). *(Mdlfiliiii* **ttdctli** slifub with yellow flowers, found near the son shore.
Bagnit, T.; Bflguit, B.; **Bixftisfel,** T.; lbud-Ibud, V.

THISTIRA TitiiTKitA Hiiillk. *ISupindacece.)* Large tree.
Cahoy-dalaga; Maladlae.

THIUMFETTA SEMITRILOUA L. ***[TitfaoeB.)*** An herbaceous plant with globose **priddy** fruits.
Ciilfttang-bilOg; Col6tan, T.; Darac6t, V.

TURRAEA viRENs L. i*Iturseracew.) A* shrub or small tree with axillary **peduncle!** bearing elongated white or yellow flowers.
Igufa.

TYPHA ANtiusTirm.i v I.inn. *(Typhacea:)* Common in wet, open soil; "cat t:.il flag."
Baiafijvot, T.; **DiUng-butlquI, T.j Homai-hotnli, 7.; Lampaoftnai,** V.

TVPHONIUM tu\Ai:it'.\Ti-M Hi-fin-, i *Aroidea:,)* **Tuberoua bei**
Lbi-gabfflfibi, T.

U.

IM\.T\. (itttfeiooea). Climbing shrubs, the dowers in loose globose lie:;

' anauay, 'I'.: llii^Aiioj;; **Quilap,** T.

I. AI l.)A Koxb, M:n]i])i'l. V.

U. HOOKKHI Viil. **Baluotttu** iMorong).

I \O.N A. i. I *nomirrir.*) Trees ov shrubs.

Amfiyon **(Tayabas) ; Cfibog, T.j Caboy, SuBong calabao, T.**

U. OIIOBATA (?) DC. Alilynii **(Angat).**

LIKENA, *{Mnhiifcrv.* \ **Herbs <>r undershrubs** man' **or teas** covered with rigid stellate hairs.

Mankft, T.

U. -i\r.vTA **L Blowers pink.**

Col6tan, T., \ .. Pamp.; OolO) colotan, T., *V.,* Pamp.j < nhnulniau, **T.;** Culûtan : **Dalflpan, T.. V., Pamp.; Deldpang, V.j Molopfilo, T, V..** Pamp.

UROPH YI.LIM **QLABBUJd Jack. *IBubiacece.)*** A shrub or ^111:1 **II tree.**

Do&tlo : -Mujrlimueon.

\ Ti:unr.ARiA FI.KXI:OKA **VahJ.** ***(LentibulariaG&gi,)*** **,\ Boating herb with yellow flowers.**

I oftta i **Bulacan).**

I ** WUA. *[Anonaoete.)*** **Trees** m[1] shrubs.

Sfisong"dainolag, Pump.; Tan"glaan, T.

r. ***ouuaiB*** Uiinal. **Balaganum, W; Dalagao,** V.

I', OVALIFOLIA Blume. **BulfigaOj 15.**

U. FOBPCBEA Blume. Banauac, 'l'.. V.: Sasong talabuo. T,, V,

V .

\' \ I I I M I M **BAKANDAOTTM** \'i(lnl. *\ Eftrttcf tr,* **SIM'IIIJN nr iiiMlershriilis of the higher mountains.** The "blue **berries*' of** the **United** Slates.

Lftsong (Ive]»:ni!o).

V. i.vm TI M \iiiii. **Banuay, [g.; Bunu4y (Bontoc),**

VALLISNERIA -rniAiis L. *| II t/ilroc/Hnitliu-rtf.)* A **submerged** marine Ilerb **with** verv lnnjr linear leaves.

Cintas-cin **tasan,** T.

VANDA [i^MiiiiiDiDES Undl. *iOrchiiliirai.)* **An epiphytic orchid.**

Sûl»ihi. **I.**

\ **\M,I** KI:I \ **BPIJIOSA** Knxb. ***(Rubiaeeof.)*** A shrub or **small** tree **with** minierous spines and small **edible drupes.**

Madondon, T.j xMalaiisis, I.

VAT **u'A.** ***[Dipterocarpaceat.)*** **Large trees yielding** valuable timber.

Baenog, I'iin*:,: **LAuan-narpulfl, T.j Ihlalacban, T.j 5faeal-puti, T.**

V. MANCAmAIM! **Blanco. Mangaehapai,** T.

VERNOMA, ***{Composite,)*** **Herbs, shrubs** or trees.

Ahiui. T. J Fiin^lVni^iin. **I^r.; Sifigon,** Ig.

V. ARitoin \ **Ham.** A simitl tree **with purplish** flowers.

Lnoqnio, Cag.; Piilaliu-inii **(ParagUft).**

V. CHINKNStS Less. All ;tllllllt:ll herb.

Baviiqufboc T, •. **HIpon-hipon, *V.;* Laobtag-laebfing, V.**

V. vihAi.n Merrill, similar **to V. arbore*, but** the leaves densely **pubesoent. Malastfjnbdng,** T.

VERBENA ROKAKTEKSIS L. *{Yerbenacc<E.)* An herb with sessile oblong leaves.

Polêo.

VENTILAGO uADKusi'.vrw \ **Gftertn.** *[Bhamnaoea.)* **A scanderi** shrub with glabrous leaves, **the Bowers in Bimple or paniculate spikes.**

Salapfio, T.; **Sillpao,** T.

VIKURM u **LUZONIOUM** Itolfe. *[Caprifaliaceie.)* A **scandent** ^!irub with **Bagniroro,** V.; I'utQd (Xueva-Viscaya).

V. owm.vns.siMi M **BLer.** Apiit. *[g,*

\ IKALIA. *(Outtifer&z.)* **Trees with coriaceous leave**

Caloc-oatroo; BCagaan, B.; Malasaguin-lalfique.

v*. i 1,1'H.OTA F. Vill. **Palo-marfaj** T.

V. NAVKSII p. Vill. **Palo-marfang gttbat, T.**

Vit;\\. *(i<c(jii»ihi(>,iea:)* **Herbaceous** vines.

liutfiTgni.

V. r\i,!v\<, **Endl. Cultivated, the "cow *wu" of the Dnited States.**

Balfitong, V.j Hamtflc, v*.; LastOn, V.: Quibal,T.; Sftao (Manila).

VILLA.BIA PIni.iITIXEK.sis Rolfc. i *itiiti'mmr.)* slinit>> **or trees.**

Lasgá*i,* **B.**

VILLEBRUNEA. *(Urticaceat.)* **Shraha** or trees.

Alipasfac.. B.

V. FRUTESCKSS Bluinc Aliimang,

VJNCA ROBEA l.imi. *[ApoomaowB.)* A low. iTci-t **tuidershrub with** showy while HI **red Bowers, COD....*m* along** the **seashore.**

CanWtanj T.j Roaaa-aa-babay, V,

VITEX. i I *erbenaoea.)* Trailing or erect **shrubs or large trei**

\....raong, I[1]-- Balauen, Fang.; **Bulaufean, II,: Caltmantaoj Oimu-**bflou. *X.*: **QamoMuon, 9*.j LomolIniQ, 11.: Magftmu (AJbay) j Malu-gagaao, \.: urarasagat, n.; Mulato, I.: Mulauen-babae; Paawiou-**liinan, **B.**j **Salipapa (Albay).**

V. AMKHMANA Mfirill. A **tree** with <rlo9sy leaves.

Ig[1]'"*n<* **T.**

\'. **BXTEBOPHTU \ Rozb. A tree.**

Bagfiarcm, V.

V'. UTTOBAxis Oeonc. A larf:*- **tree,** valuable **for ite timber.**

Amuauan; Aznugfinan; Aiituyj'ion, **Bulaon, T.. Pamp.; Haftiulaon, T., B.; Jamolauon;** Mul.'n.n **(lloilo) ; ifolauin, T.j Molove, T.;** .\Iolávin, **T.j** Miih'niiii. T.; **Sflgfid, II.: Sagat, Ll.j Solincapli, TQga**

V. OBOVATA Tlmiib. A **trailing shrub** with.....**pate unifoliate leaves,** common **on** ilio **seashore.**

Agu**bftrao,** *V,* **Sapas-gapas, \'.: Lagflndo, T.j [agundlng-gapang, T.**

V. NEOUNDO Linn. An **erecl shrub with** ''>-t''<li;ii<- leav

Aguocasto, Sp. Fil. Vit. ft mil. T.j **Malawin, 'I'.: Molavin. T.**

V. pHUJppiwEJrsia Merrill. A **tree** with **large 5-foliat« leave*, the petiole** broadly **foliate toargini**

Bull-ofthoy.

V. TftiFOUA L. An **erect** shrub *or* small tr....*m* **seashore.**

DfitTf>!ot. II.; Lagiiiidfn-dagat.

VITIS. *(Ampelidncete.)* **Tendril-bearing woodj vines. The grape and the "w....i bine** of the United States belongs to thin genus.**

Sugpon sugpon, \'.: Tnauntfng, V.

V. CAPBIOLATA Don. Ayo, T.

V. CARNOSA Wall. Alaiĩgfñgi, V.; Áyu, Pamp.; Cagulndi, V.; Calitcâlit, T.; Cavllan, T.; Culutpámo, Pamp.; Lagĩmi, V.; Lafĩgfñgi, V.; Lúpo, V.; Pac6pod, T.

V. GENICULATA Blume. Ldbas, Pamp.; Sampáng, T.

V. LATIFOLIA Roxb. Bfca, T., V.

V. LANGEOLARIA Roxb. Alupfdan, V.; Háyoc (Tayabas).

V. QUADRANOULABIS Wall. Dugdúng-âhas, T.; Súgpon-sũgpon, V.

V. REPENS W. & A. Pirfipit-âñgin, Pamp.

VOACANGA. *{Apocinacece.)* Shrubs or small trees with large white flowers.
Llfa, V.

W.

WALLICHIA TREMULA Mart (?). *(Palmeos.)* Dayáca, T.; Dumay&ca, T.

WALSURA ROBUSTA Roxb. *(Meliacece.)* A large tree.
Galamfny-amũc, B.; Palfng-hufii, B.

WEDERA. *[Rubiacece.)* Trees or shrubs.
Malacafe* (Tayabas).

WEDELIA. *(Oompo8it(B.)* A clambering herbaceous plant with yellow flowers.
Hag6nay, T.

W'KJNMANMA LtrzoNiENSis Vidal. *{Saxafragacew.)* Sáyo, Ig.

WENDLANOIA LUZONIENSIS DC. *(Rubiacew.)* A slirub or small tree.
Laded, Ig.; Lasâlia.

WIKSTROEMIA INDICA Mey. *(Thymcliacca:)* A shrub with subopposite leaves and flowers in terminal subsessile fasciles.
Malasampfiga, T.; Salágo, T., V.

W. OVATA Mey. Arandtfn, 11.

WOLFFIA SCHLEIDENI Miq. *(Lemmacea:)* Minute floating scale-like plant.
Dfigmán, V.; Lia, T.

WOKMIA LUZONENSIS Vidal. *(Dilleniaccw.)* A tree with large flowers in terminal racemes or panicles.
PañgUfnon, Z.; Paniñguin6n, Z.

WKIGITTIA (?). *(Apocinacece.)* Trees.
Bat^te.

W. OVATA A. DC. A tree with pubescent leaves, milky ssip. jind pink flowers, yielding a valuable timber.
Alan6ti; An6tong (Zambales); Lamfsi, C; Lanélc. ⁷\\: Lunfti, T.; Lanfi.si, Cag.; Lanfiti, 11.; Loñgáyan; Lonfti.

X.

XANTHOPHYLLUM. *{Polygalacea:.)* Trees with usually yellowish green leaves.
Bânig (Morong) ; Dáyap-gfibat, V.; Mogb6c, V.

XANTHOSTEMON VERDEROONIANUS Naves. *{Myrtacecp.)* A large tree with exceedingly hard wood.
Mancdno, V.; Palo-de-bie*rro, V.

XEROTES LONGIFOLIA R. Br. *(Juncacew.)* Rush-like plants.
Dftat, T.

XVI.IA. *[Leguminoaew.)* Tall, **unarmed** tree* **with bipinnate leaves,** the flowers in round beads.
Quitaqufta, I).; Tile, Z.

VYLOPIA. ***[Anonacect.)*** Trees.
AniiivMii. **T.j Casffigag, i\ •. Pfllo. T.**

X. DKBZSOENS Merrill. Amfiyon, It.: Binftanj Ca4ai, T.j Lanotan, T.; TaiTgfsang-baglo, T.

XvLossfA ciMiNtili Cloa. *(Hixacecr.)* A tree or shrub.
Amaét, V.

XYIXX'AMU'S OBOVATUS .fiiHH. *[Ueliaceoe.)* *A* small tree frcquei4 tilony **tidal rivers, bearing targe,** sphprinil. woody fruits. Leaves obtuse.
[1] **alumpftflga-sa-lftti, T.j** Mfyi, **Pamp.;** Mfqui, Pamp.; **Nfgi,** I ; Nffjui. **T.j Pifigao, T.j** TiWgi.

X. liUA.NA'n M **Koffnig, Similar** to the preceding, but leaves **acute,**
Calflmpag-sa-lati, T.; Libato-puirt, I.

XYKIS COMPLAXATA R. Br. ***[Xyridacece.]*** **Tufted,** ri^id. **grnss-like herb.**
Cumi "I'imi, T.

Z.

/. vi. M-(\ i in i is Reinw, *{Paltnta:}* **Limoren.**

ZAJfTBOXTtXm AVU'KNNAE DC. {*Jtutacctr,*) Tree or shrub.
B&ga-taxnbfll, V.; Cafigay, Pani]».; **Cayntfina, Pamp.; Marbaar,** *V.* Sfilay, Pamp.; Siihiy **cafigajj Pamp.**

A. OXYPIIYLLUM Edgew. A shrub **clothed** with **hooked prick** les.
Casfibang, II.; Cayutfina, T.; **Sagay-cafigay; Baladay; Sfllay,** \.

ZKA .MAVS *It. {<;iamiiiv.a\)* **Corn, eultivutod.**
Bordna; Mafz, Sp. **HI.**

ZINGIBER. ***iZingerberaoea.)*** **Herbaceous plants with aromatic** too t-stocks, **the** source of ginger.
Baggbay, V., T.j Baflgrfiy, V.j LompAyau, T.j Lanipfryang-itflyam, V.; l.innlfna-fthun. T.; L6y-a, **V.j Lflya-lflya, T.j Luyan ffga** *i^\,* **\ . Lflyang** asn, **T.J Uryaag oaiu,** T.j Mangiay, rump.; **T0tnbong-&s6,** I.

Z. OIFICINALE Linn. Bfisnng, 11.; **Laval,** Z.; Lrtya, T.j **Pafigas,** *'/..*

'A. y.v.ni MULT Itose. Dao.^V.; **Lampflyaaag, V.j Lay*, !• . Timo, T.**

Xi/.Yi'iiis. *[iihinnnticfu.i* Ticca orsbrubs **with prominentlj reined leaves. frequently** armed **with prickles.**
Bfga, **T.j Bofqglfta, V.-, Buiiglfta;**]M;t, *'/..-,* **Diran, • : Talanas,** T.

Z AHBOREA Merrill. A **largi** tree. **Spineless, leaves glabrous.**
Lfgap, T.

Z. n\i\\i\ Blanco. DalantA, \

/. TiiixKitvis Poir. A ti-ce; leaves **pubescent**
Balacat, 'J'.: Bigaa, T-; Dielap; DaolAp, I'-; Lftbba Iftblwi, II.; Ligao, T.

'/., jujtBA Linn. A small **tree armed witfi ibori prickles and bearing** an **edible fruitj** not a native **of** the **Philippines,** Imt **frequently found in cultivation and Bpontaneoaa.**
\l•HI/:IH;I-, Sp. **Kil.;** Mun/;iliftits, Sp. **Pil.**

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BIOLOGICAL LABORATORY.

A PRELIMINARY REPORT

ON

TRYPANOSOMIASIS OF HORSES

IN THE PHILIPPINE ISLANDS.

By W. E. MUSGRAVE. M. D.,
Acting Director Biological Laboratory,

AND

NORMAN E. WILLIAMSON,
Assistant Bacteriologist. Bureau of Government Laboratories.

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TRYPANOSOMA AND TRYPMOSOHIASIS, WITH SPECIAL REFOTCE TO SURRA H THE PBILIPPINE ISLANDS,

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Hv

W. E. VIUSORAVE, M. U,

Acting Director Biological Laboratory.

AND

MOSES T. CLEGG,

Assistant Bacteriolujjki. Bioioglc.nl Laboratory.

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II. THE AMERICAN ELEMENT IN THE IIIILII'TINE FLORA.

BY ELMER D. MERRILL, BOTANIST.

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OF *THE*

PHILIPPINE ISLANDS.

By ELMcR D. MERRILL, BOTANIST.

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