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AND COSTA RICA

BY

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## NEW SAPINDACEAE FROM PANAMA AND COSTA RICA

BY PROF. DR. L. RADLKOFER, MUNICH

In a collection of Sapindaceae made chiefly by Mr. H. Pittier during his botanical explorations in Central and South America from 1905 to 1912, but containing also specimens gathered by Messrs. William R. Maxon, of the U. S. National Museum, and R. S. Williams of the New York Botanical Garden, and a few others, there were found several new species which are here described. One collection from Costa Rica supplied the necessary data for determining the true position of a species known only from incomplete material collected by Oersted in 1847, which had been placed provisionally in the genus *Dilodendron*. On certain special characters of the leaves and structural details of the flower and the fruit, I have established the new genus *Dipterodendron*, the affinities of which are with the Brazilian *Tripterodendron* and *Dilodendron*.

### **SERJANIA MICROCEPHALA** Radlk., sp. nov.

Scandens fruticosa; rami 6-angulares, angulis alternis acutioribus magis prosilientibus, juniores sufferrugineo-hirtelli; corpus lignosum compositum e centrali magno et periphericis tribus parvis angulis acutioribus subjectis; folia biternata; foliola terminalia et lateralia superiora lanceolata, paucidentata, lateralia inferiora abbreviata ovata vel suborbicularia, membranacea, supra  $\pm$  glabrata subfusca, subtus pilis glandulisque microscopicis adspersa subincana, utrinque opaca, impunctata, attamen cellulis secretoriis staurenychymatis angustis basi dilatatis instructa, epidermide mucigera; petiolus communis nudus, partialium intermedius marginulatus; thyrsi in ramulis axillaribus juxta cirros enascentibus paniculatim congesti, ecirrosi, sat dense cincinnigeri, hirtelli; cincinni breviter stipitati; flores (e sepalis sub fructu relictis) parvi; fructus sectionis XII (*Syncecus*), parvus, breviter cordato-ovatus, ad loculos inter alas e summo dorso emergentes quasi immersos trigonus, breviter apiculatus, retrorsum pilosus, ceterum glabriusculus, intus laxe villosus; semen ad basin loculi insertum, obovoideum, spadiceum.

Rami diametro 2.5 mm. Folia 6 cm. longa, 5 cm. lata; foliola terminalia 3.5 cm. longa, 1.5 cm. lata, lateralia minora; petiolus com-

munis 1-1.5 cm. longus; stipulae minutae, ovatae. Thyrsi ad 8 cm. longi; cincinnorum stipes 1 mm. vix superans; bractea bracteolaeque parvae, lineares, pilosae. Fructus toro glabro insidens ad 1.5 cm. longus et latus.

PANAMA: Ancon Hill, Canal Zone, fr. Feb. 20, 1908, *R. S. Williams* No. 31 (Type, U. S. Nat. Herb. No. 677877).

*Obs.*—This species belongs in Sect. XII (*Syncooccus*) and is nearly related to *Scerjania rhombea* Radlk., which differs in its larger leaflets and fruits, the rhomboidal shape of the terminal leaflet, and in the cells of the fruit, which manifestly exceed the wings.

**PAULLINIA FIBRIGERA** Radlk., sp. nov.

Scandens, fruticosa, subglabra; rami teretes, juveniles 3-goni, sulcati, cano-tomentelli; corpus lignosum simplex; folia 5-foliolato-pinnata; foliola superiora longius, inferiora brevius oblongo-lanceolata, in acumen curvatum obtusiusculum terminata, basi obtusiuscula, nunc integerrima, nunc latere exteriori vel utrinque supra medium dente singulo obtuso notata, rarius repando-bidentata, subsessilia, membranaceo-chartacea, nervis lateralibus procurvis, supra glabra, subtus in nervorum axillis parce barbulata, glandulis microscopicis malleoliformibus (praesertim supra subimmersis) ornata, insignia diachymate fibris sclerenchymaticis a venulis aberrantibus crebris percurso nec non pneumatenchymatis strato subepidermali secundo crystallata numerosissima fovente, reti utriculorum laticigerorum laxo subtus instructa, epidermide non mucigera, pagine inferioris sparsim crystallophora; petiolus rhachisque mediocriter alata; stipulae parvae, ovatae, acutae, cano-tomentellae; thyrsi ad apices ramorum axillares, sordide tomentelli, a basi sat dense cincinnigeri; cincinni sessiles, contracti; bractea parvae, subulatae, tomentellae; flores mediocres, subsessiles, sepalis (sub fructu relictis) tomentellis; fructus sectionis I (*Neurotoechus*) e globoso breviter pyriformis, in stipitem brevem attenuatus, apiculatus, pilis brevibus laxo adpersus; semen ellipsoideum, a lateralibus compressiusculum, testa fusco-spadicea glabra splendida, tota longitudine arillo (sicco) brunneo dorso ventreque usque ad basin fissum obtectum.

Frutex cirrosus, alte scandens, truncis 1.8 cm., ramis 5 mm. crassis. Folia petiolo 8-12 cm. longo adjecto ca. 30 cm. longa, 12-20 cm. lata; foliola superiora 12-16 cm. longa, 3.5-6 cm. lata; petioli alae utrinque 2-4 mm. latae; stipulae 3 mm. longae. Thyrsi 5-8 cm. longi; bractea 2-3 mm. longae. Sepala interiora 3 mm. longa. Capsula stipite

4 mm. longo incluso 2.4 cm. longa, 1.5 cm. crassa, purpureo-nigra. Semen 1.2 cm. longum, 7 mm. latum.

PANAMA: Cituro, southern Darien, fl. April 14, 1908, *R. S. Williams* No. 672 (Type, U. S. Nat. Herb. No. 678204); Marragantí, southern Darien, fl. April 6, 1908, *R. S. Williams* No. 1014 (U. S. Nat. Herb. No. 678358).

*Obs.*—This species apparently belongs in Sect. I (*Neurotoechus*) between *Paullinia clavigera* Schlecht. and *P. scssiliflora* Radlk. The leaflets are remarkable on account of their conspicuous sclerenchymatous fibers.

**PAULLINIA FUNICULARIS** Radlk., sp. nov.

Scandens fruticosa, hirtella, mox glabrata; rami 3-angulares, 3-lateri, lateribus costula hirtella notatis, angulis et ipsis pilis crispatis hirtellis dein glabratis denique in costas 3 lamini- vel chordiformes maxime prosilientes cum parte centrali tenui commissuris angustis connexas leviter spiraliter tortas productis et ramos vel truncos profunde 3-sulcatos funiformes efficientibus, cortice fusco; corpus lignosum simplex, triquetrum, 3-sulcatum vel ob costulas partim magis prominentibus inaequaliter 4-5-angulare, 4-5-sulcatum, ramorum adultiorum quasi 3-alatum; folia impari-pinnata, 3-juga, jugo infimo ternato; foliola ex ovali-oblongo lanceolata, terminalia ex obovato subrhombea, omnia acuta vel subacuminata, a medio remote grossiuscule dentata, subsessilia, membranacea, praeter marginem nervosque utrinque puberulos glabra, nitidula, saturate viridia, glandulis microscopicis cernuis adspersa, creberrime pellucide punctata et minutissime lineolata, reti utriculorum laticiferorum parum pellucido substructa, epidermide non mucigera; petiolus nudus, rhacheos segmentum superius sat late, interdum inferius quoque angustius alatum; stipulae elongatae, lineares, imo filiformes; thyrsi in ramis juvenilibus axillares, solitarii, perbreves, pubescentes, in ramis adultioribus truncisve glomeratim congesti, glabri, omnes ecirrosi (eorum loco vero in ramorum apicibus novellis pedunculi steriles longi, apice elongate bicirrosi); flores parvi, glabriusculi; fructus—(non suppetebat).

Trunci 1.4 cm., rami juniores 3 mm. crassi. Folia ad 30 cm. longa, 18 cm. lata; foliola 5-12 cm. longa, 2.5-4.5 cm. lata; petiolus communis 6-12 cm. longus; rhacheos segmentum superius ad 4 cm. longum alis utrinque 5 mm. latis, inferius ad 6 cm. longum alis (ubi sunt) utrinque 1 mm. vix excedentibus; stipulae 7-10 mm. longae, 0.5-2 mm. latae, puberulae vel hispidulae, mox glabratae. Thyrsi 1-2

cm. longi, sat dense cinnos stipitatos 2-4 floros gerentes; bractee bracteolaeque minutae, glabrae vel puberulae; pedicelli 3-5 mm. longi, supra basin articulati. Flores albi. Sepala duo exteriora tertiam interiorum partem aequantia, glabra vel puberula, margine ciliolata, interiora elliptica, 3 mm. longa. Petala tenera obovato-spathulata, intus glandulis laxè adspersa; squamae dimidiam petalorum partem vix superantes, margine ciliatae, superiores crista brevi biloba appendiceque deflexa brevi obtusa barbata, inferiores crista dimidiata dentiformi instructae. Tori glandulae ovatae, puberulae. Stamina ima basi puberula. Germen (floris ♂) rudimentarium puberulum.

PANAMA: Along Rio Fató, Province of Colon, fl. July 9, 1911, *Pittier* No. 3886 (Type, U. S. Nat. Herb. No. 678961); fl. Aug. 16, 1911, *Pittier* 4188 (U. S. Nat. Herb. No. 679289); Hato del Jobo above San Felix, eastern Chiriquí, fl. December 28, 1911, *Pittier* No. 5418 (U. S. Nat. Herb. No. 715641).

*Obs.*—*Paullinia funicularis* Radlk. is to be incorporated in Sect. XII (Caloptilon) among the species related to *P. cauliflora* Jacq. and *P. hispida* Jacq., from which it differs in its deeply 3-sulcate-funifoliate stem and the very numerous pellucid dots of the leaflets.

#### TALISIA NERVOSA Radlk., sp. nov.

Arbuscula eramosa, pyramidalis (*Pittier*), praeter paniculas glabra, trunco tereti, cortice laevi fusco; folia paripinnata, 5-juga, inferiora quam superiora multo majora (*Pittier*), petiolo mediocri tereti basi incrassato, rhachi supra bisulcata subtus carinata; foliola sat magna, ex oblongo lanceolata, acuminata, basi acuta petiolulis brevibus bulboso-incrassatis insidentia, rigide chartacea, nervis lateralibus approximatis utrinque ca. 13 obliquis strictis supra impressis subtus valde et quidem obtuse prominentibus prope marginem subrevolutum manifeste arcuatim anastomosantibus, utrinque glabra nec nisi subtus ad nervos pilis minutissimis subulatis adspersa glandulisque stipitatis turbinato-capitatis parcis ornata, nitida, e viridi fuscescentia; panicula mediocris, folia dimidia superans, pauciramosa; flores—non visi, nisi partes sub fructu relictæ; calyx 5-lobus, lobis anguste imbricatis obtusis, exterioribus leviter carinatis, pulverulento-puberulis intus glabris; petala—?; discus margine et intus hirsutus; stamina pilosula; fructus majusculus, obovoideo-ellipsoideus, obsolete trigonus, sessilis, stylo persistente longiuscule apiculatus, apice (ut et stylus) adpresse puberulus, ceterum glabratus, leviter granulatus, partim suberoso-squamulatus, pericarpio crassiusculo tra-

beculis sclerenchymaticis turbinato-clavelliformibus contiguis in directione radiali percurso, abortu 1-2-locularis, 1-2-spermus, intus in loculorum dorso pilis brevibus adspersus; semina trigono-ellipsoidea, a dorso convexo compressiuscula, ventre obtusangula, testae parte putaminosa crustacea laevi brunea.

Arbuscula 2 m. alta. Folia superiora petiolo 8-9 cm. longo adjecto ca 40 cm. longa, 25 cm. lata; foliola cum petiolulis 6 mm. longis ca. 20 cm. longa, 5 cm. lata, inferiora plus dimidio minora. Panicula 30 cm. longa; pedicelli vix 2 mm. longi. Fructus 2.5 cm. longus, 1.8 cm. crassus, stylo 2.5 mm. longo, pericarpio 2 mm. crasso. Semen 2 cm. longum, 1.2 cm. latum, 8 mm. crassum.

PANAMA: Loma de la Gloria, back of Fató, Province of Colon, fr. August 23, 1911, *Pittier* 4249 (Type, U. S. Nat. Herb. No. 679350).

*Obs.*—In the absence of the flowers the place of this species in the systematic arrangement is doubtful. In the carinate rachis of its leaves it approaches somewhat *Talisia carinata* Radlk.; in the character of its nervation, *T. clathrata* and *T. dasyclada* Radlk.

#### DIPTERODENDRON Radlk., gen. nov.

Flores—non visi, nisi partes sub fructu juvenili relictæ; calycis basis horizontalis, parva, puberula, circumciter (lobis decisis) cicatricata; petalorum vestigia nulla; discus annularis, parvus, sufferrugineo-dein canescenti-tomentellus, staminum insertionibus foveolaribus in lobulos 8 partitus; staminum decisorum vestigia 8; pistillum auctum (fructus juvenilis) trigono- (rarius digono-) ellipsoideum vel obovoideum, brevissime sufferrugineo-puberulum, apice in rostrum breve pyramidatum contractum, stylo rostrum aequante subulato sulcis 3 (2) stigmatosis suturalibus exarato terminatum; loculi 3 (2), intus pilis teneris amplis floccoso-villosi; gemulae in loculis solitariae (vel in germinis septo altero evanido bilocularis loculo majore binae), e loculi basi erectae, campylotropae, apotropae. Capsula sat magna (Aesculi semen magnitudine aequans) tri- (di-) gono-globosa, in rostrum breve dilatato-pyramidatum interdum subevanidum terminata et styli reliquiis apiculata, ad angulos sulco exarata, basi umbilicato-cava, sicca dure crustacea, loculicide 3- (2-) valvis, valvis medio septigeris glabratis granulatis lenticellisque orbicularibus rufis crebris obsitis fusco-brunneis intus tomento sericeo denso pallido vestitis, pericarpio sat crasso trabeculis sclerenchymaticis vasa includentibus crebris radiatim percurso, parenchymate interstitiali e cellulis magnis materia saponino affini (in aqua facile, in alcohol tarde solubili) foetis aliisque tanninigeris conflato. Semina

trigono-ellipsoidea, sat magna, testa crustacea glabra laevi nitida fusco-spadicea, arillo dorso depresso, inde subbilobo scarioso usque ad medium oblecta. Embryo notorrhizus, subcircinato-curvatus; cotyledones crassiusculae, carnosae, amylo farctae cellulisque majoribus saponinigeris persitae, interior transversim subcircinatim buplicata ab exteriori (dorsali) incurva amplexa; radícula a medio seminis dorso intra testae plicam descendens.

Arbores magnae fructicesve. Rami teretiusculi, thyrsgigeri sulcati cortice subfusco laevi, adultiores lenticellis orbicularibus longitudinaliter vel exacte cruciatim sulcatis ornati. Folia sparsa, exstipulata, abrupte bipinnata, larga, petiolo supra parum subtus magis convexo, rhachi supra bisulcata, sulcis a pinnarum insertionibus decurrentibus, minutim puberula; pinnae (et ipsae abrupte pinnatae) utrinque 4-9, alternae vel superiores (rarius omnes) suboppositae, oblongae; foliola (pinnulae) pinnarum inferiorum et summarum pauciora, utrinque 4-7, pinnarum reliquarum 10-12, alterna vel subopposita, sessilia, summa interdum in apicem serratum (quasi foliolum terminale) confluentia, proxima quasi decurrentia et rhachin (secundariam) apice marginatum efficientia, ex oblongo-lanceolata vel basi inaequali (latere interiore latiore) in rhomboideum vergentia, acuta et acute serrata chartacea, cellulis secretoriis (ut in *Tripterodendron* et *Dilodendron* staurenchymatis ampliatis) saponinigeris crebre minutum pellucidopunctata utriculisque seriatis sub nervis instructa, contrita aqua agitata mox spumam efficientia, epidermide mucigera. Thyrsi e foliorum infimorum axillis vel infra folia supra squamaram (perularum) cicatrices enascentes, petiolos aequantes vel subduplo superantes, a medio remote polychasia 4-flora, dichasia 3-flora vel cincinnos 2-flores (apice ad flores singulos reductos) stipitatos 4-10 saepius per paria approximatos gerentes; bractearum vestigia obsoleta. Flores, ut videtur, parvi, feminei longiuscule pedicellati, pedicellis infra medium articulatis.

Species 2, Costa Rican.

The new genus *Dipterodendron* is closely allied to *Tripterodendron* and nearly intermediate between this and *Dilodendron*. It agrees with the latter in its bipinnate leaves (papillose underneath in the second species), so that once it seemed to me (See Mart. Flora Bras. XIII, 3, p. 597) that the second species, *Dipterodendron elegans*, represented by leaves only in the collection of Oersted, must be referred to the genus *Dilodendron*. The genus *Tripterodendron*, besides its tripinnate leaves, differs in the entire margin of the disc (though this may be undulated on account of the pressure of the stamens),



the oleose-carnose aril, and the greenish embryo devoid of saponiferous cells (and perhaps also in its bisquamulose petals).

### KEY TO THE SPECIES

Leaflets smooth on both sides, bright green. 1. *D. costaricense*.

Leaflets minutely papillose and appressed pubescent beneath, dark green. 2. *D. elegans*.

#### 1. DIPTERODENDRON COSTARICENSE Radlk., sp. nov.

Arbor magna; folia bipinnata; foliola utrinque laevia praeter nervum medianum supra puberulum glandulisque minutis adpersum glabra, saturate viridia, epidermidis paginae inferioris cellulis compluribus (2-4-aggregatis) crystalla singula gerentibus; reliqua ut supra.

Arbor 15-20 m. alta, fere a basi ramosa. Rami juniores (thyrigeri) teretiusculi, sulcati, glabri vel apice pilosi, innovationibus lanuginosis, cortice laevi subfusco, adultiores teretes, lenticellis orbicularibus longitudinaliter vel nitide cruciatim sulcatis ornati. Folia bipinnata petiolo 8-20 cm. longo adjecto 30-70 cm. longa, 20-28 cm. lata; pinnae 7-20 cm. longae, interstitiis 3-4.5 cm. longis; pinnulae (foliola) intermediae 1.5-3.5 cm. longae, 0.6-1 cm. latae, summae infimaeque minores, interstitiis 0.5-1 cm. longis. Thyrsi 8-15 cm. longi, interstitiis inter ramulorum paria circ. 2 cm. longis, pedicellis 5-10 cm. longis. Capsula diametro 2.5-3 cm., pericarpio (sicco) 2 mm. crasso; semina 1.5-1.8 cm. longa, 1 cm. crassa.

COSTA RICA: La Balsa de Rio Grande, Province of Alajuela, young and mature fruits, June 2, 1911, *Pittier* 3645 (Type, U. S. Nat. Herb. No. 678704); El Coyolar, near Santo Domingo, June, 1911, coll. *Wercklé*, *Pittier* 3681 (U. S. Nat. Herb. Nos. 678748-9), with mature fruits, leaves partly discolored, yellowish green.

#### 2. DIPTERODENDRON ELEGANS Radlk.

*Dilodendron bipinnatum* Radlk., var. *elegans* Radlk. in Mart. Fl. Bras. XIII, 3, p. 597. 1900.

Folia (sola visa, quae vero scribenti mihi ad manus non sunt) bipinnata; foliola subtus minutim papillosa (papillis supra stomata minuta conniventibus, stomatibus aliis majoribus interjectis), pilis

supra basin geniculatis adpressis subsericeo-puberula, utrinque atroviridia, apicalia saepius confluentia.

COSTA RICA: Near Turrialba, leaves only, May, 1847 (*Oersted* No. 415, in Herb. Havn.).