BLUMEA 45 (2000) 1–146

# REVISION OF ALYXIA (APOCYNACEAE). PART 1: ASIA AND MALESIA

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SUMMARY

The genus *Alyxia* is revised for Continental Asia and Malesia as the first part of a complete revision of the genus. Intergeneric and infrageneric relationships are discussed, as are the morphological characters for the whole genus. Problematic species and areas in need of further study are highlighted. Keys and descriptions for the species are given. 69 species are recognised of which 12 are newly described. These new species are *Alyxia celebica, A. globosa, A. graciliflora, A. kwalotabaa, A. lackii, A. longiloba, A. manusiana, A. minutiflora, A. muguma, A. papuana, A. uniflora* and *A. vera.*

***Key words***: *Alyxia*, Apocynaceae, Asia, Malesia, taxonomic revision.

## INTRODUCTION

This paper is part one of a two part revision of *Alyxia* R.Br. in the Apocynaceae. The revision divides conveniently into two parts as there is very little overlap between the species of Continental Asia and Malesia on the one hand, and the islands of the Pacific Ocean and Australia on the other. General points on the relationships of *Alyxia* to other genera, the infrageneric classification and the morphological characters are, however, discussed for the whole genus. It is also a continuation of a series of papers on the Apocynaceae sensu stricto towards a completion of the family, in the traditional sense, for Flora Malesiana.

*Alyxia* is a genus of shrubs and woody climbers from Eastern Asia, Malesia, Australia and the islands of the Pacific as far east as Pitcairn and north to Hawaii. It was first published by Robert Brown (1810) who described five species. Forster & Forster (1775) published the genus *Gynopogon* with two species. This genus is synonymous with *Alyxia* and clearly predates it. For some time names were published under both genera, including new combinations by Schumann (1895) who transferred all the species of *Alyxia* to *Gynopogon*, although *Alyxia* has now been conserved against *Gynopogon* with *Alyxia spicata* R.Br. as the type (Greuter, 1994). The generic name *Pulassarium* Rumph. (1747) has also been used, particularly by Kuntze (1891), but has no basis as it is pre-Linnean. There are only two other generic synonyms, *Paralstonia* Baill. and *Discalyxia* Markgr., both of which have long been included in synonymy of *Alyxia*, a

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conclusion with which I concur. The position of *Petchia*, traditionally treated with the single species *Petchia ceylanica* (Wight) Livera, has been more problematic with various authors including it in either *Alyxia* or maintaining its generic status. Examination of this species showed, in fact, that this species is not an *Alyxia* and that *Petchia* is synonymous with *Cabucala* from Madagascar which differs from *Alyxia* in the form of the pistil head and, particularly, in the fruits which are bilaterally compressed and somewhat asymmetrical and in the seeds which lack the ruminate endosperm found in *Alyxia*. *Petchia* has priority and new combinations in *Cabucala* have now been made by Leeuwenberg (1997). Mary Endress (pers. comm.) suggests that this genus is actually not particularly closely related to *Alyxia*, but rather to *Rauvolfia*. Pichon (1948) included *Pteralyxia* in *Alyxia* as a separate section with all the other species in section *Gynopogon* (= section *Alyxia* as it includes the type of the genus, *A. spicata*). In common with most authors I recognise *Pteralyxia* as a separate genus which differs from *Alyxia* in its growth form, its spirally arranged leaves and its fruits with the winged endocarp. Recent work on pollen (Van der Ham, pers. comm.), however, does confirm that the two genera are closely related.

There have been three relatively recent significant works on *Alyxia*: Markgraf (1977), Boiteau (1981) and Forster (1992). The latter two works will be discussed further in part 2 of this work. Markgraf (1977) revised the genus in the Flora Malesiana area. Many of the species he recognised have been reduced to synonymy in this work and the extensive infrageneric classification he proposed has been found to be extremely artificial and has been abandoned. Species from different series in his treatment have been synonymised together (see particularly *A. pilosa*, *A. reinwardtii*, *A. acuminata*). Similarly many of the species recognised by Boiteau (1981) for New Caledonia will be reduced to synonymy and the series (published by Boiteau & Allorge, 1979), proposed in an expansion of the system begun by Markgraf, have also been abandoned as artificial. Li (1990) proposed a section *Monospermae*, somewhat altering the system adopted by Markgraf (1977) of recognising infrageneric taxa at the series level. This section was based on the number of articles in the fruit and has not been maintained although the type species of the section, *A. balansae*, along with its relatives *A. siamensis* and *A. menglungensis*, are fairly distinct and may form the basis of a future infrageneric taxon but recognised on different characters such as inflorescence structure. Forster (1992), wisely, did not attempt to construct an infrageneric classification for the Australian species but referred them to Markgraf's series whilst commenting that the system required a "rigorous review". The main problem with Markgraf's system was that it was based on many characters that can be extremely variable within species such as leaf shape, inflorescence structure (in some respects), flower size (particularly in *A. reinwardtii*) and bud shape. Even using very narrow species concepts many of the species do not fit into the scheme he proposed for them. All sections and series have simply been included in synonymy of *Alyxia* here. One of the main problems with constructing a lasting infrageneric classification is that there are, overall, remarkably few discrete morphological characters which could easily be used in a phylogenetic analysis. There are only two groups, *Discalyxia* (Markgr.) Markgr. and *Cylindrocarpae* Boiteau, which can more or less be distinguished from the general morass of the genus on clear morphological characters. There are other groups of species which can be recognised, such as the *A. balansae* group discussed above, but no clear basis for es-

tablishing an infrageneric classification which could encompass all species in a natural system. To split off any groups whilst leaving the rest of the genus in series *Alyxia* would be deeply unsatisfactory and it would be better to abandon any pretence of an infrageneric system until novel characters, such as molecular ones, can be employed to gain a clearer understanding of the evolution of the group.

Within the area considered in this paper, namely continental Asia (including its offshore islands such as Taiwan and Hainan) and Malesia there have been various local works, apart from Markgraf (1977). For the whole of China there has been Tsiang & P.T. Li (1973, 1977) and P.T. Li et al. (1995); for Hainan: Anonymous (1974); for Yunnan: Anonymous (1983); for Taiwan: H.-L. Li (1978); for Indochina: Pitard (1933); for Thailand: Kerr (1939); for Vietnam: Lý (1986); for the Andaman and Nicobar Islands: Gangopadhyay & Chakraborty (1992); for New Guinea: Van Royen (1983) and Markgraf (1927a, 1927b); for Peninsular Malaysia: King & Gamble (1908) and Ridley (1923); for Borneo: Merrill (1921); for the Philippines: Merrill (1923); for Java: Backer & Bakhuizen van den Brink Jr. (1965).

Many of the herbarium specimens have unopened but mature buds. Leeuwenberg (1991) reported that a number of species of *Tabernaemontana* only opened at night which might suggest moth pollination. This may also be true in *Alyxia*, the presence only of buds due to the fact that most botanical collectors are only active in the day. Albers & Van der Maesen (1994) discussed pollination in the Apocynaceae and concluded that, broadly speaking, there were two types of stigmatic receptiveness in the family which they called the *Plumeria* type and the *Allamanda–Nerium* type, distinguished in that the former is receptive over most of the pistil head surface and the latter is receptive only at the base. They suggested that the two types could usually be distinguished on the pistil head morphology. Although no work has been done on *Alyxia* pollination one could tentatively conclude from the morphology that they are of the *Plumeria* type. Some herbarium specimens (e.g. *Florence 3781* from the Society Islands) report that bees visit the flowers and that they are very fragrant.

Chromosome numbers are known for a few species: *Alyxia ruscifolia* R.Br. from Australia and *A. sinensis* from China, both of which have 2n = 36, and *A. stellata* (J.R. Forst. & G. Forst.) Roem. & Schult. (using the name *A. oliviformis* Gaud.) from Hawaii with 2n = 36–39 (Van der Laan & Arends, 1985).

Don (1837) suggests that the name derives from the Greek *Alyxis* meaning anxiety or grief in reference to the gloomy appearance of the plants although this seems a rather strange derivation given the actual appearance of the plants. Green (1994) and Forster (1992), however, suggest the name derives from the Greek *halysis* meaning a chain in reference to the fruits which are often moniliform. This reference to chains, however, could equally well apply to the use of the plants to make leis, particularly in Polynesia (Mabberley, 1998).

## MATERIALS AND METHODS

Approximately 5000 herbarium specimens from Asia and Malesia have been studied. These are from the following herbaria: A, AAU, ABD, AD, AMES, AWH, B, BISH, BKF, BM, BO, BR, BRI, C, CAL, CANB, CBG, DBN, DNA, DR, E, F, FI (photos), FR, FU (photos), G, G-DC, GH, HBG, IBSC, K, K-W, KUN, L, LAE , M, MEL, MO,

MW, NY, P, PE, PERTH, PNH, PR, QRS, S, SING, SYS, TAIF (photos), TCD, TER, TI, U, UC, US, W, WAG, WRSL, Z.

All dimensions given are for dried specimens except for androecium and gynoecium characters which are from flowers reconstituted by boiling in water. The flowers are approximately 10% smaller when dried.

*Collections*

Care has to be taken when interpreting a number of collections as some collectors used the same collection numbers for different collections. Of particular importance are the collections by Pierre in Indochina, many of which have the same number but were collected on different dates and often in different places. Several new species were described based on his collections and care must be taken when designating lectotypes and isotypes. A similar situation exists for Franc's collections from New Caledonia and Cunningham's from Australia.

*The problems*

There are a number of acute outstanding problems in *Alyxia*. The most important amongst these is the lack of collections in some areas, most notably in Yunnan, Burma, Laos, Cambodia and Vietnam in Continental Asia; Sulawesi, the Moluccas and New Guinea in Malesia; Vanuatu and many other islands in the Pacific. In each of these areas further collecting could clear up questions of specific delimitation so far made only on the basis of the sparse, and often poor, collections. There are curious species from Sulawesi, particularly *A. celebica*, which like *A. kabaenae* has a 2-lobed calyx, a character not noted before as *A. kabaenae* was only known in fruit. Several species in Sulawesi are known only from very few or poor specimens, particularly *A. globosa*, only known from specimens with some small mutated flowers, *A. kendarica*, known only from two collections, *A. uniflora* and *A. lackii*, known only from one collection each and *A. sulana*, known only from three. Some of these species show affinities with each other but the lack of collections makes it difficult to assess the level of variability within species and maybe in the future the specific limits will need to be reassessed. The affinities of *A. halmaheirae* and *A. vera* in the Moluccas are also vague. The rather poor type specimen of *A. halmaheirae* from Halmahera has been linked with specimens from Sulawesi but further collecting in the Moluccas will clarify whether this is correct.

Another large problem is in the group of species around *A. reinwardtii*. Many taxa have been included in synonymy of this species but the limits with *A. pseudosinensis, A. pilosa, A. ganophylla, A. oleifolia* and *A. angustifolia* are still not totally clear for some specimens. Detailed population studies and molecular studies may clarify this group.

Several species have been synonymised into *A. acuminata*. There remain a number of species which are closely related and an understanding of their relationship with *A. acuminata* would greatly benefit from closer scrutiny in future, more-detailed studies. These particularly include *A. subalpina, A. scabrida* and *A. tetraquetra*.

Specimens of *Alyxia* are far more commonly collected in fruit than in flower. In the rarer species or those widely dispersed with few collecting localities it is not always easy to associate fruiting and flowering specimens.

## CHARACTERS

### *Habit*

There are both shrubs and climbers of various sizes in *Alyxia*. The shrubs are more common in Australia and New Caledonia where many of the species are described as being shrubs with flexuous branches. Sometimes there are species with some individuals as shrubs and some as climbers so the distinction between shrubs with flexuous branches and climbers is a rather subjective one. This is particularly relevant in the *A. stellata* complex where various authors have attempted to distinguish taxa based on habit. Often habit information is lacking from herbarium labels and in a few cases the only indication is 'shrub' or suchlike from just one or two specimens. In cases such as this, where I think it is unlikely that it is only an erect shrub, this has been indicated. There are a few collections with 'tree' on the label. These are all in species which are normally large climbers and I have, possibly presumptuously, assumed that they have been mistaken with the tree they were climbing up. Amongst the climbers there is a large range of variations on the theme from the small scramblers over rocks like *A. linearis* to plants climbing into the forest canopy such as can be found in *A. acuminata* amongst others. Specialised fieldwork is necessary to really establish the value of habit in the systematics of this genus.

### *Bark*

Unfortunately the characteristics of the bark are hardly ever recorded on herbarium labels. In herbarium specimens this character has very little value except in such species as *A. rubricaulis* with its clearly red branchlets even in the dried state.

### *Indumentum*

The indumentum, or lack of it, on all plant parts can be a very useful character. When present the indumentum is usually minute and needs to be observed with a lens. In a few species a tomentose indumentum is found.

### *Leaves*

The leaves are opposite or in whorls of 3 to 7, most commonly 3 or 4. This character is mostly reasonably consistent within species with very few showing more than two different numbers of leaves in a whorl. Opposite leaves are widespread in the genus and variable within some species but consistently opposite in many others, particularly in New Caledonia. The leaf arrangement is, unsurprisingly, directly related to the number of angles in the branchlets. In all species there are small rod-shaped colleters in the leaf axils. These colleters are sometimes somewhat glued together. No diagnostic features have been observed for this character. The relative sizes of the leaves between species is, unsurprisingly, related to the habitat in which they grow. Those from higher altitude and drier conditions generally have smaller leaves. The leaves can also be very variable within species, more particularly in shape rather than in size although widespread species such as *A. stellata* and *A. reinwardtii* also show an enormous variation in leaf size. In common with many other genera in the Apocynaceae *Alyxia* often shows considerable differences in leaf shape between younger and older branches, and possibly also between leaves growing in the light or shade, but far more detailed notes on herbarium specimens or dedicated fieldwork are needed to confirm this.

I have not observed this myself in SE Asia but neotenous leaf forms are reported from New Caledonia (Boiteau, 1981) and herbarium specimens often have extremely different leaf forms on the one specimen with no indication that the branchlets may have been collected on different plants (e.g. *Veillon 8001*, collected in New Caledonia has leaves from 1.1–13 times as long as wide and *McKee 23658*, also a specimen from New Caledonia, has leaves 2.4–40 times as long as wide on the same plant). Venation can be a useful taxonomic character but usually only for distinguishing groups of closely related species, such as the *A. multistriata* group with its innumerable closely packed secondary veins, rather than for distinguishing species. An intramarginal vein is often present but is not always consistent within species due more to the inrolling of leaf margins or the thickness of the leaf than because the vein is actually missing in some specimens.

*Inflorescence*

The form of the inflorescence is a vital character. The simplest type is a solitary flower which is actually quite rare and would appear to be a reduction from a simple pleiochasium rather than the plesiomorphic state. This character is rare in the genus as a whole but mostly consistent within a species. The simple pleiochasium consisting of a peduncle and then just 3–5 flowers at a single node is very common. It is consistent within some species and variable within others. In some cases there are axillary simple pleiochasia and a terminal pleiochasium with an extra node. The next form of complexity is where there are 2 or more nodes in the inflorescence with whorls of flowers at each node and no further second order branching. This is particularly common in species from New Guinea. From this state inflorescences can become more elaborate with second, or more, order branching. The complexity also depends on various degrees of laxity or congestion depending on the lengths of the internodes, the position of the inflorescences along the branches which can lead to large terminal panicles in some cases, and whether truly terminal inflorescences are present or not. Markgraf (1977) claimed there were no truly terminal inflorescences, rather pseudoterminal ones. This position was also adopted by Forster (1992). However, species such as *A. laurina* and *A. ruscifolia* would indeed appear to have truly terminal inflorescences.

*Bracts and bracteoles*

The bracts are more often than not small and deltoid. In a few species they are narrower and lanceolate. In most species they are more or less persistent in the inflorescence and sometimes also in the infructescence but occasionally they fall early in the inflorescence development such as in *A. rostrata*. It is often difficult to accurately observe the bracteoles in a consistent way. In some species the pedicels are so short and the bracts so large it is impossible to see if there are bracteoles beneath without destroying the specimen. In others there is a bracteole on the endmost flower in the cyme but not on the others, a process whereby the bracteole is almost certainly simply a bract with an unformed bud in the axil. In other species there are one, two or several bracteoles on the pedicel. In some species the bracteoles character is variable, particularly in *A. reinwardtii*, a species variable in many other characters too. They are taxonomically useful in some species, particularly those that have multiple bracteoles. They can also be useful for matching flowering and fruiting specimens to

a single species although care has to be taken in interpreting the bracteoles on fruiting stalks as these may also be the remnants of a bract with an aborted axillary flower in some cases. In some species the bracts and bracteoles are particularly stiff, projecting from the axes and clearly visible, a character recorded as 'apparent' in the keys and descriptions.

*Calyx*

The calyx is most often of five small sepals fused at the very base. The shape and size relative to the corolla can provide useful taxonomic characters. Two species, *A. celebica* and *A. kabaenae* show a 2-lipped calyx as in a labiate flower (see note under *A. kabaenae*). In *A. torresiana* there are two types of sepals with some much larger than others. In *A. sarasinii* the sepals are quite leafy and reflexed at the apex. They approach this state in other species such as *A. spicata.*

*Corolla*

In bud the corolla lobes are sinistrorse. The mature corolla of all species is salverform. The tube is narrow and generally only somewhat inflated around the stamens and the throat is mostly narrowed by a slight thickening of the tissue at the throat or a ring of tissue. The length of the corolla tube and the relative length of the tube compared to the sepals and the lobes provide useful characters for distinguishing species. The corolla lobes are variable in shape and size within the genus but generally spreading and often somewhat curled. They are auriculate at the base on one side. The size and shape of the lobes provide many useful characters. The corolla is mostly glabrous outside but sparsely to densely pubescent in a number of species. The lobes are also mostly glabrous inside with some exceptions. The most common type of indumentum inside the tube is where there are a few hairs around the stamens and a denser band of hairs beneath the insertion of the stamens. This band varies in width. In a few species the corolla tube is almost continuously pubescent to the base inside and in some other species there are hairs at the throat. These are useful characters for distinguishing some species.

*Stamens*

The stamens are mostly inserted on the corolla tube near the mouth or above the middle of the corolla tube. In a few species they are inserted below the middle of the corolla tube but never at the base. The filament is short and thin. The anthers are introrse and dehisce down the entire length. They are more or less fertile for the entire length. The shape of the anthers provides no characters for distinguishing species.

*Pistil*

The ovary is composed of two separate carpels which are united into a common style as is common elsewhere in the Apocynaceae. The indumentum, or otherwise, on the ovary can provide useful characters although in some species it is very variable. In a number of species there is a ring of hairs only around the base of the ovary although sometimes these hairs can be quite long with the result that the ovary may appear to be hairy all over. The style is thin and the pistil head fairly undifferentiated with a two cleft apex and short hairs.

*Fruit*

The fruits are drupes with a fleshy mesocarp of varying thickness and an endocarp which is mostly papery but occasionally much harder as in *A. leucogyne* from New Caledonia. The fruits are paired but very often only one of the carpels develops. The most unusual thing about the fruits of *Alyxia* is that they often form moniliform strings. Again this is often reduced to only one article in each string but this character is difficult to ascertain with any degree of certainty as they are often delicate and the one remaining article on a herbarium sheet may not be the natural state. In some species they always have several articles such as in *A. concatenata* and *A. markgrafii* and in others it is variable. The distance between the articles is also variable and sometimes the constriction between the articles is not complete giving a two seeded fruit with a 'waist'. In several New Caledonia species such as *A. margaretae* and *A. cylindrocarpa* the articles are elongated and sometimes somewhat curved.

*Seeds*

The seeds of most species are more or less ellipsoid and ruminate with a deep ventral groove. In a few species around *A. margaretae* they are linear in shape and have a number of deep grooves. At first sight they seem totally different to the 'normal' seed but these grooves are homologous with the fissures on the shorter seeds. Apart from this exception, there are no characters in the seed which are not also reflected in the fruit. The embryo has cotyledons which are either linear or may be wider than the radicle and strongly undulate. There may be some taxonomic characters here but not for distinguishing species as closely related species generally have the same type of embryo.

## SYSTEMATIC TREATMENT

### ALYXIA

*Alyxia* R.Br., Prodr. (1810) 469, nom. cons.; Roem. & Schult., Syst. Veg. 4 (1819) 439; Spreng., Anl. Kenntn. Gew., ed. 2 (1817) 494; G. Don, Gen. Syst. 4 (1837) 96; A.DC., Prodr. 8 (1844) 345; Benth. & Hook.f., Gen. Pl. 2 (1876) 697; Pichon, Mém. Mus. Nat. Hist. Nat., n.s. 27 (1948) 164. — *Alyxia* sect. *Gynopogon* (J.R. Forst. & G. Forst.) Pichon, Mém. Mus. Nat. Hist. Nat., n.s. 27 (1948) 165, nom. illeg. [it included the type species of *Alyxia*]. — *Alyxia* ser. *Alyxia* Markgr., Blumea 23 (1977) 390. — Type species: *Alyxia spicata* R.Br.

*Pulassarium* [Rumph., Herb. Amboin. 5 (1747) 430, nom. inval.]; Kuntze, Revis. Gen. Pl. 2 (1891) 416, nom. illeg.

*Gynopogon* J.R. Forst. & G. Forst., Char. Gen. Pl. (1775) 35, nom. rejic.; K. Schum., Nat. Pflanzenfam. 4, 2 (1895) 151. — Type species: *Gynopogon stellatus* J.R. Forst. & G. Forst. [= *Alyxia stellata* (J.R. Forst. & G. Forst.) Roem. & Schult.].

*Alexia* Wight, Ic. Pl. 4 (1848) t. 1293, orth. var.

*Paralstonia* Baill., Bull. Soc. Linn. Paris 1 (1888) 750. — Type species: *Paralstonia clusiacea* Baill. [= *Alyxia concatenata* (Blanco) Merr.].

*Discalyxia* Markgr., Nova Guinea 14, 2 (1927) 282. — *Alyxia* ser. *Discalyxia* (Markgr.) Markgr., Blumea 23 (1977) 410; Boiteau, Fl. Nouv.-Cal. 10 (1981) 98. — Type species: *Discalyxia ridleyana* (Wernham) Markgr. [= *Alyxia rostrata* Markgr.].

*Alyxia* ser. *Reinwardtianae* Markgr., Blumea 23 (1977) 380; Boiteau, Fl. Nouv.-Cal. 10 (1981) 100. — *Alyxia* ser. *Reinwardtianae* subser. *Reinwardtianae* Markgr., Blumea 23 (1977) 386. — Type species: *Alyxia reinwardtii* Blume.

*Alyxia* ser. *Reinwardtianae* subser. *Clusiaceae* Markgr., Blumea 23 (1977) 380. — Type species: *Alyxia clusiacea* (Baill.) Pichon [= *Alyxia concatenata* (Blanco) Merr.].

*Alyxia* ser. *Reinwardtianae* subser. *Pilosae* Markgr., Blumea 23 (1977) 382. — Type species: *Alyxia pilosa* Miq.

*Alyxia* ser. *Laurinae* Markgr., Blumea 23 (1977) 391. — Type species: *Alyxia laurina* Gaud.

*Alyxia* ser. *Globuliferae* Markgr., Blumea 23 (1977) 392; Boiteau, Fl. Nouv.-Cal. 10 (1981) 98. — Type species: *Alyxia concatenata* (Blanco) Merr.

*Alyxia* ser. *Megalocarpae* Markgr., Blumea 23 (1977) 393. — Type species: *Alyxia scortechinii* King & Gamble [= *Alyxia pilosa* Miq.].

*Alyxia* ser. *Floribundae* Markgr., Blumea 23 (1977) 394. — Type species: *Alyxia maluensis* Markgr. [= *Alyxia acuminata* K. Schum.].

*Alyxia* ser. *Defoliatae* Markgr., Blumea 23 (1977) 398. — Type species: *Alyxia defoliata* Markgr.

*Alyxia* ser. *Subalpinae* Markgr., Blumea 23 (1977) 402. — Type species: *Alyxia subalpina* Markgr.

*Alyxia* ser. *Microphyllae* Markgr., Blumea 23 (1977) 404. — Type species: *Alyxia microphylla* Markgr.

*Alyxia* ser. *Laxiflorae* Markgr., Blumea 23 (1977) 406. — Type species: *Alyxia laxiflora* Merr. [= *Alyxia luzoniensis* Merr.].

*Alyxia* ser. *Ruscifoliae* Markgr., Blumea 23 (1977) 412. — Type species: *Alyxia ruscifolia* R.Br.

*Alyxia* ser. *Baillonianae* Boiteau, Adansonia 18 (1979) 444; Fl. Nouv.-Cal. 10 (1981) 100. — Type species: *Alyxia baillonii* Guillaumin.

*Alyxia* ser. *Suaves* Boiteau, Adansonia 18 (1979) 444; Fl. Nouv.-Cal. 10 (1981) 100. — Type species: *Alyxia suavis* (Baill.) Schltr. [= *Alyxia clusiophylla* (Baill.) Guillaumin].

*Alyxia* ser. *Cylindrocarpae* Boiteau, Adansonia 18 (1979) 445; Fl. Nouv.-Cal. 10 (1981) 101. — Type species: *Alyxia cylindrocarpa* Guillaumin.

*Alyxia* ser. *Bracteolosae* A.C. Sm., Fl. Vit. Nov. 4 (1988) 56. — Type species: *Alyxia bracteolosa* A. Gray.

*Alyxia* sect. *Monospermae* Tsiang & P.T. Li, J. S. China Agric. Univ. 11 (1990) 27. — Type species: *Alyxia balansae* Pit.

Climbers, scramblers or shrubs. *Branches* sometimes with large corky protuberances. *Branchlets* mostly strongly or weakly angled when young, becoming mostly terete with age; lenticellate or not; pubescent or not. *Leaves* opposite or in whorls of 3–7, more or less equal in size within a whorl but often of extremely different sizes and shapes on different parts of the plant, entire; colleters present in the axils; secondary venation usually only distinguishable with difficulty from the tertiary venation or not distinguishable at all, tertiary venation generally parallel to the secondary venation or somewhat reticulate, often with an intramarginal vein. *Inflorescences* axillary and/or terminal, consisting of solitary flowers, of simple pleiochasia, or of compound pleiochasia and then sometimes forming large terminal panicles; peduncle delicate or robust, rarely more or less absent, pubescent or glabrous; bracts usually small, sometimes rather leafy, persistent or caducous; bracteoles absent or with one, two or several bracteoles on the pedicel. Flowers 5-merous (but see *A. kabaenae*). *Sepals* erect, rarely reflexed, rarely somewhat fleshy and rarely of widely varying sizes, ovate to linear. *Corolla* actinomorphic; lobes sinistrorsely contorted in bud; tube cylindrical, somewhat inflated around stamens; lobes erect, spreading or reflexed; outside and inside glabrous or pubescent. Stamens inserted mostly in the upper half of the corolla tube, more rarely around or just beneath the middle, not exserted from corolla throat; filaments straight, short and thin; anthers ovate, fertile for most of length; free from pistil head. Disc absent. *Ovary* of two separate carpels united into a common style; glabrous, with tufts of hair between the two carpels, pubescent in a ring around the base of the ovary, or pubescent all over; style glabrous; pistil head small, pubescent. Ovules several.

*Fruit* a pair of drupes from each flower, very frequently with one aborted, consisting of one or more articles with one seed, when more than one then forming a moniliform chain; articles globose, ellipsoid or cylindrical, symmetrical or somewhat curved especially in the elongated articles (not found in Asia); endocarp thin and papery, sometimes somewhat thicker to quite tough, mesocarp fleshy, often very thinly so; pericarp thin and coloured. *Seeds* simple; endosperm ruminate or with longitudinal ridges. Embryo with flat to strongly undulate cotyledons.

108 species found from north-east India through Southern China to Taiwan and southwards through south-east Asia to Australia and eastwards through the Solomon Islands out into the Pacific west as far as Henderson Island and north to Hawaii. In Continental Asia and Malesia there are 69 species.

## THE KEYS

The following keys are quite complex due to the large degree of variation in many species. They have been constructed using readily observable characters rather than some of the more obscure characters that may have led to a shorter key but which would have been difficult to see. At the end of the keys is a regional breakdown of the species with a few spot characters to rapidly identify some of the species. These pointers must, however, be used with care and specimens checked against the descriptions.

## KEY TO THE SPECIES IN ASIA (EXCLUDING MALESIA)

1a. Branchlets densely puberulent or tomentose ..... 2
b. Branchlets glabrous or only sparsely puberulent ..... 7
2a. Leaves thickly coriaceous; anther apex c. 1.3 mm from corolla mouth; corolla bud head c. 4.5 mm long ..... **30. A. marginata**
b. Leaves coriaceous to papery; anther apex ≤ 1 mm from corolla mouth; corolla bud head 0.8–3.7 mm long ..... 3
3a. Branchlets, inflorescence and sepals densely covered with long hairs; corolla lobes 4.3–4.5 mm long, apex acuminate ..... **38. A. nathoi**
b. Branchlets with short hairs; sepals glabrous to pubescent with short hairs; corolla lobes 0.9–3.8 mm long, apex rounded to acute ..... 4
4a. Peduncle 3–4.4 cm long; inflorescence a lax panicle; seeds 20–26.6 mm long ..... **6. A. balansae**
b. Peduncle 0–2 cm long; inflorescence various but not a lax panicle; seeds 4.1–13.4 mm long ..... 5
5a. Inflorescence a simple unbranched pleiochasium or branched but not congested; corolla tube 2.5–10 times as long as sepals ..... **51. A. reinwardtii**
b. Inflorescence branched and densely congested; corolla tube 0.9–2 times as long as sepals ..... 6
6a. Corolla tube 2–3 mm long; leaves reaching 2.3–3.1 cm long .. **60. A. sinensis**
b. Corolla tube 3.4–4.2 mm long; leaves reaching 4.2–9.6 cm long ..... **56. A. schlechteri**
7a. Leaves hairy all over beneath ..... 8
b. Leaves glabrous or sparsely puberulent only on midrib beneath ..... 9

8a. Leaves coriaceous to papery; corolla lobes 1.2–3.8 mm long; anther apex ≤ 1 mm from corolla mouth; fruit glabrous or sparsely puberulent at ends, intramarginal nerve, if present, weak ..... **51. A. reinwardtii**
b. Leaves thickly coriaceous; corolla lobes c. 4.5 mm long; anther apex c. 1.3 mm from corolla mouth; fruit densely puberulent; intramarginal nerve strong and inset from margin ..... **30. A. marginata**
9a. Inflorescence of lax panicles with no inflorescences of simple unbranched pleiochasia ..... 10
b. Inflorescences not lax panicles, if appearing like terminal panicles then only composed of axillary simple pleiochasia and a terminal one with one or two nodes, rarely with axillary inflorescences also with one extra node ..... 14
10a. Corolla tube 3.8–6 mm long, 2.1–3.8 times as long as sepals; stamens inserted above middle of tube ..... 11
b. Corolla tube 1.6–2.8 mm long, 0.9–1.8 times as long as sepals; stamens inserted around middle of tube ..... 12
11a. Corolla lobes not ciliate; ovary sparsely or densely pubescent all over ..... **58. A. siamensis**
b. Corolla lobes ciliate; ovary glabrous ..... **32. A. menglungensis**
12a. Branchlets sparsely puberulent; sepals densely puberulent; fruit articles 23–40 mm long; inflorescence sparsely to densely puberulent all over ..... **6. A. balansae**
b. Branchlets glabrous; sepals glabrous or puberulent on tips only; fruit articles 6.1–14 mm long; inflorescence glabrous or sparsely puberulent in upper parts ..... 13
13a. Leaf blade apex rounded to acuminate; pedicels 0.4–1 mm long; ovary glabrous or very sparsely pubescent; fruit articles 6.1–7 by 5.9–6 mm; leaves reaching 3.4–8.1 cm long ..... **50. A. racemosa**
b. Leaf blade apex caudate with a long apex which is rounded at the end; pedicels 4–8 mm long; ovary pubescent around base only; fruit articles 11–14 by 9–13.5 mm; leaves reaching 10.4–14 cm long ..... **18. A. gracilis**
14a. Corolla tube 1.8–4 mm long ..... 15
b. Corolla tube over 4 mm long ..... 20
15a. Inflorescence short and congested with no clear internodes ..... 16
b. Inflorescence variable but with clear internodes ..... 17
16a. Corolla tube 2–3 mm long, leaves reaching 2.3–3.1 cm long . **60. A. sinensis**
b. Corolla tube 3.4–4 mm long, leaves reaching 4.2–9.6 cm long ..... **56. A. schlechteri**
17a. Secondary veins not prominent above; ovary pubescent in tuft between carpels ..... **19. A. hainanensis**
b. Secondary veins prominent above; ovary pubescence variable but not pubescent in tufts ..... 18
18a. Intramarginal nerve strong; stamens inserted at 2.2–2.6 mm from corolla base ..... **12. A. fascicularis**
b. Intramarginal nerve weak; stamens inserted at 0.9–1.7 mm from corolla base ..... 19

19a. Corolla lobes elliptic or oblong 0.6–0.8 mm wide; ovary glabrous or very sparsely pubescent; fruit articles 6.1–7 mm long; seeds 4.5–5 by 3.2–4.1 mm ..... **50. A. racemosa**
b. Corolla lobes ovate > 1 mm wide; ovary pubescent around base only; fruit articles 8.3–15.8 mm long; seeds 7.2–11.9 by 6.2–7.5 mm ..... **4. A. annamensis**
20a. Inflorescence short and congested, both inflorescence and sepals with dense long hairs ..... **67. A. thailandica**
b. Inflorescence variable, both inflorescence and sepals glabrous or hairy but not with dense long hairs and sepals always less hairy than inflorescence axes 21
21a. Corolla tube < 4.5 mm long, 1.4–2 times as long as sepals **56. A. schlechteri**
b. Corolla tube > 4.5 mm long, 1.7–10 times as long as sepals ..... 22
22a. Venation mostly obscure beneath but with a clear marginal vein; corolla tube 1.7–2.1 times as long as sepals ..... **14. A. funingensis**
b. Venation variable but if obscure beneath without a clear marginal vein; corolla tube 2.5–10 times as long as sepals ..... 23
23a. Corolla tube pubescent almost to base inside tube. — Taiwan ..... **59. A. sibuyanensis**
b. Corolla tube not pubescent almost to base inside tube. — Not in Taiwan .. 24
24a. Mature corolla bud head > 4 mm long. — Vietnam ..... **30. A. marginata**
b. Mature corolla bud head < 4 mm long. — Widespread ..... 25
25a. Corolla bud head c. 0.54 of bud length ..... **45. A. pseudosinensis**
b. Corolla bud head 0.18–0.42 of bud length ..... **51. A. reinwardtii**

## KEY TO THE SPECIES IN MALESIA

1a. Leaf apex clearly mucronate; shrubs ..... **39. A. oblongata**
b. Leaf apex not clearly mucronate; shrubs or climbers ..... 2
2a. All leaves opposite ..... 3
b. At least some leaves in whorls of 3 or more on a branch ..... 9
3a. Leaf blade ratio 10.7–20 times as long as wide, leaf blade linear, flowers solitary ..... **26. A. linearis**
b. Leaf blade ratio 1.4–8.8 times as long as wide, leaf blade not linear, if narrow then sides not parallel; flowers in cymes ..... 4
4a. Secondary veins numerous, close together and barely distinguishable from tertiary venation, > 100 pairs; leaf margin strongly undulate; sepal apices rounded .. ..... **37. A. multistriata**
b. Secondary veins variable, 12–58 pairs; leaf margin strongly undulate to flat; sepal apices obtuse to acuminate ..... 5
5a. Leaf margin strongly undulate; corolla tube c. 2.6 mm long; stamens inserted at c. 1.4 mm from corolla base, insertion c. 0.35 of tube length; anther apex c. 1.4 mm from corolla mouth ..... **62. A. sogerensis**
b. Leaf margin not undulate to weakly undulate; corolla tube 4.8–14 mm long; stamens inserted at 2.7–9.4 mm from corolla base, stamen insertion 0.67–0.87 of tube length; anther apex 0–1 mm from corolla mouth ..... 6

6a. Corolla lobe apex acuminate; inflorescence pedunculate, delicate. — Philippines (not in Palawan) ..... **28. A. luzoniensis**
b. Corolla lobe apex rounded to acute; inflorescence pedunculate or not, delicate to robust. — Not in the Philippines except for Palawan ..... 7
7a. Corolla tube continuously pubescent except for base inside; inflorescence robust; bracts and bracteoles stiff and apparent. — Moluccas and New Guinea ..... **9. A. composita**
b. Corolla tube glabrous inside or pubescent but not to near base; inflorescence usually not robust; bracts and bracteoles not stiff and apparent, often absent. — West Malesia ..... 8
8a. Inflorescence 2.5–9 cm long, usually densely pubescent, rarely to glabrous, at least some inflorescences on a branch with several internodes; fruit articles 17–30 cm long. — Sumatra and Peninsular Malaysia ..... **44. A. pilosa**
b. Inflorescence 1–3.5 cm long, only very rarely densely pubescent, most inflorescences simple pleiochasia; fruit articles 6–20(–25.3) mm long. — Widespread in West Malesia ..... **51. A. reinwardtii**
9a. Leaves punctate ..... 10
b. Leaves not punctate beneath ..... 11
10a. Secondary veins 33–79 pairs, tertiary venation parallel to secondary veins and weakly prominent above; inflorescence with several clear internodes and unbranched side branches; corolla bud head c. 0.43 of bud length, apex acuminate ..... **61. A. sleumeri**
b. Secondary veins 14–23 pairs, tertiary venation obscure; flowers solitary or inflorescence a simple unbranched pleiochasium; corolla bud head 0.26–0.37 of bud length, apex obtuse to acute ..... **48. A. punctata**
11a. Flowers solitary ..... 12
b. Flowers in an inflorescence ..... 16
12a. Leaf blade base rounded, more rarely to acute; secondary and tertiary veins not prominent above; sepals 0.9–1.3 mm long; ovary pubescent around base only or pubescent in a tuft between the carpels ..... 13
b. Leaf blade base cuneate; secondary and tertiary veins weakly prominent above; sepals 1.8–2.8 mm long; ovary densely pubescent all over ..... 15
13a. Corolla lobes glabrous inside; corolla tube c. 3.5 times as long as lobes, 5.8 times as long as sepals. — Borneo ..... **36. A. mujongensis**
b. Corolla lobes pubescent at base of lobes inside; corolla tube c. 2.5 times as long as lobes, 2.9–3.9 times as long as sepals. — Sulawesi, New Guinea ..... 14
14a. Sepals sparsely puberulent; corolla lobes c. 1.9 times as long as wide. — New Guinea ..... **57. A. semipallescens**
b. Sepals glabrous; corolla lobes c. 1 times as long as wide. — Sulawesi ..... **68. A. uniflora**
15a. Bracteoles several along pedicel; pedicels 1–3 mm long; sepal apices obtuse, 2.3–2.8 mm long, sparsely to densely puberulent ..... **43. A. parvifolia**
b. Bracteoles two immediately beneath calyx; pedicels c. 6 mm long; sepal apices acuminate, c. 1.8 mm long, sepals glabrous ..... **3. A. angustissima**
16a. Calyx fused into a 2-lipped tube ..... 17
b. Calyx of free sepals or only fused around base with 5 lobes ..... 18

17a. Inflorescence puberulent, delicate, peduncle 1–1.3 mm wide; corolla tube 2.8–3 mm long, 1.1–1.6 times as long as lobes, c. 1.5 times as long as sepals; fruit articles 24.5–27 by 14–16 mm ..... **21. A. kabaenae**
b. Inflorescence glabrous, robust, peduncle c. 1.8 mm wide; corolla tube 7–7.5 mm long, 2.1–2.7 times as long as lobes, c. 3.2 times as long as sepals; fruit articles 10.4–11.2 by 7.5–8 mm ..... **8. A. celebica**
18a. Inflorescence a simple unbranched pleiochasium or of axillary unbranched pleiochasia and a terminal compound pleiochasium with only 1 or 2 nodes .... 19
b. No inflorescences of simple unbranched pleiochasia, all compound ..... 53
19a. Inflorescence with only two flowers; leaves at least 5.8 times as long as wide. — Philippines ..... **3. A. angustissima**
b. Inflorescence with more than two flowers; leaves variable, usually less than 5.8 times as long as wide. — Throughout Malesia ..... 20
20a. Bracteoles present ..... 21
b. Bracteoles absent or only on pedicel of terminal flower ..... 31
21a. Corolla tube 1.8–4 mm long; leaves generally fairly small, leaves reaching 2.4–8 cm long ..... 22
b. Corolla tube > 4 mm long; leaves very variable in size but often larger, leaves reaching 1.3–20 cm long ..... 25
22a. Secondary veins weakly prominent beneath; stamens inserted at 1.4–1.6 mm from corolla base; ovary pubescent around base or pubescent in tuft between carpels. — New Guinea ..... 23
b. Secondary veins obscure or only weakly visible beneath; stamens inserted at 2.2–3.7 mm from corolla base; ovary pubescent all over. — New Guinea and the Philippines ..... 24
23a. Branchlets glabrous; corolla tube glabrous outside; leaf short to long acuminate and rounded at tip, leaves reaching 5.1–6.6 cm long ..... **42. A. papuana**
b. Branchlets densely puberulent, corolla tube sparsely puberulent around top of tube outside; leaf acuminate but notched at the apex, leaves reaching c. 2.4 cm long ..... **33. A. microphylla**
24a. Inflorescence not delicate, peduncle 0.7–1.8 mm wide; corolla lobes glabrous or pubescent only at base of lobes inside; fruit articles 12.8–21.5 mm long; leaves 1–3.9 times as long as wide. — New Guinea ..... **64. A. subalpina**
b. Inflorescence delicate, peduncle 0.5–0.8 mm wide; corolla lobes sparsely pubescent at the tips and base of lobes inside; fruit articles 9–11.5 mm long; leaves 2.9–6 times as long as wide. — Philippines, Borneo, Sulawesi ..... **41. A. palawanensis**
25a. Corolla tube continuously pubescent except for base inside; inflorescence robust. — Moluccas, New Guinea and the Philippines ..... 26
b. Corolla tube glabrous inside or pubescent only in upper half or not much beneath a narrow band beneath the stamens; inflorescence usually not robust. — Throughout Malesia ..... 27
26a. Bracts and bracteoles stiff and apparent; corolla lobes 2–2.6 mm long; corolla tube 4–5.1 times as long as lobes; fruit articles 4.7–7.9 mm long; leaves not glaucous beneath. — Moluccas, New Guinea ..... **9. A. composita**

b. Bracts and bracteoles not stiff and apparent; corolla lobes 2.5–4.2 mm long; corolla tube 2–4.1 times as long as lobes; fruit articles 8.6–24.4 mm long; leaves sometimes glaucous beneath. — Philippines ..... **59. A. sibuyanensis**

27a. Corolla never pubescent outside, lobe apex acuminate; leaf apex often acuminate and notched; inflorescence delicate, peduncle 0.4–0.8 mm wide. — Philippines ..... **28. A. luzoniensis**

b. Corolla pubescent outside or not, lobe apex rounded to acute; leaf apex variable but not notched; inflorescence delicate or not, peduncle 0.5–3.8 mm wide. — Not in the Philippines except for Palawan ..... 28

28a. Stamens inserted at 0.57–0.67 of corolla length; corolla tube 3.4–6.2 mm long, only very rarely glabrous outside ..... **64. A. subalpina**

b. Stamens inserted at 0.67–0.87 of corolla length; corolla tube 4.8–14 mm long, glabrous or pubescent outside ..... 29

29a. Leaves very small, reaching 1.3–2 cm long; corolla tube glabrous outside. — New Guinea ..... **54. A. royeniana**

b. Leaves larger, reaching 3.6–17 cm long; corolla tube glabrous or pubescent outside. — West Malesia ..... 30

30a. Corolla tube densely pubescent outside, if glabrous then clearly papillate; leaves often densely tomentose beneath ..... **15. A. ganophylla**

b. Corolla tube glabrous or sparsely puberulent only at top of tube outside; leaves glabrous to puberulent beneath ..... **51. A. reinwardtii**

31a. Corolla tube 1.8–4 mm long ..... 32

b. Corolla tube > 4 mm long ..... 36

32a. Ovary pubescent all over; corolla tube often pubescent outside; corolla lobes often with few hairs or papillate inside ..... 33

b. Ovary glabrous or pubescent in tuft between the carpels; corolla tube glabrous outside; corolla lobes glabrous ..... 34

33a. Inflorescence not delicate, peduncle 0.7–1.8 mm wide; corolla lobes glabrous or pubescent only at base of lobes inside; fruit articles 12.8–21.5 mm long; leaves 1–3.9 times as long as wide. — New Guinea ..... **64. A. subalpina**

b. Inflorescence delicate, peduncle 0.5–0.8 mm wide; corolla lobes sparsely pubescent at the tips and base of lobes inside; fruit articles 9–11.5 mm long; leaves 2.9–6 times as long as wide. — Philippines ..... **41. A. palawanensis**

34a. Branchlets sparsely to densely puberulent; tertiary venation weakly prominent above; inflorescence sparsely to densely puberulent all over; sepals 1.6–1.8 times as long as wide; corolla tube 2.1–2.5 times as long as sepals ..... **5. A. arfakensis**

b. Branchlets glabrous; tertiary venation obscure; inflorescence glabrous; sepals 1.1–1.25 times as long as wide; corolla tube 3.1–3.8 times as long as sepals 35

35a. Leaves in whorls of 3 or 4; leaf blade elliptic; secondary veins indistinct or only weakly distinguishable above; ovary glabrous ..... **69. A. vera**

b. Leaves in whorls of 5; leaf blade obovate; secondary veins distinct above; ovary pubescent in a tuft between the carpels ..... **65. A. sulana**

36a. Secondary veins not visible above ..... 37

b. Secondary veins distinguishable above ..... 42

37a. Leaves usually rounded at both apex and base, rarely to obtuse, thickly coriaceous; bracts < 1 mm long; sepals 0.9–1 mm long; corolla tube c. 5.8 times as long as sepals, c. 3.5 times as long as lobes ..... **36. A. mujongensis**
b. Leaves only rarely rounded at apex and base, if so then bracts longer and corolla tube/sepals ratio lower, leaves papery to thickly coriaceous ..... 38
38a. Leaves thickly coriaceous, often somewhat fleshy ..... 39
b. Leaves papery to coriaceous, not fleshy ..... 41
39a. Stamens inserted at 2.2–3.7 mm from corolla base; corolla tube usually somewhat pubescent outside, not fleshy. — New Guinea ..... **64. A. subalpina**
b. Stamens inserted at 4.2–7.1 mm from corolla base; corolla tube glabrous outside, somewhat fleshy. — West Malesia ..... 40
40a. Leaves ovate to elliptic, if narrowly so then not pubescent beneath; inflorescence usually glabrous, rarely pubescent; fruit articles 13–28.2 mm long, fruit stalks 3.4–15 mm long ..... **40. A. oleifolia**
b. Leaves mostly narrowly elliptic or linear, rarely to ovate, usually sparsely puberulent beneath, sometimes only on midrib; inflorescence puberulent; fruit articles 7.5–10.2 mm long, fruit stalks 1.8–2.1 mm long ..... **2. A. angustifolia**
41a. Stamens inserted at 0.57–0.67 of corolla length; corolla tube 3.4–6.2 mm long, only very rarely glabrous outside. — New Guinea ..... **64. A. subalpina**
b. Stamens inserted at 0.67–0.87 of corolla length; corolla tube 5.4–14 mm long, glabrous or pubescent outside. — West Malesia ..... **51. A. reinwardtii**
42a. Inflorescence glabrous or only very sparsely puberulent in upper parts .... 43
b. Inflorescence sparsely to densely puberulent all over ..... 46
43a. Leaves in whorls of 3, blade thickly coriaceous, often fleshy; flowers somewhat fleshy ..... **40. A. oleifolia**
b. Leaves in whorls of 3–7, blade coriaceous to papery; flowers not fleshy .. 44
44a. Leaves in whorls of 4–7, obovate or spathulate, apex emarginate to, rarely, acuminate, often folded back; stamens inserted at 0.5–0.69 of corolla tube length; not all inflorescences on a branch simple pleiochasia. — New Guinea .... 45
b. Leaves in whorls of 3–5, only rarely obovate, never spathulate, apex caudate to rounded, not folded back; stamens inserted at 0.67–0.87 of corolla tube length; most inflorescences simple pleiochasia. — West Malesia **51. A. reinwardtii**
45a. Corolla tube 4.1–5 mm long; branchlets pubescent, sometimes glabrescent .. ..... **7. A. cacuminum**
b. Corolla tube 6.3–6.9 mm long; branchlets glabrous ..... **47. A. pullei**
46a. Leaves in whorls of 5–7 ..... 47
b. Leaves in whorls of 3 or 4 ..... 48
47a. Leaves obovate or spathulate, apex emarginate to, rarely, acuminate, often folded back, in whorls of 5–7; stamens inserted at 0.5–0.64 of corolla tube length; not all inflorescences on a branch simple pleiochasia. — New Guinea ..... ..... **7. A. cacuminum**
b. Leaves only rarely obovate, never spathulate, apex caudate to rounded, not folded back, in whorls of 3–5; stamens inserted at 0.67–0.87 of corolla tube length; most inflorescences simple pleiochasia. — West Malesia **51. A. reinwardtii**
48a. Stamens inserted at > 4 mm from corolla base; corolla tube 4.8–14 mm long ..... 49

b. Stamens inserted at 2.2–4 mm from corolla base; corolla tube 4–6.2 mm long ..... 51

49a. Inflorescence robust, peduncle 1.3–2.8 mm wide; leaves frequently obovate; secondary venation prominent above. — New Britain and the Solomon Islands ..... **23. A. kwalotabaa**

b. Inflorescence not robust, peduncle 0.5–1.3(–1.4) mm wide; leaves only rarely obovate; secondary venation obscure to prominent above. — West Malesia .. ..... 50

50a. Leaves in whorls of 3, blade thickly coriaceous, often fleshy, often strongly revolute; flowers somewhat fleshy ..... **40. A. oleifolia**

b. Leaves in whorls of 3–5, blade coriaceous to papery, rarely revolute; flowers not fleshy ..... **51. A. reinwardtii**

51a. Inflorescences not all simple pleiochasia, mostly with several internodes and unbranched side branches; usually with a clear intramarginal nerve inset from margin; corolla bud head 0.37–0.4 of bud length ..... **20. A. halmaheirae**

b. Inflorescences hardly ever with several internodes and unbranched side branches, if so then without a clear intramarginal nerve inset from margin; corolla bud head 0.2–0.32(–0.42 outside Malesia) of bud length ..... 52

52a. Stamens inserted at 0.57–0.67 of corolla length; corolla tube 3.4–6.2 mm long, only very rarely glabrous outside. — New Guinea ..... **64. A. subalpina**

b. Stamens inserted at 0.67–0.87 of corolla length; corolla tube 5.4–14 mm long, glabrous or, very rarely, pubescent outside. — West Malesia ..... ..... **51. A. reinwardtii**

53a. Inflorescences frequently branched and forming large, lax terminal panicles formed from axillary and terminal inflorescences, often longer than the leaves ..... 54

b. Inflorescences of various sorts of compound pleiochasia but not forming large lax panicles and generally shorter than the leaves ..... 58

54a. Pedicels with one bracteole immediately beneath the calyx; stamens inserted above the middle of the corolla tube ..... 55

b. Pedicels with two bracteoles on the pedicel or without bracteoles; stamens inserted below the middle of the corolla tube (latter character not known in *A. manusiana*) ..... 56

55a. Corolla lobes elliptic, c. 0.9 mm wide; corolla tube 1.6 times as long as lobes; stamens inserted at 1.2 mm from corolla base, 0.52 of tube length ..... ..... **49. A. purpureoclada**

b. Corolla lobes ovate or orbicular, c. 1.1 mm wide; corolla tube 2.5–2.7 times as long as lobes; stamens inserted at 2.2–2.3 mm from corolla base, 0.65–0.7 of tube length ..... **13. A. floribunda**

56a. Leaf margin weakly inrolled; inflorescence 3.5–7 cm long; fruit articles 5.3–7.3 mm long ..... **29. A. manusiana**

b. Leaf margin flat; inflorescence 4.3–16.5 cm long; fruit articles 5.5–19 mm long ..... 57

57a. Sepals 1.2–1.7 mm long; ovary pubescent around base only or pubescent in tuft between carpels; fruit articles 5.5–9.9 by 4.3–6.5 mm ..... **53. A. rostrata**

b. Sepals 2.1–2.9 mm long; ovary densely pubescent all over; fruit articles 11.5–19 by 8.7–13 mm ..... **52. A. ridleyana**
58a. Inflorescences exclusively terminal ..... 59
b. Inflorescences not exclusively terminal ..... 60
59a. Leaf apex caudate; secondary veins 50–58 pairs; inflorescence c. 2 cm long, delicate; pedicels 4–5 mm long; corolla tube c. 2.6 mm long ..... **62. A. sogerensis**
b. Leaf apex emarginate to acuminate and then often notched at the apex; secondary veins 28–46 pairs; inflorescence 1.1–1.5 cm long, robust; pedicels 0–0.8 mm long; corolla tube 6.7–7.4 mm long ..... **25. A. laurina**
60a. Secondary veins prominent, not particularly distinct from prominent tertiary venation so appearing densely packed, > 100 pairs ..... 61
b. Secondary veins variable, distinct or not, sometimes obscure, < 100 pairs . 62
61a. Inflorescence glabrous, 4–9 cm long ..... **13. A. floribunda**
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81a. Corolla lobe apex acuminate; leaves reaching 2.5–7 cm long, often notched at the apex even if acuminate; ovary pubescent all over. — Philippines ..... **28. A. luzoniensis**
b. Corolla lobe apex rounded to acute, very rarely to acuminate but then leaves > 10 cm long, not notched; ovary glabrous, pubescent around base only or pubescent all over. — Throughout Malesia ..... 82
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b. Corolla tube glabrous inside or pubescent only in upper half or not much beneath a narrow band beneath the stamens; leaves glabrous to densely tomentose beneath; fruit usually with no more than 2 articles in a chain. — Philippines and West Malesia ..... 85

84a. Inflorescence mostly with clear internodes, pubescent; leaves reaching 3–10.5 cm long, not strongly revolute; several articles in a fruit, globose or subglobose, 4.5–8.8 by 4.3–6.8 mm ..... **10. A. concatenata**

b. Inflorescence mostly congested, rarely with clear internodes, glabrous to pubescent; leaves reaching 10–20 cm long, sometimes strongly revolute; 1 or 2 articles in a chain in the fruit, ellipsoid, 8.6–24.4 by 6.5–16 mm ..... **59. A. sibuyanensis**

85a. Bracts generally persistent and apparent in inflorescence; leaves glabrous; corolla glabrous outside; several articles in a fruit, globose or subglobose, 4.5–8.8 by 4.3–6.8 mm. — Philippines ..... **10. A. concatenata**

b. Bracts not always persistent, generally small and insignificant in inflorescence; leaves glabrous to pubescent; corolla glabrous to densely pubescent outside; 1 or 2 articles in a chain in the fruit, ellipsoid, 6–25.3 by 4.8–11.4 mm. — Not in the Philippines except for Palawan ..... 86

86a. Corolla tube densely pubescent outside, very rarely glabrous but then clearly papillate; leaves often densely tomentose beneath ..... **15. A. ganophylla**

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88a. Corolla tube continuously pubescent except for base inside; inflorescence robust; bracts and bracteoles stiff and apparent. — Moluccas and New Guinea ..... **9. A. composita**

b. Corolla tube glabrous inside or pubescent only in upper half or not much beneath a narrow band beneath the stamens; inflorescence usually not robust; bracts and bracteoles not stiff and apparent. — West Malesia ..... 89

89a. Inflorescence 2.5–9 cm long, usually densely pubescent, rarely to glabrous; fruit articles 17–30 cm long. — Sumatra and Peninsular Malaysia ... **44. A. pilosa**

b. Inflorescence 1–3.5 cm long, only very rarely densely pubescent; fruit articles 6–20(–25.3) mm long. — Widespread in West Malesia ... **51. A. reinwardtii**

90a. Peduncle c. 2.3 mm wide; intramarginal nerve clear and inset from margin; leaves in whorls of 6, emarginate to rounded at apex. — Sulawesi .... **24. A. lackii**

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91a. Stamens inserted at 0.57–0.67 of corolla length; corolla tube only very rarely glabrous outside. — New Guinea ..... **64. A. subalpina**

b. Stamens inserted at 0.67–0.87 of corolla length; corolla tube mostly glabrous, rarely sparsely pubescent outside. — West Malesia ..... **51. A. reinwardtii**

92a. Corolla lobes linear, c. 3 times as long as wide; corolla tube 1.1–2.2 mm long; inflorescence delicate; fruit articles globose, 5.8–7.4 by 4.8–7 mm. — Sulawesi ..... **16. A. globosa**

b. Corolla lobes orbicular to elliptic, 0.7–3 times as long as wide; corolla tube 1.4–14 mm long; inflorescence variable; fruit articles globose to ellipsoid, 4.7–54 by 4.6–28 mm. — Throughout Malesia ..... 93
93a. Leaves in whorls of 4–7 ..... 94
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94a. Corolla tube 1.4–5 mm long ..... 95
b. Corolla tube > 5 mm long ..... 104
95a. Inflorescences with c. 25–27 flowers; leaves sharply acuminate; corolla tube 1.4–2.1 mm long, glabrous to only sparsely pubescent outside ..... **55. A. scabrida**
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96a. Inflorescence glabrous ..... 97
b. Inflorescence densely pubescent to sparsely pubescent at least in upper parts ..... 98
97a. Corolla tube 1.8–3.8 mm long; leaf apex not folded back; 1.6–9.3 mm between fruit articles ..... **31. A. markgrafii**
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98a. Leaves in whorls of 5–7 ..... 99
b. Leaves in whorls of 4 ..... 100
99a. Corolla glabrous outside, 4.1–5 mm long. — New Guinea ..... **7. A. cacuminum**
b. Corolla pubescent around top of tube and lobes outside, 2.3–2.7 mm long. — Sulawesi ..... **34. A. minutiflora**
100a. Corolla tube and lobes glabrous outside ..... 101
b. Corolla tube and/or lobes pubescent outside ..... 102
101a. Inflorescence delicate, peduncle 0.5–0.8 mm wide; sepal apex acute to acuminate; corolla bud head apex acute to acuminate; leaves with 19–80 pairs of secondary veins. — Moluccas and Sulawesi ..... **20. A. halmaheirae**
b. Inflorescence not delicate, peduncle 0.7–1.8 mm wide; sepal apex rounded to acute; corolla bud apex rounded to acute; leaves with 11–36 pairs of secondary veins. — New Guinea ..... **64. A. subalpina**
102a. Corolla lobes 0.8–1.6 times as long as wide, tube 2.5–6.2 mm long. — New Guinea ..... 103
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103a. Leaves mostly thickly coriaceous, rarely to subcoriaceous, reaching 2.5–8 cm long; branchlets mostly densely pubescent, rarely to glabrous. Altitude (650–) 1400–3260 m ..... **64. A. subalpina**
b. Leaves subcoriaceous to coriaceous, reaching 8.6–18 cm long; branchlets glabrous to sparsely puberulent. Altitude 0–1950 m ..... **1. A. acuminata**
104a. Ovary pubescent in tufts between the carpels; leaves mostly spathulate, sometimes obovate ..... **47. A. pullei**
b. Ovary glabrous to densely pubescent all over but not in tufts between the carpels; leaves never spathulate ..... 105

105a. Stamens inserted at 0.57–0.67 of corolla length; corolla tube 2.5–6.2 mm long, densely pubescent around top of tube and lobes outside, only very rarely to glabrous. — New Guinea ..... 106
b. Stamens inserted at 0.67–0.87 of corolla length; corolla tube 5.4–14 mm long, glabrous or sparsely pubescent outside. — West Malesia ..... 107
106a. Leaves mostly thickly coriaceous, rarely to subcoriaceous, reaching 2.5–8 cm long; branchlets mostly densely pubescent, rarely to glabrous. Altitude 1400–3260 m ..... **64. A. subalpina**
b. Leaves subcoriaceous to coriaceous, reaching 8.6–18 cm long; branchlets glabrous to sparsely puberulent. Altitude 0–1950 m ..... **1. A. acuminata**
107a. Inflorescence 2.5–9 cm long, usually densely pubescent, rarely to glabrous, at least some inflorescences on a branch with several internodes; fruit articles 17–30 cm long. — Sumatra and Peninsular Malaysia ..... **44. A. pilosa**
b. Inflorescence 1–3.5 cm long, only very rarely densely pubescent, most inflorescences simple pleiochasia; fruit articles 6–20(–25.3) mm long. — Widespread in West Malesia ..... **51. A. reinwardtii**
108a. Leaf blade very thickly coriaceous ..... 109
b. Blade papery to coriaceous ..... 110
109a. Corolla tube 6.6–10.5 mm long, somewhat fleshy; stamens inserted at 4.9–7.1 mm from corolla base, 0.63–0.78 of tube length. — West Malesia ..... **40. A. oleifolia**
b. Corolla tube 3.4–6.2 mm long, not fleshy; stamens inserted at 2.2–3.7 mm from corolla base, 0.57–0.67 of tube length. — New Guinea ..... **64. A. subalpina**
110a. Corolla lobes < 1 mm long, tube c. 2.2 mm long. — New Guinea ..... **46. A. pugio**
b. Corolla lobes 1.2–3.8 mm long, 1.8–14 mm long. — Throughout Malesia ..... 111
111a. Corolla lobe apex acuminate; leaves strongly undulate at margin, apex long acuminate to caudate; inflorescences delicate. — New Guinea ..... **61. A. sleumeri**
b. Corolla lobe apex rounded to acute; leaf margin variable, apex emarginate to long acuminate, very rarely to caudate; inflorescences delicate to robust. — Throughout Malesia ..... 112
112a. Inflorescence glabrous ..... 113
b. Inflorescence sparsely to densely puberulent ..... 116
113a. Ovary pubescent in a tuft between the carpels or very sparsely pubescent only around the base; fruits with up to 7 articles in a chain. — New Guinea ..... **31. A. markgrafii**
b. Ovary glabrous, pubescent all over or densely pubescent only around base; fruits with only up to 2 articles in a chain. — New Guinea or West Malesia ..... 114
114a. Corolla tube 3.5–3.7 mm long. — New Guinea ..... **11. A. defoliata**
b. Corolla tube 5.4–14 mm long. — West Malesia ..... 115

115a. Inflorescence 2.5–9 cm long, usually densely pubescent, rarely to glabrous, at least some inflorescences on a branch with several internodes; fruit articles 17–30 cm long. — Sumatra and Peninsular Malaysia ..... **44. A. pilosa**

b. Inflorescence 1–3.5 cm long, only very rarely densely pubescent, most inflorescences simple pleiochasia; fruit articles 6–20(–25.3) mm long. — Widespread in West Malesia ..... **51. A. reinwardtii**

116a. Corolla tube > 4 mm long ..... 117

b. Corolla tube 2.3–4 mm long ..... 121

117a. Leaves shiny above; corolla bud head acuminate, 0.37–0.4 of bud length. — Moluccas and Sulawesi ..... **20. A. halmaheirae**

b. Leaves usually dull above; corolla bud head rounded to acute, very rarely acuminate, 0.18–0.32(–0.42 outside Malesia) of bud length. — West Malesia and New Guinea ..... 118

118a. Stamens inserted at 0.57–0.67 of corolla length; corolla tube 2.5–6.2 mm long, densely pubescent around top of tube and lobes outside, only very rarely to glabrous. — New Guinea ..... 119

b. Stamens inserted at 0.67–0.87 of corolla length; corolla tube 5.4–14 mm long, glabrous or sparsely pubescent outside. — West Malesia ..... 120

119a. Leaves mostly thickly coriaceous, rarely to subcoriaceous, reaching 2.5–8 cm long; branchlets mostly densely pubescent, rarely to glabrous. Altitude (650–) 1400–3260 m ..... **64. A. subalpina**

b. Leaves subcoriaceous to coriaceous, reaching 8.6–18 cm long; branchlets glabrous to sparsely puberulent. Altitude 0–1950 m ..... **1. A. acuminata**

120a. Inflorescence 2.5–9 cm long, usually densely pubescent, rarely to glabrous, at least some inflorescences on a branch with several internodes; fruit articles 17–30 cm long. — Sumatra and Peninsular Malaysia ..... **44. A. pilosa**

b. Inflorescence 1–3.5 cm long, only very rarely densely pubescent, most inflorescences simple pleiochasia; fruit articles 6–20(–25.3) mm long. — Widespread in West Malesia ..... **51. A. reinwardtii**

121a. Corolla sparsely to densely pubescent outside ..... 122

b. Corolla tube glabrous outside ..... 124

122a. Corolla lobes elliptic; bud head c. 0.48 of bud length; bracts c. 0.9–1 mm long; fruit articles 6.9–8.2 mm wide ..... **17. A. graciliflora**

b. Corolla lobes ovate or orbicular; bud head 0.26–0.38 of bud length; bracts 1.1–5 mm long; fruit articles 9.6–20 mm wide ..... 123

123a. Leaves mostly thickly coriaceous, rarely to subcoriaceous, reaching 2.5–8 cm long; branchlets mostly densely pubescent, rarely to glabrous. Altitude (650–) 1400–3260 m ..... **64. A. subalpina**

b. Leaves subcoriaceous to coriaceous, reaching 8.6–18 cm long; branchlets glabrous to sparsely puberulent. Altitude 0–1950 m ..... **1. A. acuminata**

124a. Secondary veins indistinct or indistinguishable from tertiary venation above; ovary glabrous or pubescent only in tufts between the carpels ..... **5. A. arfakensis**

b. Secondary veins weak but clear above; ovary pubescent all over or pubescent around base only ..... 125

125a. Peduncle 0.7–0.9 mm wide; sepals 0.4–0.8 mm wide, apex acute; corolla lobes pubescent at base inside; fruit articles 15–16.2 mm long ..... **17. A. graciliflora**

b. Peduncle 1.4–1.5 mm wide; sepals 1.1–1.3 mm wide, apex rounded to obtuse; corolla lobes glabrous or papillate inside; fruit articles 9–10.5 mm long ..... **11. A. defoliata**

## IDENTIFICATION GUIDE BY REGION

For those species in brackets the particular character is very rare.

**India** — *A. fascicularis* (Wall. ex G. Don) Benth. ex Hook.f., *A. gracilis* (Wall. ex A.DC.) Benth. ex Hook.f.

Strong intramarginal vein — *A. fascicularis*
Inflorescence of lax panicles, inflorescences of simple pleiochasia absent — *A. gracilis*

**China (including Taiwan)** — *A. balansae* Pit., *A. funingensis* Tsiang & P.T. Li, *A. hainanensis* Merr. & Chun, *A. menglungensis* Tsiang & P.T. Li, *A. reinwardtii* Blume, *A. schlechteri* H. Lév., *A. sibuyanensis* Elmer, *A. sinensis* Champ. ex Benth.

Large branched inflorescence with tiny flowers — *A. balansae, A. menglungensis*
Corolla tube pubescent outside — *A. menglungensis*
Strong intramarginal vein — *A. funingensis*
Large flowers, Lanyu Island — *A. sibuyanensis*
Mostly with a simple unbranched inflorescence — *A. reinwardtii,* (*A. funingensis*)
Low growing scramblers — *A. schlechteri, A. sinensis*
Inflorescences congested cymes in leaf axils with very small flowers — *A. sinensis*
Ovary pubescent in a tuft between the carpels — *A. hainanensis*
Fruit articles about 2 cm long or more (unknown in *A. menglungensis*) — *A. sibuyanensis, A. balansae,* (*A. reinwardtii*)

**Burma** — *A. funingensis* Tsiang & P.T. Li, *A. gracilis* (Wall. ex A.DC.) Benth. ex Hook.f., *A. reinwardtii* Blume

Inflorescence of lax panicles, inflorescences of simple pleiochasia absent — *A. gracilis*
Strong intramarginal vein — *A. funingensis*
Mostly with a simple unbranched inflorescence — *A. reinwardtii*

**Thailand** — *A. reinwardtii* Blume, *A. schlechteri* H. Lév., *A. siamensis* Craib, *A. thailandica* D.J. Middleton

Mostly with a simple unbranched inflorescence — *A. reinwardtii*
Large branched inflorescence with small flowers — *A. siamensis*
Inflorescence hispid, corolla bud head acuminate — *A. schlechteri, A. thailandica*

**Indochina** — *A. annamensis* Pit., *A. balansae* Pit., *A. hainanensis* Merr. & Chun, *A. marginata* Pit., *A. nathoi* Lý, *A. pseudosinensis* Pit., *A. racemosa* Pit., *A. reinwardtii* Blume, *A. sinensis* Champ. ex Benth.

All parts with dense long hairs — *A. nathoi*
Thickly coriaceous leaves, corolla bud head c. 4.5 mm long — *A. marginata*

Large branched inflorescence with tiny flowers — *A. annamensis, A. balansae, A. racemosa*
Branchlets glabrous — *A. annamensis, A. hainanensis, A. pseudosinensis, A. racemosa, A. reinwardtii, A. sinensis*
Mostly with a simple unbranched inflorescence — *A. reinwardtii*
Ovary glabrous — *A. racemosa*
Ovary pubescent in a tuft between the carpels — *A. hainanensis*

**Philippines** — *A. angustifolia* Ridl., *A. angustissima* Merr. & Quisumb., *A. concatenata* (Blanco) Merr., *A. ganophylla* Markgr., *A. linearis* Markgr., *A. luzoniensis* Merr., *A. muguma* D.J. Middleton, *A. palawanensis* Markgr., *A. parvifolia* (Merr.) Merr., *A. reinwardtii* Blume, *A. sibuyanensis* Elmer

Leaves opposite — *A. linearis, (A. luzoniensis)*
Leaves in whorls of 5 or more — *A. angustissima, A. palawanensis, A. reinwardtii, A. sibuyanensis*
Flowers solitary — *A. angustissima, A. linearis, A. parvifolia*
Inflorescence a simple pleiochasium — *A. angustifolia, A. luzoniensis, A. palawanensis, A. reinwardtii, A. sibuyanensis*
Inflorescence of a long peduncle and flowers clustered at apex — *A. muguma, A. luzoniensis*
Corolla pubescent almost to base inside — *A. sibuyanensis*
Corolla tube 10 mm or more in length — *A. concatenata, A. reinwardtii, A. sibuyanensis*
Fruits in long chains of globose articles — *A. concatenata*

**Peninsular Malaysia and Sumatra** — *A. angustifolia* Ridl., *A. ganophylla* Markgr., *A. oleifolia* King & Gamble, *A. pilosa* Miq., *A. reinwardtii* Blume

[This is a particularly difficult group of species for which the key is really needed]
Leaf margins strongly revolute — *A. angustifolia, A. ganophylla, A. oleifolia*
Corolla tube densely pubescent outside — *A. ganophylla*
Corolla tube sparsely pubescent or papillose outside — *A. angustifolia, A. ganophylla, A. reinwardtii*
Corolla tube glabrous outside — *A. angustifolia, A. oleifolia, A. pilosa, A. reinwardtii*

**Java** — *A. reinwardtii* Blume

**Lesser Sunda Islands** — *A. reinwardtii* Blume, *A. spicata* R.Br.

Flowers subsessile — *A. spicata*
Fruit globose — *A. spicata*
Mostly with a simple unbranched inflorescence — *A. reinwardtii*

**Borneo** — *A. angustifolia* Ridl., *A. ganophylla* Markgr., *A. mujongensis* Markgr., *A. oleifolia* King & Gamble, *A. palawanensis* Markgr., *A. reinwardtii* Blume

Leaf margins strongly revolute — *A. angustifolia, A. ganophylla, A. oleifolia*
Leaves small, inflorescences delicate — *A. mujongensis, A. palawanensis*
Flowers sometimes solitary — *A. mujongensis*
Corolla tube densely pubescent outside — *A. ganophylla*

**Sulawesi** — *A. celebica* D.J. Middleton, *A. ganophylla* Markgr., *A. globosa* D.J. Middleton, *A. halmaheirae* Miq., *A. kabaenae* Markgr., *A. kendarica* Markgr., *A. lackii* D.J. Middleton, *A. minutiflora* D.J. Middleton, *A. palawanensis* Markgr., *A. sulana* Markgr., *A. uniflora* D.J. Middleton

Leaves in whorls of 5 or more — *A. lackii, A. minutiflora, A. palawanensis, A. sulana*
Flowers solitary — *A. uniflora*
Flowers in a delicate inflorescence with clear internodes and no additional side branching — *A. globosa, A. halmaheirae, A. kabaenae, A. kendarica, A. minutiflora*
Flowers in a simple pleiochasium — *A. palawanensis, A. sulana*
Calyx fused into a two lipped tube — *A. celebica, A. kabaenae*
Corolla tube densely pubescent outside — *A. ganophylla, A. minutiflora*
Corolla tube shorter than lobes — *A. globosa, A. kendarica*

**Moluccas** — *A. composita* Warb., *A. halmaheirae* Miq., *A. oblongata* Domin, *A. sulana* Markgr., *A. vera* D.J. Middleton

Leaves with a mucronate apex — *A. oblongata*
Inflorescence robust with stiff bracteoles — *A. composita*
Inflorescence a delicate simple pleiochasium with tiny flowers — *A. sulana, A. vera*
Flowers in a delicate inflorescence with clear internodes and no further side branching — *A. halmaheirae*
Ovary glabrous — *A. vera*

**New Guinea** — *A. acuminata* K. Schum., *A. arfakensis* Kaneh. & Hatus., *A. cacuminum* Markgr., *A. composita* Warb., *A. defoliata* Markgr., *A. floribunda* Markgr., *A. graciliflora* D.J. Middleton, *A. kwalotabaa* D.J. Middleton, *A. laurina* Gaudich., *A. longiloba* D.J. Middleton, *A. manusiana* D.J. Middleton, *A. markgrafii* Tsiang, *A. microphylla* Markgr., *A. multistriata* Markgr., *A. oblongata* Domin, *A. papuana* D.J. Middleton, *A. pugio* Markgr., *A. pullei* Markgr., *A. punctata* Kaneh. & Hatus., *A. purpureoclada* Kaneh. & Hatus., *A. ridleyana* Wernham, *A. rostrata* (Markgr.) Markgr., *A. royeniana* Markgr., *A. scabrida* Markgr., *A. semipallescens* F. Muell., *A. sleumeri* Markgr., *A. sogerensis* Wernham ex S. Moore, *A. spicata* R. Br., *A. subalpina* Markgr., *A. tetraquetra* Markgr.

Leaves punctate beneath — *A. punctata,* (*A. sleumeri*)
Leaves mucronate — *A. oblongata*
Leaves opposite — *A. composita, A. multistriata, A. sogerensis* (all three species are more commonly verticillate)
Inflorescence only terminal — *A. laurina, A. oblongata*
Inflorescence a simple pleiochasium — *A. arfakensis, A. cacuminum, A. composita, A. kwalotabaa, A. microphylla, A. papuana, A. pullei, A. royeniana, A. subalpina*
Inflorescence several times branched — *A. floribunda, A. manusiana, A. purpureoclada, A. ridleyana, A. rostrata, A. scabrida*
Flowers solitary — (*A. microphylla*), *A. punctata, A. royeniana, A. semipallescens*
Flowers more or less sessile — *A. acuminata, A. composita, A. laurina, A. oblongata, A. scabrida, A. spicata, A. tetraquetra*
Sepals somewhat fused around base — *A. floribunda, A. purpureoclada*

Corolla pubescent outside — *A. acuminata, A. cacuminum, A. graciliflora, A. microphylla, A. ridleyana, A. scabrida, A. spicata, A. subalpina, A. tetraquetra*
Corolla lobes narrowly elliptic or linear (> 3 times as long as wide) — *A. longiloba, A. oblongata, A. spicata*
Stamens inserted around or below middle of corolla tube — *A. ridleyana, A. rostrata*
Ovary glabrous — *A. arfakensis, A. floribunda, A. purpureoclada*
Fruit articles 4 or more in a string — *A. floribunda, A. markgrafii, A. purpureoclada, A. rostrata*

## 1. Alyxia acuminata K. Schum. — Map 1

*Alyxia acuminata* K. Schum. in K. Schum. & Hollrung, Fl. Kaiser Wilhelmsland (1889) 110; Markgr., Nova Guinea 14, 2 (1927) 279; Bot. Jahrb. Syst. 61 (1927) 181; Blumea 23 (1977) 390, p.p. — *Gynopogon acuminatus* (K. Schum.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — Type: *Hollrung 762* (holo B†; lecto K, designated here; iso BO, MEL, P) from Papua New Guinea, West Sepik Province, August.

*Alyxia acuminata* K. Schum. var. *lancifolia* Markgr., Nova Guinea 14, 2 (1927) 280; Bot. Jahrb. Syst. 61 (1927) 182. — Type: *Gjellerup 987* (holo U; iso A (scrap), BO, K, L) from Indonesia, Irian Jaya, Humboldt Bay.

*Alyxia acuminata* K. Schum. var. *montana* Markgr., Bot. Jahrb. Syst. 61 (1927) 182. — Type: *Ledermann 10967, 11429, 12915, 12941*, syntypes, all lost. Markgraf himself synonymised this variety in 1977.

*Alyxia maluensis* Markgr., Bot. Jahrb. Syst. 61 (1927) 185; Blumea 23 (1977) 395, p.p. — Type: *Ledermann 6942* (holo B†; lecto SING, designated here) from Papua New Guinea, East Sepik, Malu.

*Alyxia clemensiae* Markgr., Blumea 23 (1977) 396 (but not all paratypes). — Type: *J. Clemens 2973* (holo Z; iso BR, Z) from Papua New Guinea, Morobe Province, Yungzaing.

*Alyxia lata* auct. non Markgr.: Markgr., Blumea 23 (1977) 381, p.p.

*Alyxia multistriata* auct. non Markgr.: Markgr., Blumea 23 (1977) 397, p.p.

*Alyxia scabrida* auct. non Markgr.: Markgr., Blumea 23 (1977) 397, p.p.

*Alyxia fragrans* auct. non Merr. & L.M. Perry: Markgr., Blumea 23 (1977) 398, p.p.

*Alyxia blancoi* auct. non Merr.: Markgr., Blumea 23 (1977) 401, p.p.

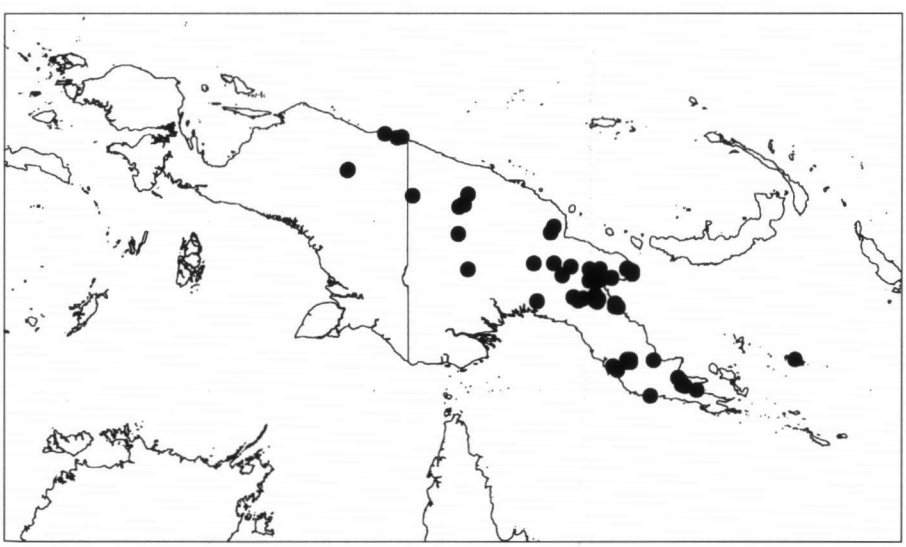
*Alyxia sogerensis* auct. non Wernham ex S. Moore.: Markgr., Blumea 23 (1977) 407, p.p.

Climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent, glabrescent. *Leaves* in whorls of 3 or 4; petiole 0.3–1.1 cm long, glabrous or pubescent; blade coriaceous or subcoriaceous, elliptic, obovate or oblong, apex obtuse to acuminate or cuspidate, base obtuse to decurrent onto petiole, margin weakly inrolled or flat, strongly undulate or not, 3.1–18 by 1.1–7.8 cm, 1.5–3.8 times as long as wide, midrib prominent, sunken or raised and with a central groove above, intramarginal nerve weakly present, inset from margin, secondary veins 15–55 pairs, 60–80° from midrib, strongly prominent to sunken above but mostly simply weakly visible, sometimes obscure, weakly visible or prominent beneath, tertiary venation weakly prominent or flattened above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium, either congested or with clear internodes, or with several internodes and unbranched side branches, sparsely puberulent in upper parts to densely puberulent all over, 1–7.8 cm long; peduncle 0.8–3 cm by 0.9–2 mm; bracts caducous or persistent, ovate or deltoid, 1.1–3 by 0.8–2.2 mm; bracteoles absent; flowers 6–14; pedicels 0–3.5 mm long. *Sepals* ovate, apex obtuse to acuminate, not keeled, 0.8–2.7 by 0.6–1.3 mm, 1.1–2.1

times as long as wide, ciliate, glabrous to densely puberulent, pubescent only at tips or glabrous inside. *Corolla* cream, yellow, with a brown tube and green or white lobes or with a yellowish tube and white lobes; bud head 0.8–2.1 mm long, 0.29–0.38 of bud length, globular, ovate or deltoid, apex rounded to acute; tube cylindrical or slightly inflated, throat with or without thickening, 2.5–5.8 by 1.2–2 mm, 1.3–3.9 times as long as sepals, 1.5–2.5 times as long as lobes, sparsely to densely puberulent around top of tube to densely puberulent for most of outside, glabrous, sparsely pubescent around stamens and more densely in a band beneath them or very sparsely pubescent in upper half of tube inside; lobes ovate or orbicular, apex rounded or obtuse, base auriculate, 1.2–2.4 by 1–3 mm, 0.8–1.6 times as long as wide, sparsely or densely puberulent outside, glabrous, pubescent at base of lobes or papillate inside, ciliate or not ciliate. *Stamens* inserted at 2–3.2 mm from corolla base, 0.57–0.65 of tube length; anther apex 0–0.5 mm from corolla mouth; anthers 0.8–1.3 by 0.3–0.5 mm, 2–3 times as long as wide; filaments 0.3–0.7 mm long. *Ovary* 0.5–1 mm high, densely pubescent all over; style 1–1.6 mm long; pistil head 0.4–0.8 mm long, glabrous or pubescent. *Fruit* yellow, black, yellow-orange, orange, orange turning black, green to bright orange, finally dark purple, or orange-brown (most likely these all suggest an orangish or yellowish fruit which turns black or dark purple when mature), stalks 2.4–8.1 mm long, with 1–3 articles in each string, glabrous, articles dry smooth, fleshy or with thin flesh, 12.5–34 by 9.6–20 mm, ellipsoid or subglobose, symmetrical, apex rounded to acuminate. *Seeds* ruminate, 10.8–30 by 7.3–15 by 6.9–12 mm. Embryo cotyledons wider than radicle, strongly or weakly undulate, embryo 11–28 mm long, cotyledons 0.75–0.89 of embryo length.
(Description based on 330 specimens.)

Distribution — New Guinea.

Habitat — In primary or secondary lowland to montane evergreen, mixed or swamp forest on limestone, well drained to marshy or volcanic soil at 0–1950 m altitude.



Map 1. Distribution of *Alyxia acuminata* K. Schum.

Vernacular names — Dongtoh (Minj), Iamunarre (Mondo), Kan anggum (Kuman), Lapa (Kefamo), Tobna (Togoba).

Typification — Markgraf (1977) designated *Gjellerup 975* as a lectotype for this species. However, the original description was published in 1889 with a collection cited, *Hollrung 762*, still extant in a number of herbaria. *Gjellerup 975* was collected in 1912 so there has clearly been some mistake. The synonym *A. clemensiae* is typified by *Clemens 2973* from the Zurich herbarium. In Zurich there are two duplicates of this collection which are both labelled holotype. One has been labelled as the holotype and the other as an isotype.

Notes — Markgraf (1977) used a number of characters to distinguish this species from *A. spicata* which do not hold up. Both species are glabrous or pubescent on the outside of the corolla and the pubescence of the inflorescence is too variable for it to be reliable. It is, however, true that *A. acuminata* is far more likely to have a pubescent corolla than *A. spicata* and that the inflorescences are generally less densely pubescent in *A. acuminata*. The best characters to distinguish the species are the obviously pedicellate flowers and the corolla lobes which are less than twice as long as wide in *A. acuminata*. *Alyxia acuminata* is closely related to species such as *A. subalpina* and *A. tetraquetra*. *Alyxia acuminata* is a very variable species formerly divided into a number of widespread species distinguished primarily on leaf shape and characters of the inflorescence, such as the number of nodes, which do not hold up to scrutiny. Leaf shape can be very variable within many species of *Alyxia* and even the sensu lato interpretation of the species here has leaves that are not as variable as elsewhere in the genus.

Some specimens of *A. acuminata* approach *A. tetraquetra*, primarily *Pullen 653*, *Schodde & Craven 4767* and *Brass 28742* but these specimens all have more delicate inflorescences and generally larger flowers.

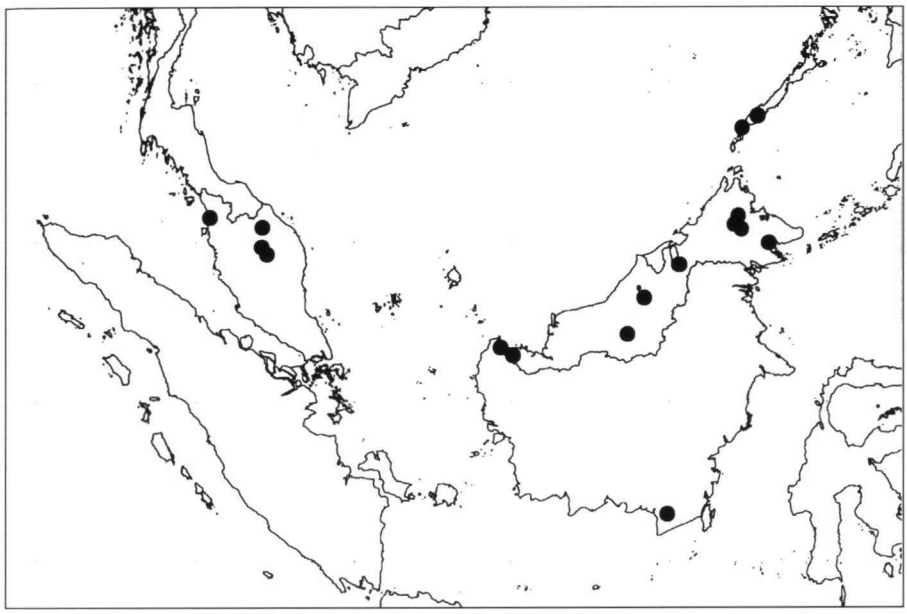
### 2. **Alyxia angustifolia** Ridl. — Map 2

*Alyxia angustifolia* Ridl., J. Fed. Malay States Mus. 6 (1915) 161; Fl. Malay Pen. 2 (1923) 333; Markgr., Blumea 23 (1977) 385, p.p. — Type: *Ridley 16060* (lecto K, designated here; iso A (scrap), BM, SING) from Malaysia, Pahang, Gunong Tahan.

*Alyxia pachyphylla* Merr., J. Straits Branch Roy. Asiat. Soc. 77 (1917) 237; Bibl. Enum. Born. Pl. (1921) 499; Markgr., Blumea 23 (1977) 383, p.p. — Type: *Native Collector 2224* (lecto PNH, designated here; iso A) from Malaysia, Sarawak, Gunong Santubong.

*Alyxia pagonensis* Markgr., Blumea 23 (1977) 385, p.p. — Type: *Ashton BRUN 1886* (holo L) from Brunei, Pagon Ridge.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3 or 4; petiole 0.1–0.5 cm long, glabrous or pubescent; blade thickly coriaceous, linear, narrowly elliptic, elliptic or lanceolate, apex rounded to acuminate, not mucronate, base rounded to decurrent onto petiole, margin weakly or strongly inrolled, not undulate, 1–7.3 by 0.4–1.2 cm, 1.9–9 times as long as wide, midrib sunken above, intramarginal nerve absent, secondary veins indistinct above, obscure beneath, tertiary venation obscure; glabrous to sparsely puberulent only on midrib or all over beneath and glabrous to puberulent on midrib only or all over above. *Inflorescences* axillary or terminal, a simple unbranched pleiochasium, sparsely puberulent all over, c. 2.3 cm long; peduncle 0.3–0.9 cm by 0.7–1 mm; bracts



Map 2. Distribution of *Alyxia angustifolia* Ridl.

caducous or persistent, deltoid, c. 2 by 1 mm; bracteoles absent or only on pedicel of terminal flower; flowers usually 4; pedicels 1.6–5.3 mm long. *Sepals* ovate or lanceolate, apex acute, keeled or not, 1.2–3 by 0.6–1 mm, 2–3.3 times as long as wide, ciliate, glabrous or sparsely puberulent, inside pubescent only at tips or glabrous. *Corolla* white, cream or yellow, slightly fleshy; bud head 1.6–2.8 mm long, 0.22–0.3 of bud length, lanceolate or ovate, apex acute; mature tube cylindrical, 5.7–6.5 by 1.5–1.7 mm, 3–5.4 times as long as sepals, 2.2–3.25 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, sparsely pubescent around stamens and more densely in a band beneath them or very sparsely pubescent in upper half of tube inside, throat with thickening; lobes ovate or orbicular, base auriculate, apex rounded or obtuse, not ciliate or ciliate near tips only, 2–2.6 by 1.6–2.1 mm, 1.2–1.25 times as long as wide, glabrous outside, glabrous or pubescent at base of lobes inside. *Stamens* inserted at 4.2–4.5 mm from corolla base, 0.62–0.66 of tube length; anther apex 0.8–0.9 mm from corolla mouth, anthers 1–1.4 by 0.4–0.5 mm, 2.5–2.8 times as long as wide; filaments 0.4–0.6 mm long. *Ovary* 0.6–0.9 mm high, densely pubescent all over or pubescent around base only; style 2.9–3.9 mm long; pistil head 0.4–0.6 mm long. *Fruit* with 1 article in each string; stalks 1.8–2.1 mm long; articles 7.5–10.2 by 5.8–7.7 mm, ellipsoid, symmetrical, apex rounded to acuminate, sparsely puberulent at ends. *Seeds* ruminate, c. 6.5 by 4.8 by 4.4 mm.
(Description based on 53 specimens.)

Distribution — Peninsular Malaysia, Borneo, Palawan.

Habitat — In forest, scrub, swamp forest or kerengas from 100–1677 m altitude. Reported from ultramafic soils.

Note — Close to *A. oleifolia*. There are also similarities to *A. ganophylla* in the degree of pubescence and the inrolled leaves.

### 3. Alyxia angustissima Merr. & Quisumb. — Map 3

*Alyxia angustissima* Merr. & Quisumb., Philipp. J. Sci. 82 (1954) 334; Markgr., Blumea 23 (1977) 410. — Type: *Celestino 8018* (holo A; iso A, K, L, PNH) from the Philippines, Luzon, Mountain Province, Mt Polis.

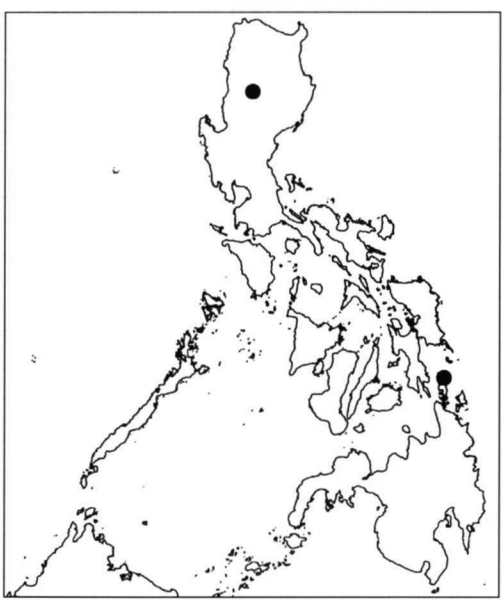
Climbers. *Branchlets* weakly angled, sparsely lenticellate, sparsely puberulent, sometimes glabrescent. *Leaves* in whorls of 3–5; petiole 0.1–0.3 cm long, glabrous or pubescent; blade subcoriaceous to papery, linear to narrowly elliptic, apex acuminate, base cuneate, margin weakly revolute to flat, weakly undulate or not, 1.9–6.5 by 0.2–0.8 cm, 5.8–15.2 times as long as wide, midrib weakly sunken above, no clear intramarginal vein, secondary veins weakly prominent above, obscure beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous or puberulent on midrib only beneath, glabrous above. *Inflorescences* of 2 flowers or of solitary axillary flowers, delicate, glabrous or sparsely puberulent, 1.5–1.7 cm long; bracts persistent, deltoid or leafy; pedicels c. 6 mm long; bracts in a ring around the middle of the pedicel; 2 small bracteoles immediately beneath calyx. *Sepals* ovate, apex acuminate, c. 1.8 by 1 mm, c. 1.8 times as long as wide, ciliate, glabrous. Corollas unknown. *Fruit* with 1 article in each string; stalks 3.4–3.7 mm long; articles with thin flesh, 9–11.4 by 6.2–8 mm, ellipsoid or subglobose, apex rounded, black when mature. *Seeds* c. 6.7 by 5.5 by 5.2 mm.

(Description based on 2 collections made into 7 specimens.)

Distribution — Philippines (Luzon).

Habitat — Reported from Dipterocarp forest on clay.

Note — The only flowering specimen known, the type specimen, has solitary flowers. However, the long thin pedicels have a ring of bracts around the middle in some of which there appears to be a scar where a second flower may have been. Much better collections are needed of this species. See note under *A. linearis*.



Map 3. Distribution of *Alyxia angustissima* Merr. & Quisumb.

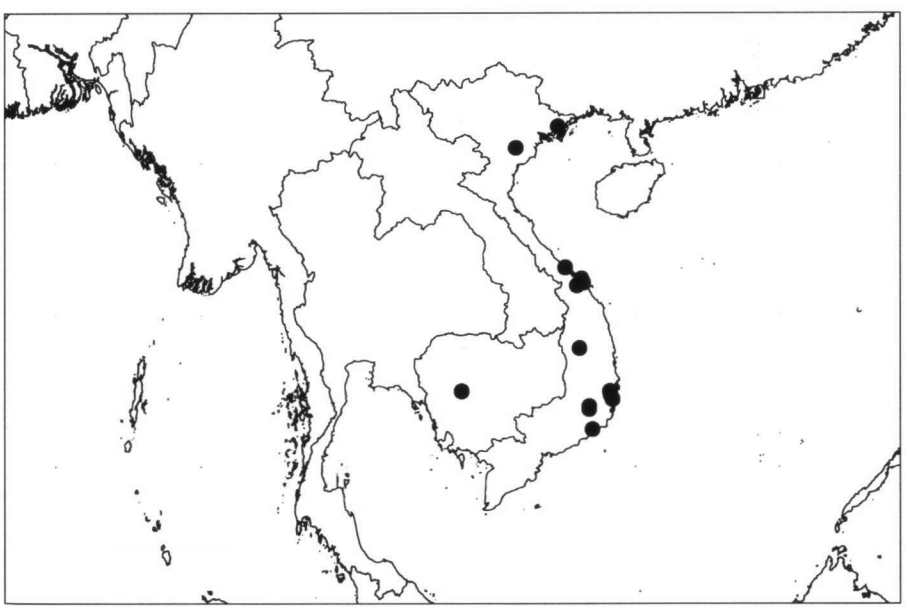
## 4. Alyxia annamensis Pit. — Map 4

*Alyxia annamensis* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1121; Lý, Feddes Repert. 97 (1986) 435. — Type: *Eberhardt 2875* (lecto P, designated here; isolecto P) from Vietnam, Bo-giang.

*Alyxia poilanei* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1122; Lý, Feddes Repert. 97 (1986) 435. — Type: *J. Clemens & M.S. Clemens 3107* (lecto P, designated here; isolecto G, K, NY, US) from Vietnam, Mt Bana.

*Alyxia divaricata* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1122; Lý, Feddes Repert. 97 (1986) 435. — Type: *Poilane 3327* (lecto P, designated here; isolecto P) from Vietnam, Song-mau Valley.

Climbers. *Branchlets* terete or weakly angled, sparsely lenticellate or not, glabrous. *Leaves* opposite or in whorls of 3, coriaceous or subcoriaceous; petiole 0.3–1 cm long, glabrous; blade narrowly to broadly elliptic, obovate or oblong, apex obtuse to acuminate, base rounded to cuneate, margin weakly inrolled, weakly undulate or not, 2.5–13.7 by 1.1–6.4 cm, 1.5–4.9 times as long as wide, midrib slightly to deeply sunken above, intramarginal nerve present or absent, secondary veins 23–38 pairs, 60–75° from midrib, distinct to indistinct and weakly to strongly prominent above, obscure, weakly visible, or weakly prominent beneath, tertiary venation weakly prominent or not above, scalariform or parallel to secondary veins, glabrous beneath, glabrous above, not punctate beneath. *Inflorescences* axillary, a compound pleiochasium with clear internodes, glabrous or sparsely puberulent in upper parts, 1.4–4 cm long; peduncle 0.6–2.3 cm by 0.4–1.2 mm; bracts caducous or persistent, deltoid, 1.2–1.4 by 0.4–0.6 mm; bracteoles 2 on pedicel; flowers 8–15; pedicels 0.6–1.4 mm long. *Sepals* ovate or lanceolate, apex acuminate, keeled, 1.3–1.8 by 0.8–1.4 mm, 1.3–1.9 times as long as wide, ciliate, glabrous or puberulent on tips only, pubescent only at tips



Map 4. Distribution of *Alyxia annamensis* Pit.

inside. *Corolla* yellowish; bud head 1.3–1.6 mm long, ellipsoid or deltoid, apex obtuse, 0.38–0.4 of bud length; tube slightly inflated, 1.8–2.4 mm long, 1.2–1.5 mm wide, glabrous outside, glabrous inside, 1.3–1.5 times as long as sepals, 1.5 times as long as lobes; lobes ovate, apex rounded or obtuse, not ciliate, 1.3–1.6 by 1.1–1.2 mm, c. 1.2 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 1.2–1.7 mm from corolla base, 0.48–0.65 of tube length; filaments 0.3 mm long; anther apex 0.3 mm from corolla mouth, anthers 0.8–1.4 by 0.3–0.4 mm, 2.7–3.5 times as long as wide. *Ovary* 0.5 mm high, pubescent around base only; style 0.5–0.7 mm long; pistil head 0.2–0.3 mm long. *Fruit* with 1 or 2 articles in each string; stalks 1.4–3.5 mm long; articles dry and ribbed when young, then with a thin flesh when mature, 8.3–15.8 by 7–10.5 mm, ellipsoid, brown(?), glabrous. *Seeds* ruminate, oblong or ovoid, 7.2–11.9 by 6.2–7.5 by 4.8–6.5 mm.

(Description based on 36 specimens.)

Distribution — Vietnam, Cambodia.

Habitat — In forest from 400–1900 m altitude.

Note — Very close to *A. racemosa* from which it differs in its slightly larger flowers, shorter sepals in relation to the corolla tube and the ovary pubescent around the base.

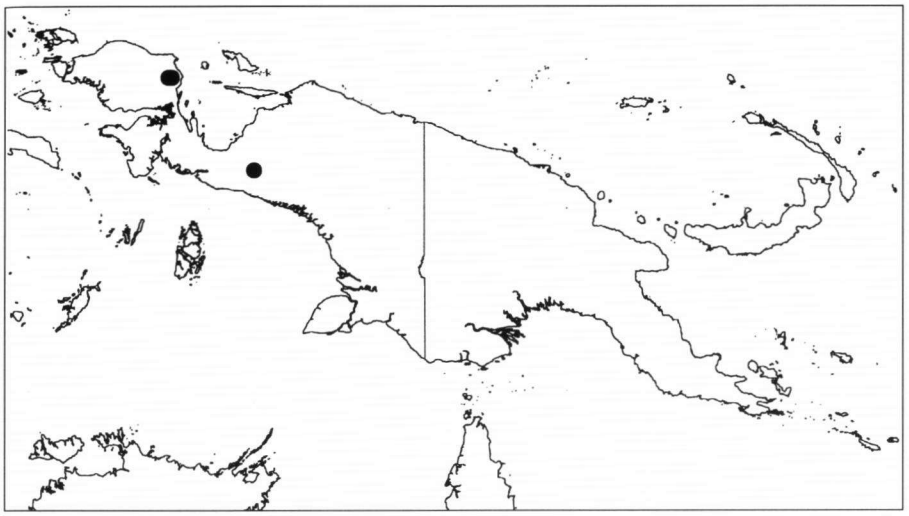
### 5. Alyxia arfakensis Kaneh. & Hatus. — Map 5

*Alyxia arfakensis* Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 489; Markgr., Blumea 23 (1977) 400, p.p. — Type: *Kanehira & Hatusima 13717* (holo FU, n.v., photo of holotype in L; iso A, BO, TI) from Indonesia, Irian Jaya, Manokwari District, Arfak Mts, Anggi Lakes.

*Alyxia punctata* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 404, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2853, p.p.

*Alyxia microphylla* auct. non Markgr.: Markgr., Blumea 23 (1977) 405, p.p.

Reported as erect shrubs (see note). *Branchlets* weakly angled, sparsely lenticellate or not, sparsely to densely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 3, coriaceous or subcoriaceous; petiole 0.1–0.4 cm long, glabrous or pubescent; blade elliptic or obovate, apex acute, shortly acuminate with an obtuse acumen or acuminate but notched at the apex, not mucronate, base cuneate, margin weakly inrolled or flat, weakly or strongly undulate, 1.4–5 by 0.4–2.3 cm, 2–4.2 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve absent, secondary veins 18–41 pairs, 65–75° from midrib, weakly prominent above but not very distinct from tertiary venation, only weakly visible to slightly prominent beneath, tertiary venation weakly prominent above, parallel to secondary veins; glabrous beneath, glabrous or puberulent on midrib only above. *Inflorescences* axillary, a simple unbranched pleiochasium or with 1 or 2 internodes and unbranched side branches, delicate, sparsely to densely puberulent, 0.8–3 cm long; peduncle 0.4–1.7 cm by 0.6–0.9 mm; bracts persistent, deltoid, leafy or lanceolate, 0.6–1.3 by 0.4–0.9 mm wide; bracteoles absent or only on pedicel of terminal flower; flowers 4–8; pedicels 0.7–6.5 mm long. *Sepals* ovate, apex obtuse or acute, not keeled, c. 1.1 by 0.6–0.7 mm, 1.6–1.8 times as long as wide, ciliate, glabrous or sparsely puberulent on centre line or all over, glabrous inside. *Corolla* white; bud head 1.2 mm long, 0.32–0.34 of bud length, ellipsoid, apex rounded; tube slightly inflated, 2.3–2.7 by 0.9–1 mm, 2.1–2.5 times as long as sepals, 1.6–2.25 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them, throat



Map 5. Distribution of *Alyxia arfakensis* Kaneh. & Hatus.

with thickening; lobes elliptic or ovate, base auriculate, apex rounded or obtuse, not ciliate, 1.2–1.4 by 0.9–1 mm, 1.3–1.4 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 1.2–1.8 mm from corolla base, 0.46–0.56 of tube length; anther apex 0.2–0.5 mm from corolla mouth, anthers 0.7–0.8 by 0.3–0.4 mm, 2–2.3 times as long as wide; filaments 0.5 mm long. *Ovary* 0.5 mm high, glabrous or pubescent in tuft between carpels; style 0.8–0.9 mm long; pistil head 0.5 mm long, pubescent. *Fruit* stalks 1.9–2.2 mm long; articles 8.5–10.3 by 6.2–7.2 mm, ellipsoid, symmetrical, apex obtuse, glabrous. *Seeds* c. 8.7 by 4.8 by 4.2 mm; ruminate. Embryo linear, c. 6.5 mm long, cotyledons 0.66 of embryo length.

(Description based on 17 specimens.)

Distribution — New Guinea.

Habitat — In forest from 1950–2400 m altitude.

Note — This species is reported from one herbarium specimen as being an erect shrub. I find this unlikely except when very young. Unfortunately there are very few collections, most of which have no habit information.

### 6. Alyxia balansae Pit. — Map 6

*Alyxia balansae* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1120; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 63; Anonymous, Fl. Yunnanica 3 (1983) 517; Lý, Feddes Repert. 97 (1986) 431. — Type: *Balansa 2106* (lecto P, designated here; iso G, K, P) from Vietnam, Quang Ninh, Mt Bavi.

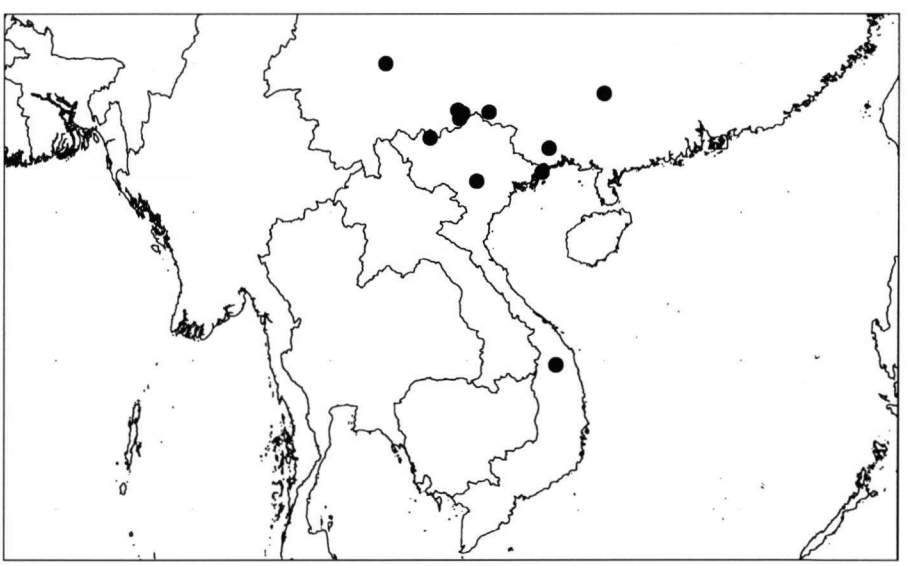
*Alyxia yunkuniana* Tsiang, Sunyatsenia 2 (1934) 107; 3 (1936) 137; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 64; Anonymous, Fl. Yunnanica 3 (1983) 517; Lý, Feddes Repert. 97 (1986) 431. — Type: *Ko 51616* (holo SYS; iso A, K) from China, Guangdong, Sunyi.

*Alyxia villilimba* C.Y. Wu, Acta Phytotax. Sin. 11 (1973) 366; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 73; Anonymous, Fl. Yunnanica 3 (1983) 521; P.T. Li et al., Fl. China 16 (1995) 160. — Type: *C.-A. Wu 8003* (holo KUN) from China, Yunnan, Hsi-Ch'ou.

?*Alyxia kontumensis* Lý, Feddes Repert. 92 (1981) 626; 97 (1986) 435. — Type: *Dao 119* (holo HN, n.v.; iso HN, n.v.) from Vietnam, Gialai-Kontum, Daklei, Dakchoong.

*Alyxia yunkuniana* Tsiang var. *pubescens* P.T. Li, Guihaia 4, 3 (1984) 193. — Type: *C. Wang 41126* (holo IBSC) from China, Guangxi, Na-Po.
*?Alyxia villilimba* C.Y. Wu var. *macrophylla* P.T. Li, Guihaia 4, 3 (1984) 194. — Type: *C.T. Li 602479* (holo IBSC, n.v.) from China, Guangxi, Na-Po.
*Alyxia reinwardtii* auct. non Blume: P.T. Li et al., Fl. China 16 (1995) 160.
*Alyxia siamensis* auct. non Craib: P.T. Li et al., Fl. China 16 (1995) 160.
*Alyxia odorata* auct. non Wall. ex G. Don: P.T. Li et al., Fl. China 16 (1995) 162.

Climbers. *Branchlets* terete or weakly angled, sparsely to densely lenticellate, sparsely to densely minutely puberulent. *Leaves* in whorls of 3 or 4; petiole 0.7–1.1 cm long, pubescent; blade coriaceous to papery, elliptic to obovate, apex acuminate to caudate, base acute to cuneate, margin weakly inrolled or flat, weakly undulate or not, 4.7–13 by 1.1–4.5 cm, 2.1–5.5 times as long as wide, midrib sunken above, intramarginal nerve present, inset from margin, secondary veins 25–36 pairs, 70–80° from midrib, weakly prominent or not above, weakly prominent or not beneath, tertiary venation weakly prominent or not above, parallel to secondary veins; glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent only on midrib above. *Inflorescences* axillary or terminal, an aggregate pleiochasium forming lax panicles, delicate, sparsely to densely puberulent, 4–15 cm long; peduncle 3–4.4 cm by 0.7–1.8 mm; bracts caducous or persistent, deltoid, 1.6–2.6 by 0.8–1 mm; bracteoles 2 on pedicel, small; pedicels 0.8–1.4 mm long. *Sepals* ovate or lanceolate, apex acute or acuminate, not keeled, 0.9–1.4 by 0.5–0.7 mm, 1.8–3.5 times as long as wide, ciliate, densely short puberulent all over. *Corolla* yellowish; bud head 1.2–1.3 mm long, globose, ovate or deltoid, apex obtuse to acute, 0.37–0.41 of bud length; tube slightly inflated, 1.6–1.9 by 1–1.1 mm, glabrous outside, glabrous inside, 1.1–1.8 times as long as sepals, 1.3–1.8 times as long as lobes; lobes ovate, apex obtuse, not ciliate, 0.9–1.2 by 0.7 mm, 1.3–1.7 times as long as wide, glabrous outside, glabrous inside. *Stamens*



Map 6. Distribution of *Alyxia balansae* Pit.

inserted at 1.1–1.2 mm from corolla base, 0.58 of tube length; filaments 0.3 mm long; anther apex 0.1 mm from corolla mouth, anthers 0.8–0.9 by 0.3–0.4 mm, 2–3 times as long as wide. Disk absent. *Ovary* 0.6 mm high, sparsely pubescent all over or pubescent around base only; style 0.5 mm long; pistil head 0.2 mm long. *Fruit* with 1 article in each string, stalks 6–19 mm long; articles fleshy, 23–40 by 13–22 mm, ellipsoid, black, glabrous. *Seeds* ovoid, 20–26.6 by 10–17.5 by 8–9.5 mm.
(Description based on 24 specimens.)

Distribution — Vietnam, southern China.

Note — *Tsai 61494* from Yunnan is possibly a specimen of this species but bears only a couple of immature fruits and has rather unusual leaves for this species. The dimensions are not included in the description but the main difference is that the leaves are very narrowly elliptic, 3.3–5.5 times as long as wide. I have been unable to get hold of the type of *A. kontumensis* Lý but from the description it appears to be a synonym of *A. balansae* and has tentatively been placed in synonymy here. I have also been unable to study any material of *A. villilimba* var. *macrophylla* P.T. Li. This taxon is placed in synonymy here tentatively but from the description would increase the maximum length of the leaves to 20 cm and the petiole to 2 cm. Close to *A. menglungensis*.

### 7. Alyxia cacuminum Markgr. — Map 7

*Alyxia cacuminum* Markgr., Nova Guinea 14, 2 (1927) 281; Bot. Jahrb. Syst. 61 (1927) 186; Blumea 23 (1977) 403, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2851, p.p. — Type: *Versteeg 2463* (lecto L, designated here; isolecto A (fragment), BO, K, U) from Indonesia, Irian Jaya, Kajan Mt.

*Alyxia semipallescens* auct. non F. Muell.: Markgr., Blumea 23 (1977) 403, p.p.

*Alyxia punctata* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 404, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2853, p.p.

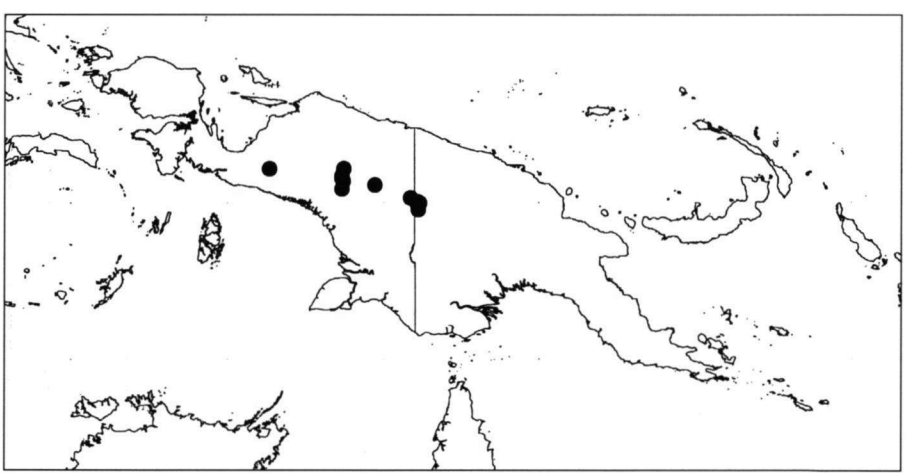
Erect shrubs, ground creepers or climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous to densely and minutely puberulent, often glabrescent. *Leaves* in whorls of 5–7; petiole 0–0.7 cm long, glabrous; blade coriaceous, obovate or spathulate, apex emarginate to acuminate, and then often notched at the apex, or cuspidate, often folded back, base cuneate or decurrent onto petiole, margin strongly inrolled, strongly undulate or not; 1–6.3 by 0.5–2.7 cm, 1.7–3.4 times as long as wide, midrib sunken above, intramarginal nerve weakly present or absent, secondary veins 12–30 pairs, 60–70° from midrib, weakly prominent or not above, obscure or weakly visible beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a simple unbranched pleiochasium or with several internodes and unbranched side branches, delicate to robust, glabrous to densely puberulent, 1.3–2.8 cm long; peduncle 0.5–1.5 cm by 1.1–2.1 mm; bracts persistent, deltoid, 0.8–1.8 by 0.7–1.4 mm; bracteoles absent or only on pedicel of terminal flower; flowers 3–9; pedicels 1–4.5 mm long. *Sepals* ovate, apex rounded or obtuse, keeled or not keeled, 1.2–2.5 by 0.9–2 mm, 0.9–1.9 times as long as wide, ciliate, glabrous or sparsely puberulent all over or only on central line, glabrous inside. *Corolla* white, cream or with tube purplish-brown and lobes creamy; bud head 1.5–2.8 mm long, 0.23–0.43 of bud length, ellipsoid or ovate, apex obtuse or acute; tube cylindrical

or slightly inflated, throat with thickening, 4.1–5 by 1.5–1.9 mm, 1.7–3.6 times as long as sepals, 1.7–3.2 times as long as lobes, glabrous or sparsely puberulent all over outside, pubescent in a band below the stamens inside or sparsely pubescent around stamens and more densely in a band beneath them; lobes elliptic, ovate or orbicular, apex rounded to acute, base auriculate, 1.5–2.6 by 1.2–2.7 mm, 0.96–1.5 times as long as wide, glabrous outside, glabrous or pubescent at tips of lobes inside, not ciliate. *Stamens* inserted at 2.2–3.5 mm from corolla base, 0.5–0.64 of tube length; anther apex 0.3–1 mm from corolla mouth, anthers 1.1–1.5 by 0.4–0.5 mm, 2.2–3.25 times as long as wide; filaments 0.5–0.8 mm long. *Ovary* 0.6–1 mm high, pubescent around base only, very sparsely pubescent all over or pubescent in tuft between carpels; style 1.2–2.3 mm long; pistil head 0.6–1 mm long. *Fruit* black, purple or orange-brown, stalks 0–5.2 mm long, with 1–3 articles in each string, 0–1 mm between articles, glabrous, with thin flesh, 7.5–11.5 by 5–7.7 mm, ellipsoid, globose, subglobose or cylindrical, symmetrical, apex rounded to acute. *Seeds* ovoid, ruminate, 6.9–8.2 by 4.3–5.6 by 4.2–5.2 mm. Embryo linear, 7.2 mm long, cotyledons 0.47 of embryo length. (Description based on 56 specimens.)

Distribution — New Guinea.

Habitat — In submontane, mossy, subalpine or ridge forest, or alpine grassland or scrub on sandstone or peat soil from 2100–3550 m altitude.

Note — Markgraf (1927a) distinguished *A. cacuminum* from *A. pullei* by its smaller flowers and leaves and later (Markgraf, 1927b) also by the degree of pubescence of the ovary. There is a continual variation in leaf size but the flowers are clearly smaller in *A. cacuminum*. There is no difference in the pubescence of the ovaries even between the type specimens. The branchlets of *A. cacuminum* are pubescent or glabrescent, those of *A. pullei* are glabrous. However, there is no doubt that these two species are closely related despite the fact that Markgraf (1977) placed them in separate series. There are several specimens from the Star Mts which have small leaves and characteristically folded back leaves but are otherwise unremarkable.

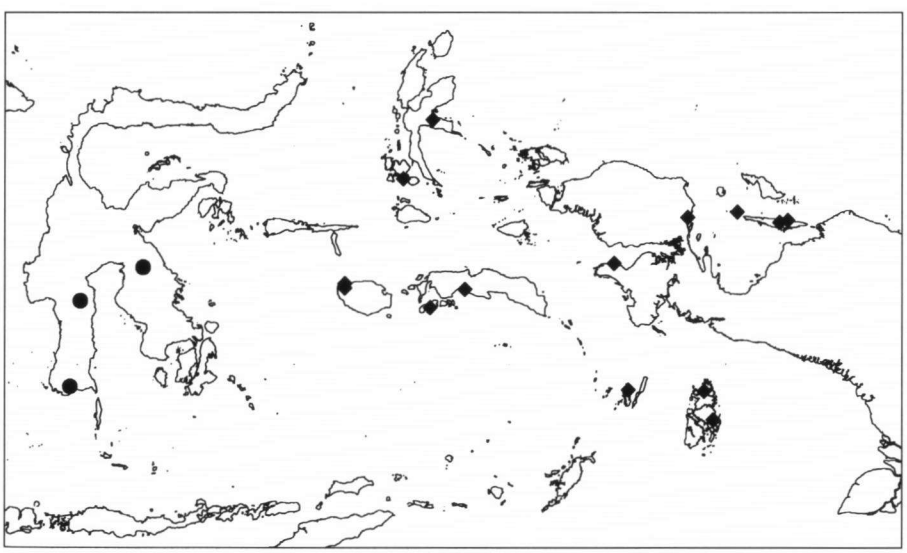


Map 7. Distribution of *Alyxia cacuminum* Markgr.

**8. Alyxia celebica** D.J. Middleton, *spec. nov.* — Fig. 1, Map 8

Frutex scandens. Folia ternata coriacea elliptica. Inflorescentiae axillares circa 7-flores glabrae 2–3 cm longae. Calyx glaber bilobus. Corolla tubo 7–7.5 mm longo lobis 2.6–3.5 mm longis. Ovarium pubescens. Mericarpia 1–2-articulata articulis ellipticis 10.4–19.5 × 7.5–12.5 mm. — Typus: *Jermy, Walker & Sands 468* (holo K; iso A, BO, C, K, L) from Indonesia, Sulawesi Selatan, Enkerang District, Latimojong Mts, Ridge SW of Bunte Tjejeng at 1900 m.

Climber (but see note below). *Branchlets* weakly angled, sparsely lenticellate, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3; petiole 0.6–1.2 cm long, glabrous; blade coriaceous, elliptic, apex acute to shortly acuminate, base cuneate, margin weakly inrolled or flat, weakly undulate, dark green and dull above, yellowish-green beneath, 4–12 by 1–4.4 cm, 2–5 times as long as wide, midrib sunken or raised and with a central groove above, weak intramarginal nerve absent, secondary veins 26–46 pairs, 75–80° from midrib, weakly to strongly prominent above, obscure or weakly visible beneath, tertiary venation weakly prominent or not above, parallel to secondary veins or obscure; glabrous beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescences* axillary, with 1 or 2 internodes and unbranched side branches, robust, glabrous, 2–3 cm long; peduncle 0.8–0.9 cm by 1.8 mm; bracts persistent, deltoid, 2.6–3.2 by 2–2.4 mm wide; bracteoles absent; flowers c. 7; pedicels 1.6–2.5 mm long. *Sepals* fleshy, fused into a 2-lipped tube, 2.2–2.6 mm long, not ciliate, glabrous, glabrous inside. *Corolla* bud head 3.8 mm long, 0.34 of bud length, ovate, apex acute or acuminate; tube cylindrical, 7–7.5 by 1.6 mm, 3.2 times as long as sepals, 2.1–2.7 times as long as lobes, glabrous outside, pubescent in a band below the stamens inside, throat without thickening; lobes orbicular, base auriculate, apex rounded, 2.6–3.5 by 2.2 mm, 1.2 times as long as wide, glabrous outside, glabrous or pubescent at base of lobes inside, not ciliate. *Stamens* inserted at



Map 8. Distribution of *Alyxia celebica* D.J. Middleton (●) and *A. composita* Warb. (◆).

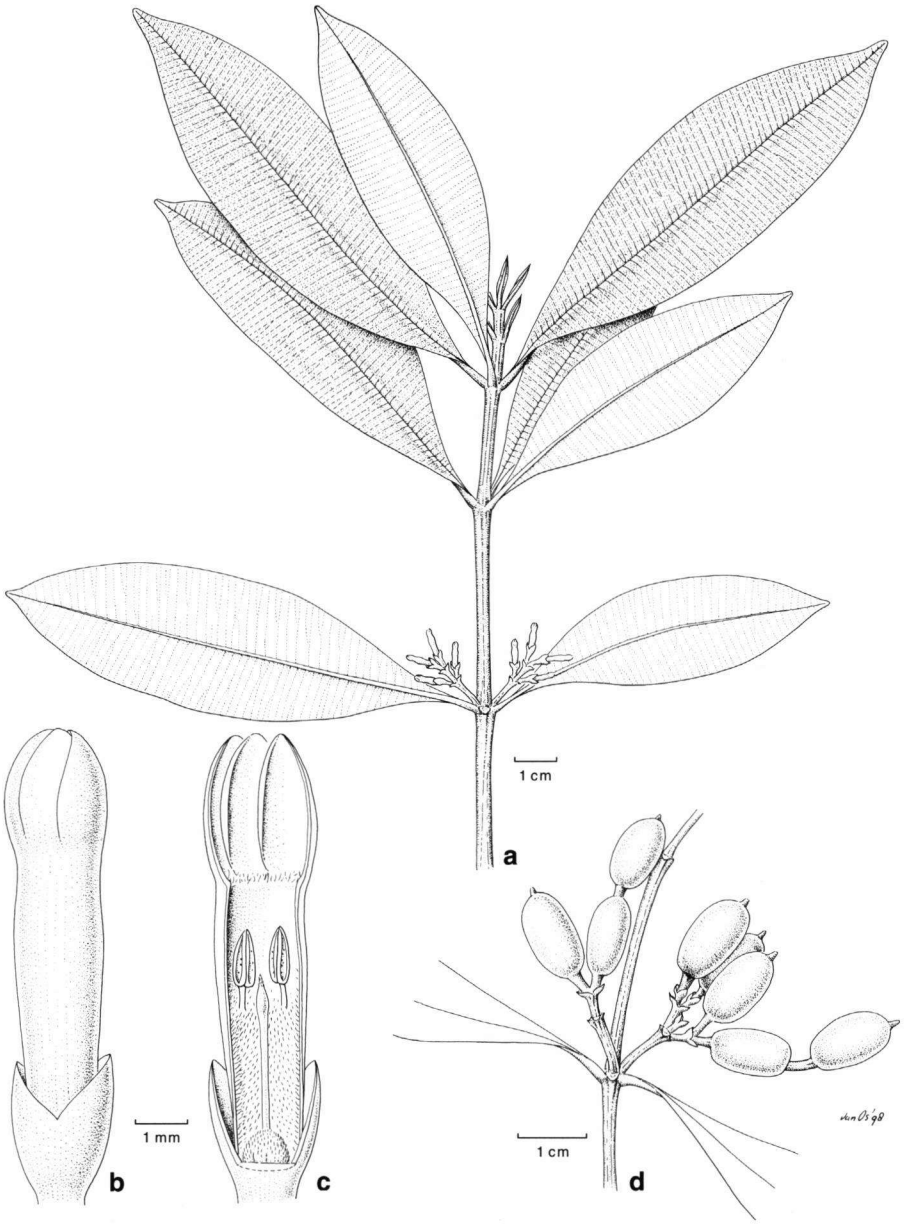



Fig. 1. *Alyxia celebica* D.J. Middleton. a. Habit; b. flower bud; c. flower dissection; d. fruit (fl. & fr. *Jermy, Walker & Sands 468*).

3.5–4.5 mm from corolla base, 0.56–0.6 of tube length; anther apex 1 mm from corolla mouth, anthers c. 1.3 by 0.5 mm, c. 2.6 times as long as wide; filaments 0.7–0.8 mm long. *Ovary* c. 0.8 mm high, densely pubescent all over; style c. 2.4 mm long; pistil head c. 0.8 mm long. *Fruit* stalks 2–2.7 mm long, 1 or 2 articles in each string, 0.8–

1.7 mm between articles, with thin flesh, 10.4–19.5 by 7.5–12.5 mm, ellipsoid or cylindrical. *Seeds* c. 9.2 by 6.3 by 5.8 mm. Embryo cotyledons weakly undulate, embryo c. 8 mm long, cotyledons 0.62 of embryo length.
(Description based on 3 collections made into 9 specimens.)

Distribution — Sulawesi.

Habitat — Reported from montane forest, oak-*Podocarpus* montane forest and scrub at 300–1900 m altitude.

Note — On the label of the type collection the habit is given as "A small tree?", from which it seems even the collectors were unsure of its habit. It is most likely to be a climber as described on *Kjellberg 3107*. This species is known from only three collections collected in Sulawesi Selatan Province of Indonesia. Two of the collections are fruiting specimens but the two lipped calyx can still easily be made out in them. It differs from *A. kabaenae*, which also has this curious calyx character, in the much larger flowers, fewer-flowered glabrous inflorescences and smaller fruits.

*Specimens studied*:

INDONESIA: Sulawesi Selatan: Bonthain, Sanyinga, *Teijsmann 14010* (BO, L); Enrekang District, Latimojong Mts, Ridge SW of Bunte Tjejeng, *Jermy, Walker & Sands 468* (type A, BO, C, K, L); Towuti Lake, Wawoendoela, *Kjellberg 3107* (BO, S).

### 9. Alyxia composita Warb. — Map 8

*Alyxia composita* Warb., Bot. Jahrb. Syst. 13 (1891) 404. — Type: *Warburg 21334* (holo B†; lecto A, designated here; iso E) from Indonesia, Irian Jaya, near Sigar.

*Alyxia lata* Markgr., Bot. Jahrb. Syst. 61 (1927) 187; Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 493; Markgr., Blumea 23 (1977) 381, p.p. — Type: *Beccari 6360* (holo FI, n.v., photo in L) from Indonesia, Irian Jaya, Pulau Miosnum.

*Alyxia maluensis* auct. non Markgr.: Markgr., Blumea 23 (1977) 395, p.p.

Climbers. *Branchlets* terete or weakly angled, not lenticellate, glabrous. *Leaves* opposite or in whorls of 3; petiole 0.2–0.9 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic to obovate, apex obtuse to acuminate, not mucronate, base acute or cuneate, margin weakly inrolled or flat, weakly undulate or not, 2.9–13.6 by 0.8–6.3 cm, 1.75–2.8 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve absent, secondary veins 18–56 pairs, 60–75° from midrib, distinct or weakly distinguishable and prominent above, weakly visible or slightly prominent beneath, tertiary venation weakly prominent or not above, parallel to secondary veins or obscure; glabrous beneath, glabrous above, not punctate beneath. *Inflorescences* axillary or terminal, of unbranched pleiochasia or short congested to laxer compound pleiochasia, delicate or robust, sparsely puberulent in upper parts to densely puberulent all over, 2.2–3.3 cm long; peduncle 0.3–1 cm by 1.1–2.1 mm; bracts and bracteoles stiff and apparent, bracts persistent, deltoid, 1.4 by 0.9–1.4 mm; bracteoles one immediately beneath calyx or on pedicel; flowers 2–9; pedicels 0–1.6 mm long. *Sepals* not fleshy, ovate, apex acute, keeled or not keeled, 1.4–2.2 by 1.2–1.6 mm, 1–1.8 times as long as wide, ciliate, sparsely or densely puberulent, pubescent only at tips or glabrous inside. *Corolla* white; tube cylindrical, 8.5–11.2 by 1.5–1.9 mm, 5–6.4 times as long as sepals, 4–5.1 times as long as lobes, glabrous outside, continuously pubescent except for base inside, throat with thickening; lobes elliptic, ovate or orbicular, apex rounded or obtuse, base auriculate, 2–2.6 by 1.7–2.3 mm, 1.1–1.2

times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 6.7–8.8 mm from corolla base, 0.74–0.82 of tube length; anther apex 0.6–0.8 mm from corolla mouth, anthers 1.1–1.2 by 0.5–0.6 mm, 2–2.2 times as long as wide; filaments 0.7–0.9 mm long. *Ovary* 1.1–1.2 mm high, densely pubescent all over; style 6.6–8 mm long; pistil head 0.5 mm long. *Fruit* orange turning black, stalks 3–4.5 mm long, with 1 or 2 articles in each string, 3.5–4 mm between articles, glabrous or sparsely puberulent at ends, articles with thin flesh, 4.7–7.9 by 7.9–9.4 mm, ellipsoid, symmetrical, rounded or obtuse at apex. *Seeds* ovoid, ruminate, 8.4–9.8 by 6.4–6.7 by 5.7–5.8 mm. Embryo linear or cotyledons weakly undulate, embryo 8.5 mm long, cotyledons 0.74 of embryo length.

(Description based on 39 specimens.)

Distribution — Moluccas, New Guinea.

Habitat — In forest on limestone, serpentine or clay soils at 6–650 m altitude.

Notes — In the Paris herbarium there is a specimen collected by Spire in 1903 in the Bogor Botanic Garden but originally from Seram. It is labelled *Gynopogon auriculatum* Pierre although this name has not been published and is, in any event, a synonym of *A. composita*. This plant, number XVII.A.78 is still alive. This species has small stiff bracts in the inflorescence, still very clear in the fruit.

There are progressively smaller leaves towards the inflorescence which is composed of short stiff axillary and terminal cymes forming short terminal panicles. It appears there are leafy bracts in the inflorescence although there is actually a sharp distinction between these small leaves and the bracts in the inflorescence proper. This species is closest to *A. sibuyanensis* and *A. concatenata* from the Philippines. It differs from the former in its laxer inflorescences and the small stiff bracts and the latter in the small stiff bracts and the larger, elliptic fruits.

### 10. Alyxia concatenata (Blanco) Merr. — Fig. 2, Map 9

*Alyxia concatenata* (Blanco) Merr., Sp. Blancoana (1918) 310; Enum. Philipp. Fl. Pl. 3 (1923) 327; Markgr., Blumea 23 (1977) 393. — *Brabejum concatenatum* Blanco, Fl. Filip. ed. 2 (1845) 40. — Type: Type not traced. *Merrill Species Blancoanae 159* (neo L, designated here; isoneo A (scrap), BM, BO, GH, K, MO, NY, P, US, W) from the Philippines, Luzon, Rizal Province, Bosoboso.

*Alyxia monilifera* S. Vidal, Revis. Pl. Vasc. Filip. (1886) 182. — *Gynopogon moniliferus* (S. Vidal) Merr., Publ. Bur. Sci. Gov. Lab. 29 (1905) 46. — Type: *S. Vidal 461* (lecto K, designated here; iso K) from the Philippines, Tayabas Province, Mt Banahao.

*Paralstonia clusiacea* Baill., Bull. Soc. Linn. Paris 1 (1888) 750. — *Alyxia clusiacea* (Baill.) Pichon, Mém. Mus. Nat. Hist. Nat., n.s. 27 (1948) 166; Markgr., Blumea 23 (1977) 380, p.p. — Type: *Barthe s.n.* (lecto P, designated here; iso P) from the Philippines.

*Alyxia confertiflora* Merr., Philipp. J. Sci., Bot. 10 (1915) 64; Enum. Philipp. Fl. Pl. 3 (1923) 327. — Type: *Reillo 16143* (lecto US, designated here; iso A, BM) from the Philippines, Basilan Island.

*Alyxia quadrata* Elmer ex Merr., Enum. Philipp. Fl. Pl. 3 (1923) 327, nom. nud. — *Alyxia quadrata* Elmer, Leafl. Philipp. Bot. 10 (1939) 3692, nom. inval. — Based on: *Elmer 15827* (A, BISH, BM, BO, C, G, GH, HBG, K, L, NY, P, S, U, UC, US, Z) from the Philippines, Sorsogon Province, Irosin, Mt Bulusan.

*Alyxia luzoniensis* auct. non Merr.: Markgr., Blumea 23 (1977) 392, p.p.

Climbers. *Branchlets* weakly or strongly angled; not lenticellate; glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3 or 4; coriaceous or subcoriaceous;

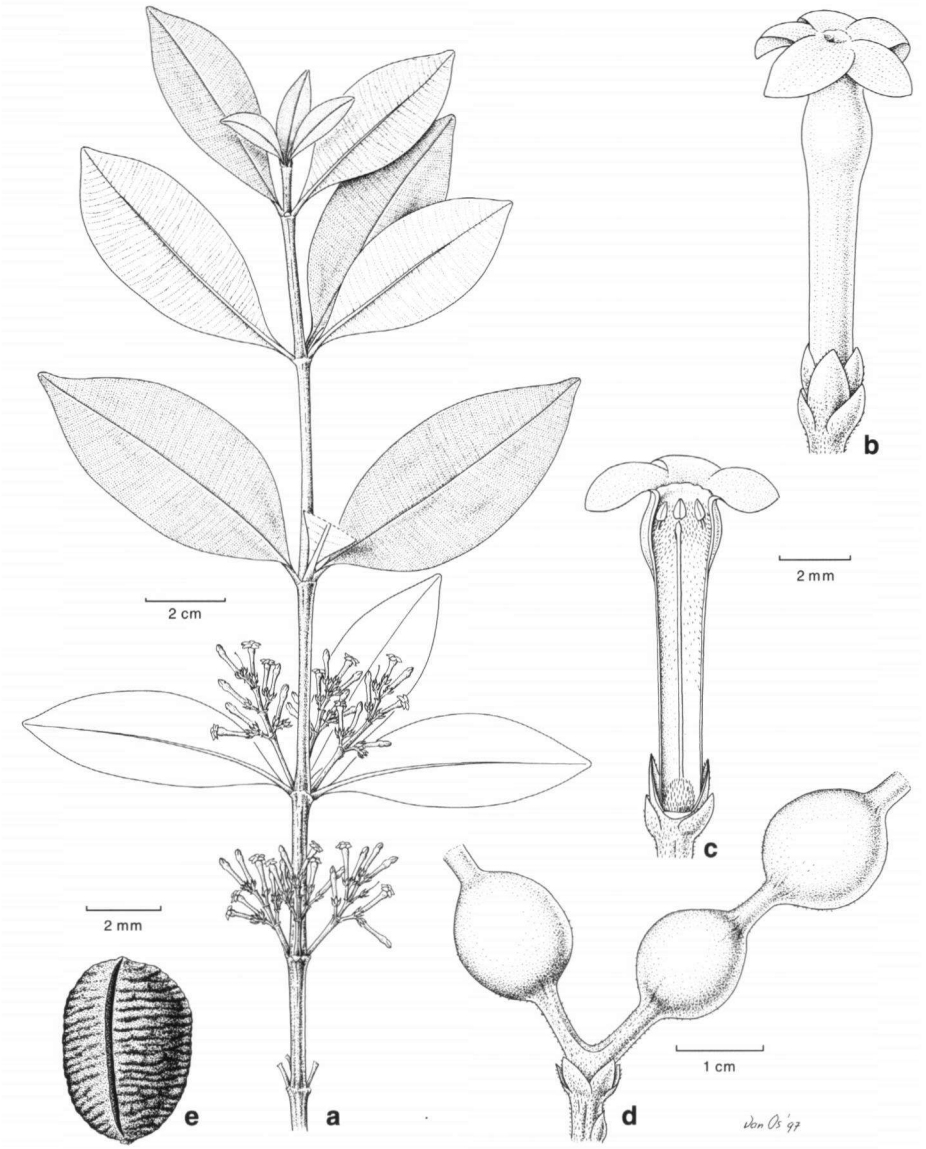
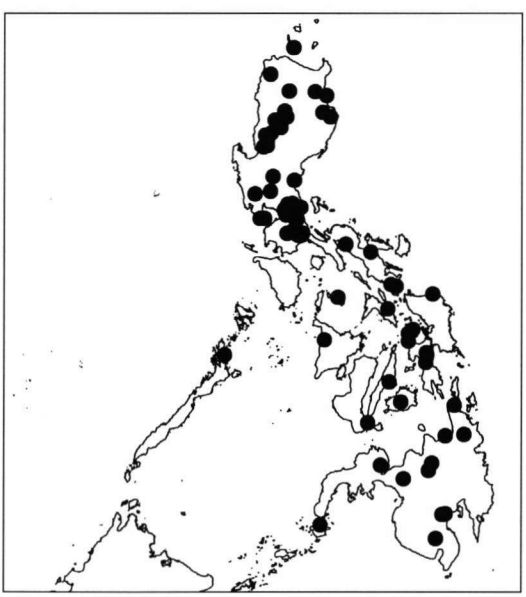



Fig. 2. *Alyxia concatenata* (Blanco) Merr. a. Habit; b. open flower; c. flower dissection; d. fruit; e. seed (fl. *Conklin & Buwaya 80646*; fr. *McGregor 19752*).

petiole 0.3–1.9 cm long, glabrous or pubescent; blade elliptic to broadly elliptic, apex rounded to acuminate or cuspidate, base acute to decurrent onto petiole, margin weakly inrolled or flat, weakly undulate, dark green and shining above, pale green beneath, 2.2–12.5 by 0.9–5.7 cm, 1.4–4.3 times as long as wide, midrib clearly to deeply sunken above, intramarginal nerve clear at margin, secondary veins 20–38 pairs, 65–75° from midrib, weakly prominent above and obscure to prominent beneath,

tertiary venation weakly prominent or flattened above, parallel to secondary veins or obscure; glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent on midrib only above. *Inflorescences* axillary, a compound pleiochasium, sparsely or densely puberulent, 1.5–4 cm long; peduncle 0.2–2.1 cm by 0.8–1.9 mm; bracts caducous or persistent, deltoid or lanceolate, 2–3.1 by 1.3–2.1 mm; bracteoles two immediately beneath calyx; flowers 5–11; pedicels 0–2.6 mm long. *Sepals* not fleshy, ovate or lanceolate, apex obtuse, acute or acuminate, keeled, 1.7–3.3 by 1–2 mm, 1–2.2 times as long as wide, ciliate or not ciliate, glabrous or sparsely to densely puberulent, sometimes only on centre line, pubescent only at tips inside. *Corolla* white; bud head 2–3.1 mm long, globular, lanceolate or ovate, apex acute or acuminate, head 0.17–0.34 of bud length; tube cylindrical, 7.6–12 by 1.3–2.3 mm, glabrous outside, continuously pubescent except for base inside, only around stamens and more densely in a band beneath them, or very sparsely pubescent in upper half of tube to beneath the stamens, tube 2.4–5.2 times as long as lobes, 3–6.7 times as long as sepals, throat with thickening; lobes ovate, apex rounded to acute, not ciliate or ciliate near tips only, 2–3.2 by 1.2–2.7 mm, 0.85–1.9 times as long as wide, glabrous outside, glabrous or papillate inside. *Stamens* inserted at 6.7–10.1 mm from corolla base, 0.72–0.82 of tube length; anther apex 0.2–0.8 mm from corolla mouth, anthers 1.1–1.4 by 0.5–0.6 mm, 1.8–2.8 times as long as wide; filaments 0.7–1.1 mm long. *Ovary* 0.6–0.8 mm high, densely pubescent all over, pubescent around base only or only on top; style 6.1–9.2 mm long; pistil head 0.4–0.8 mm long. *Fruit* yellow or orange, stalks 3.2–6.2 mm long, with 1–4 articles in a string, 1.1–4.2 mm between articles, articles 4.5–8.8 by 4.3–6.8 mm, globose, symmetrical, sparsely puberulent all over. *Seeds* ovoid, ruminate, 4.1–5.1 by 3–3.9 by 2.8–3.6 mm. Embryo linear, 4 mm long, cotyledons 0.6 of embryo length.
(Description based on 437 specimens.)



Map 9. Distribution of *Alyxia concatenata* (Blanco) Merr.

Distribution — Philippines.

Habitat — In lowland primary or secondary forest, or lower montane, mossy or montane forest from 200–2200 m altitude, on clay soils.

Note — Most of the specimens previously identified as *Paralstonia clusiacea* are actually *Ochrosia glomerata*. However, there is no doubt that the surviving type material actually belongs to *A. concatenata*. Markgraf (1977) maintained the species *A. clusiacea* but the specimens attributed to *A. clusiacea* by Markgraf are *A. sibuyanensis* and *A. concatenata*.

### 11. Alyxia defoliata Markgr. — Map 10

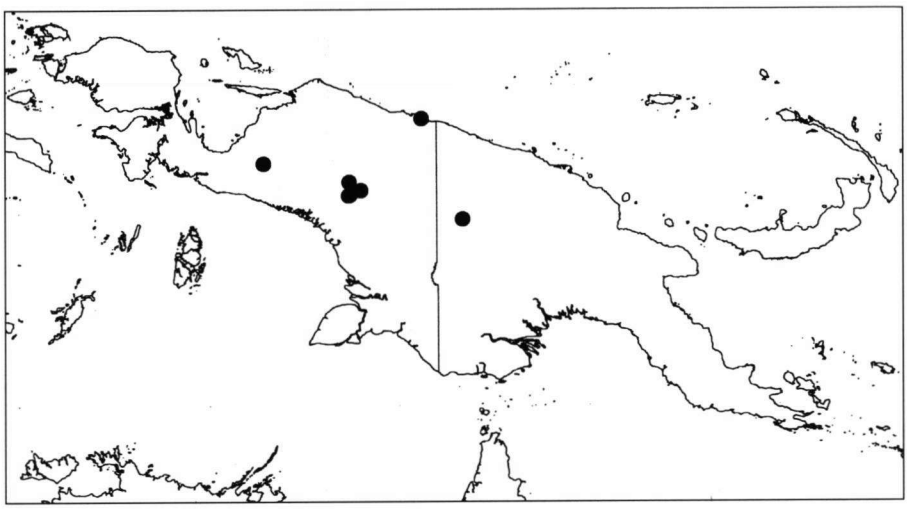
*Alyxia defoliata* Markgr., Nova Guinea 14, 2 (1927) 280; Bot. Jahrb. Syst. 61 (1927) 186; Blumea 23 (1977) 399. — Type: *Pulle 1115* (lecto L, designated here; isolecto A, BO) from Indonesia, Irian Jaya, Treub Mts.

*Alyxia defoliata* subsp. *orientalis* Markgr., Blumea 23 (1977) 399 (but not all paratypes). — Type: *Versteegh BW 10475* (holo L; iso A) from Indonesia, Irian Jaya, Baliem Valley, Wiligimaan.

*Alyxia arfakensis* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 400, p.p.

*Alyxia purpureoclada* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 400, p.p.

Erect shrubs or climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3; petiole 0.2–1.1 cm long, glabrous; blade coriaceous or subcoriaceous, narrowly to broadly elliptic or obovate, apex obtuse to acuminate but slightly notched at the apex, base cuneate, margin weakly inrolled or flat, weakly undulate, 1.3–8 by 0.6–3.6 cm, 1.4–3.1 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve clear at margin, secondary veins 24–51 pairs, 70–75° from midrib, weakly prominent above, weakly visible or prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium with clear internodes or with 1 or 2 internodes and unbranched side branches, glabrous to densely puberulent, 1.8–3.8 cm long; peduncle 0.5–1.5 cm by 1.4–1.5 mm; bracts caducous or persistent, deltoid, 1.6–2.5 by 1.2–1.4 mm; bracteoles absent; flowers 4–16; pedicels 1.8–3.5 mm long. *Sepals* ovate, apex rounded or obtuse, not keeled, 1.2–1.5 by 1.1–1.3 mm, 1.1–1.2 times as long as wide, ciliate, glabrous, glabrous inside. *Corolla* white; tube slightly inflated, throat with thickening, 3.5–3.7 by 1.6–1.8 mm, 2.3–3.1 times as long as sepals, 2.2–2.3 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes ovate or orbicular, apex rounded or obtuse, base auriculate, 1.6 by 1.1–1.9 mm, 0.8–1.5 times as long as wide, glabrous outside, glabrous or papillate inside, not ciliate. *Stamens* inserted at 1.8–2.8 mm from corolla base, 0.56–0.64 of tube length; anther apex 0.1–0.6 mm from corolla mouth, anthers 0.9–1.2 by 0.3–0.5 mm, 2.2–3 times as long as wide; filaments 0.7–0.8 mm long. *Ovary* 0.7–0.9 mm high, densely pubescent all over or pubescent around base only; style 0.8–1.9 mm long; pistil head 0.5–0.8 mm long. *Fruit* yellow, stalks 2.1–3.2 mm long, with 1 or 2 articles in each string, c. 2.7 mm between articles, sparsely puberulent at ends or all over, 9–10.5 by 7.7–8 mm, ellipsoid, globose or cylindrical, symmetrical, rounded at apex. *Seeds* 9.3 by 5.9 by 5.4 mm. Embryo linear, 7.7 mm long, cotyledons 0.64 of embryo length. (Description based on 21 specimens.)



Map 10. Distribution of *Alyxia defoliata* Markgr.

Distribution — New Guinea.

Habitat — Reported from forest edge at 1600–2500 m altitude.

Vernacular name — Kommoenan (Dani).

Typification — The type of *A. defoliata* is given as *Pulle 1115* (U) by Markgraf (1977). However, there does not seem to be any material of this number in Utrecht and therefore the Leiden specimen has been chosen as a lectotype. The specimen in A of *Pulle 1115* is just a scrap.

Note — There is a group of closely related species around *A. defoliata* which includes *A. arfakensis, A. microphylla, A. graciliflora* and *A. papuana* which differ in the indumentum, inflorescences, pedicels, bracteoles, ovary and general facies.

### 12. Alyxia fascicularis (Wall. ex G. Don) Benth. ex Hook.f. — Map 11

*Alyxia fascicularis* (Wall. ex G. Don) [Benth. & Hook.f., Gen. Pl. 2 (1876) 698, not validly combined] Benth. ex Hook.f., Fl. Brit. Ind. 3 (1882) 636; P.T. Li, J. S. China Agric. Univ. 11 (1990) 28; P.T. Li et al., Fl. China 16 (1995) 161. — *Hunteria fascicularis* [Wall., Num. List. (1819) 1612, nom. nud.] Wall. ex G. Don, Gen. Hist. 4 (1837) 105; A.DC., Prodr. 8 (1844) 350. — *Pulassarium fasciculare* (Wall. ex G. Don) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon fascicularis* (Wall. ex G. Don) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — Type: *Wallich 1612* (holo K-W; iso A (scrap), BM, BR, C, E, G, K, L, M, MEL, NY, P, W) from India, Meghalaya State, Khasia Mts, Pundua.

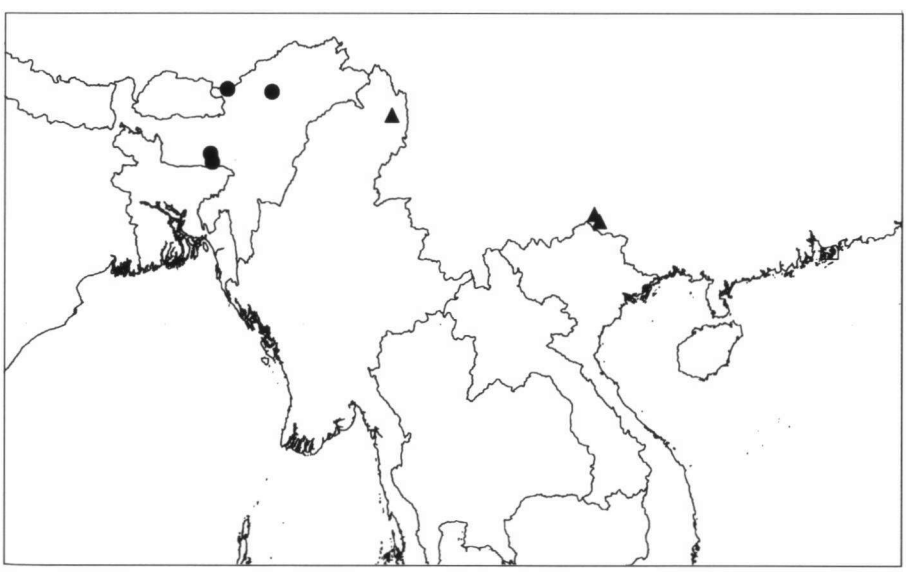
Climbers. *Branchlets* weakly or strongly angled, sparsely or densely lenticellate, sparsely puberulent. *Leaves* in whorls of 3; petiole 0.5–1.3 cm long, glabrous or pubescent; blade coriaceous to papery, elliptic or oblong, apex long sharp acuminate, base acute or cuneate, margin weakly inrolled or flat, strongly undulate, 3.4–11.2 by 1.1–4 cm, 2.4–3.5 times as long as wide, midrib deeply sunken above, intramarginal nerve present, inset from margin, secondary veins 27–40 pairs, 65–70° from midrib, weakly prominent above, weakly prominent beneath, tertiary venation weakly prominent above, reticulate

and parallel to secondary veins, glabrous or sparsely puberulent only on midrib beneath, glabrous to puberulent all over above. *Inflorescences* axillary or terminal, a short congested compound pleiochasium or compound pleiochasium with clear internodes, sparsely puberulent in upper parts or sparsely to densely puberulent all over, 1.4–3 cm long; peduncle 0.3–0.7 cm by 0.7–1.2 mm; bracts persistent, ovate, deltoid or linear, 3–3.8 by 0.8 mm; bracteoles at the base of the pedicels; flowers 8–15; pedicels 0.6–2 mm long. *Sepals* ovate, apex obtuse or acute, keeled, 1.7–2.3 by 1.2–1.4 mm, 1.4–1.9 times as long as wide, ciliate, glabrous or sparsely puberulent on centre line. *Corolla* cream; bud head 1.6–1.7 mm long, lanceolate or deltoid, apex acute or acuminate, 0.36–0.44 of bud length; tube cylindrical or slightly inflated, 2.9–3.8 by 1.2–1.8 mm, glabrous or sparsely puberulent on top of tube outside, pubescent only around stamens inside, 1.1–2 times as long as sepals, 1.9–2.9 times as long as lobes, throat with thickening; lobes elliptic, base auriculate, apex rounded, not ciliate, 1.5–1.7 by 1–1.7 mm, 1–1.5 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 2.2–2.5 mm from corolla base, 0.63–0.68 of tube length; filaments 0.3 mm long; anther apex 0.1–0.3 mm from corolla mouth, anthers 0.8 by 0.3–0.4 mm, 2–2.7 times as long as wide. *Ovary* 0.5–0.8 mm high, densely pubescent all over; style 1.4–1.7 mm long; pistil head 0.3–0.4 mm long, glabrous. *Fruit* with 1 article in each string, stalks 1.5–1.8 mm long; articles 20–21.7 by 8.9–9.6 mm, ellipsoid. *Seeds* not seen.

(Description based on 33 specimens.)

Distribution — North-East India.

Note — This species is related to *A. reinwardtii* but differs in the strong intramarginal nerve and the more complex inflorescence.



Map 11. Distribution of *Alyxia fascicularis* (Wall. ex G. Don) Benth. ex Hook.f. (●) and *A. funingensis* Tsiang & P.T. Li (▲).

## 13. Alyxia floribunda Markgr. — Map 12

*Alyxia floribunda* Markgr., Bot. Jahrb. Syst. 61 (1927) 184; Merr. & L.M. Perry, J. Arnold Arbor. 24 (1943) 211; Markgr., Blumea 23 (1977) 397, p.p. — Type: *Schlechter 17705* (holo B†; lecto L, designated here; iso A, BM, BRI, C, G, K, MO, S, UC, US) from Papua New Guinea, Madang Province, Kani Mts.

*Alyxia rostrata* auct. non (Markgr.) Markgr.: Markgr., Blumea 23 (1977) 411, p.p.

*Alyxia ridleyana* auct. non Wernham: Markgr., Blumea 23 (1977) 411, p.p.

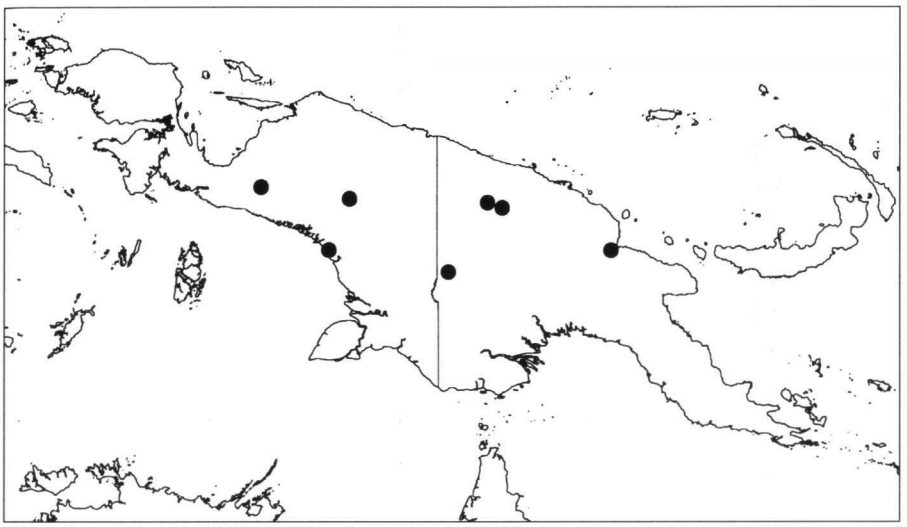
Climbers. *Branchlets* strongly angled, densely lenticellate to not lenticellate, glabrous. *Leaves* in whorls of 3–5; petiole 0.3–2 cm long, glabrous; blade coriaceous to papery, elliptic, apex rounded to shortly acuminate, acumen obtuse, base obtuse to decurrent onto petiole, margin weakly inrolled or flat, weakly undulate, 4.3–18.5 by 1.5–7.5 cm, 1.7–3 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve clear at margin, secondary veins 45–109 pairs, 80–85° from midrib, strongly or weakly prominent above, weakly visible or prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescences* axillary, a compound pleiochasium with clear internodes, glabrous, 4–9 cm long; peduncle 1–5.4 cm by 1.2–2.5 mm; bracts persistent, deltoid, 0.8–0.9 by 0.8–1 mm; bracteoles present, one immediately beneath calyx; flowers 16–51; pedicels 0.5–2.5 mm long. *Sepals* ovate, somewhat fused at base, apex rounded or obtuse, usually reflexed, 1.3–1.7 by 1.2–1.3 mm, 1–1.4 times as long as wide, ciliate, glabrous outside, glabrous inside. *Corolla* white; bud head 0.9–1.2 mm long, 0.25–0.33 of bud length, ellipsoid or ovate, apex acute; tube slightly inflated, throat with thickening, 2.8–3.3 by 1.4 mm, 2–2.2 times as long as sepals, 2.5–2.7 times as long as lobes, glabrous outside, pubescent around stamens and more densely in a band beneath them or very sparsely pubescent only beneath filaments; lobes ovate or orbicular, apex rounded or obtuse, base auriculate, 1.1–1.2 by 1.1 mm, 1–1.1 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 2.2–2.3 mm from corolla base, 0.65–0.7 of tube length; anther apex 0.2–0.3 mm from corolla mouth, anthers 0.7–1 by 0.3–0.4 mm, 1.75–3.3 times as long as wide; filaments 0.2–0.7 mm long. *Ovary* 0.6–0.8 mm high, glabrous or with varying degrees of pubescent; style 1.1–1.5 mm long; pistil head 0.4–0.7 mm long, pubescent. *Fruit* orange-brown, stalks 2–5.5 mm long, with 1–5 articles in a string, 1.8–2.7 mm between articles, sparsely puberulent at ends, articles dry and smooth, 8.3–9.7 by 6 mm, ellipsoid or cylindrical, symmetrical, rounded at apex. *Seeds* not studied.

(Description based on 40 specimens.)

Distribution — New Guinea.

Habitat — In primary or secondary forest, sometimes in swamp forest at an altitude of 10–2200 m. Reported once from limestone.

Note — The calyx lobes are slightly fused at the base and slightly reflexed. Markgraf (1977) described this species as having a pubescent ovary. However, the ovary of the type specimen is glabrous, the other specimens have an ovary of varying degrees of pubescence. Fruiting specimens of this species can be confused with *A. rostrata* and *A. markgrafii* except that the infructescences are clearly only axillary compared to the often terminal ones of *A. rostrata* and they are more robust and more branched than *A. markgrafii*. *Alyxia floribunda* is close to *A. purpureoclada* although the close-



Map 12. Distribution of *Alyxia floribunda* Markgr.

ness of the relationship had not previously been acknowledged as Markgraf had placed them in different series. The two species differ in leaf size, inflorescence pubescence and ovary pubescence. *Alyxia purpureoclada* generally has more delicate inflorescences and slightly smaller flowers. However, there are also several specimens which partially bridge the differences in size and pubescence between the two species and further collecting may throw some light on the relationship between these two species.

### 14. Alyxia funingensis Tsiang & P.T. Li — Map 11

*Alyxia funingensis* Tsiang & P.T. Li, Acta Phytotax. Sin. 11 (1973) 362; Fl. Reipubl. Popul. Sin. 63 (1977) 68; Anonymous, Fl. Yunnanica 3 (1983) 519. — Type: *C.W. Wang 89574* (holo PE; iso KUN) from China, Yunnan, Fu-Ning, Cha-Chieh.

*Alyxia marginata* auct. non Pit.: Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 67; Anonymous, Fl. Yunnanica 3 (1983) 519; P.T. Li, J. S. China Agric. Univ. 11 (1990) 28; P.T. Li et al., Fl. China 16 (1995) 161.

Climbers. *Branchlets* strongly angled, not to densely lenticellate, glabrous. *Leaves* in whorls of 3; petiole 0.6–1.3 cm long, glabrous; blade subcoriaceous or papery, elliptic, obovate or oblong, apex shortly acuminate, base cuneate, margin weakly inrolled or flat, weakly undulate, 13.2–17.7 by 2.8–5.7 cm, 2.7–4.7 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve present, inset from margin, secondary veins 25–45 pairs, 70–75° from midrib, weakly prominent above, obscure beneath, tertiary venation weakly prominent or flattened above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescence* axillary, delicate or robust, sparsely to densely puberulent all over, 1.1–2.4 cm long; peduncle 0.1–0.9 cm by 1.4–2.1 mm; bracts caducous or persistent, ovate or deltoid, 1.5–3.5 by 0.8–2 mm; bracteoles 2 on pedicel; pedicels 0.5 mm long. *Sepals* ovate, apex acute, keeled, 3.2–4 by 1.5–1.6 mm, 2–2.5 times as long as wide, ciliate, glabrous,

sparsely puberulent on centre line or puberulent on tips only. *Corolla* white; bud head 2.9 mm long, ellipsoid, apex acute, 0.35 of bud length; tube cylindrical, 6.5–6.8 by 1.3–1.7 mm, glabrous outside, pubescent only around stamens inside or sparsely pubescent around stamens and more densely in a band beneath them, 1.7–2.1 times as long as sepals, 2.1–2.3 times as long as lobes, throat without thickening; lobes elliptic, base auriculate, apex rounded or obtuse, not ciliate, 2.3–3.9 by 1.4–1.8 mm, 1.4–1.7 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 3.6–4.5 mm from corolla base, 0.62–0.69 of tube length; filaments 0.6–0.9 mm long; anther apex 0.2–0.8 mm from corolla mouth, anthers 1–1.1 by 0.4–0.5 mm, 2–2.5 times as long as wide. *Ovary* 0.6–0.8 mm high, densely pubescent all over or pubescent around base only; style 3–3.5 mm long; pistil head 0.7–0.8 mm long. Articles fleshy, 13.5–16 by 8.4–9.6 mm, ellipsoid. *Seeds* oblong, c. 13.1 by 6.5 by 5.5 mm.
(Description based on 5 specimens.)

Distribution — Southern China, Burma.

Habitat — Altitude range: 900–1067 m.

Note — Li et al. (1995) included this species in synonymy of *A. marginata* but it is quite different. It is probably most closely related to *A. fascicularis* differing from it in the larger leaves, clearer intramarginal vein, shorter leaf apex and larger flowers. *Kingdon Ward 20971* bridges the gap somewhat between *A. fascicularis* and *A. funingensis* in its leaves and also geographically but its flowers are much more like those of *A. funingensis*. Further collections in Yunnan and Burma are really needed to clarify the relationship of these two species and of both of them to *A. reinwardtii*.

### 15. Alyxia ganophylla Markgr. — Map 13

*Alyxia ganophylla* Markgr., Bot. Jahrb. Syst. 60 (1926) 314. — Type: *Hackenberg 123* (holo B†). Neotype: *Buwalda 7781* (neo L, designated here; iso A, BO, K, L) from Indonesia, Kalimantan Tengah, Sampit.

*Alyxia obovatifolia* Merr., Philipp. J. Sci. 17 (1921) 306; Enum. Philipp. Fl. Pl. 3 (1923) 328. — Type: *Ramos & Pascasio 34492* (lecto K) from the Philippines, Mindanao, Surigao Province.

*Alyxia induta* Markgr., Bot. Jahrb. Syst. 60 (1926) 315, nom. nud. — [*Gynopogon indutus* K. Schum., ined.]. — Based on: *Beccari 2121* (FI, G, K, P) from Borneo.

*Alyxia markgrafiana* O. Schwartz, Mitt. Inst. Allg. Bot. Hamburg 7 (1931) 258. — Type: *Winkler 1429* (holo HBG; iso C, E, HBG) from Indonesia, Kalimantan Barat, Sungei Bika.

*Alyxia pagonensis* Markgr., Blumea 23 (1977) 385, p.p. (not including type).

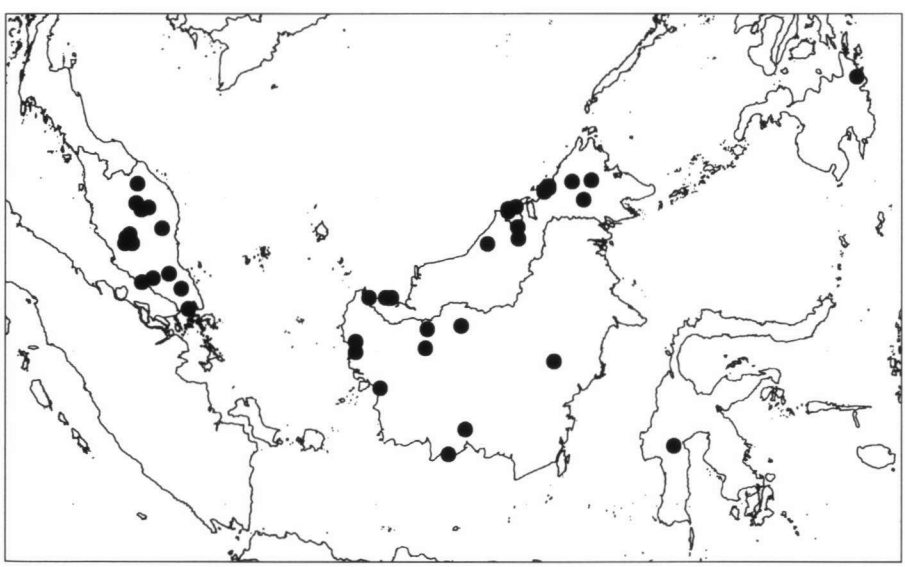
*Alyxia pilosa* auct. non Miq.: Hook.f., Fl. Brit. Ind. 3 (1882) 635; King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 416; Merr., Bibl. Enum. Born. Pl. (1921) 499; Ridl., Fl. Malay Pen. 2 (1923) 332; Markgr., Blumea 23 (1977) 382, p.p.

Climbers. *Branchlets* weakly angled, not lenticellate, sparsely to densely puberulent, hispid or tomentose. *Leaves* in whorls of 3 or 4; petiole 0.3–1.5 cm long, pubescent; blade coriaceous, elliptic, obovate or spathulate, apex emarginate to acuminate or apiculate, base obtuse to decurrent onto petiole, margin weakly to strongly revolute, undulate or not, dark green above, pale green or glaucous beneath, 3–12.8 by 1–5.7 cm, 1.8–4 times as long as wide, midrib sunken above, secondary veins 12–37 pairs, 70–85° from midrib, weakly prominent to sunken or indistinct above, weakly visible or weakly prominent beneath, tertiary venation weakly prominent and parallel to secondary veins or obscure; sparsely puberulent only on midrib, puberulent all over or tomentose beneath, puberulent on midrib only or all over above. *Inflorescences* axillary

or terminal, a compound pleiochasium with clear internodes or with 1 or 2 internodes and unbranched side branches, densely puberulent, tomentose or hispid, 1.4–6 cm long; peduncle 0.3–4 cm by 1.1–3.8 mm; bracts caducous or persistent, deltoid or lanceolate, 2.5–6 by 1.6–2.4 mm; bracteoles immediately beneath calyx or on pedicels; flowers 5–15; sessile or with pedicels up to 1.5 mm long. *Sepals* linear to ovate, apex acute, not keeled, 1.8–3.2 by 0.9–1.8 mm, 1.6–2.7 times as long as wide, ciliate, densely puberulent, pubescent only at tips inside. *Corolla* white or cream; bud head 2.3–3.9 mm long, ovate or deltoid, apex obtuse or acute, 0.22–0.37 of bud length; tube cylindrical, 6.8–8.6 by 1.8–2.3 mm, densely to sparsely puberulent outside, rarely only papillate outside, sparsely pubescent around stamens and more densely in a band beneath them, 2.7–3.9 times as long as sepals, 2.4–2.8 times as long as lobes, throat with a narrow ring of tissue; lobes elliptic, ovate or orbicular, base auriculate, apex obtuse, ciliate, 2.5–3.5 by 1.7–2.2 mm, 1.3–1.9 times as long as wide, glabrous, sparsely or densely puberulent outside, glabrous or pubescent at base of lobes inside. *Stamens* inserted at 6–7.5 mm from corolla base, 0.72–0.8 of tube length; filaments 0.6–0.7 mm long; anther apex 0.4–0.6 mm from corolla mouth, anthers 1.2–1.4 by 0.4–0.5 mm, 2.6–3 times as long as wide. *Ovary* 0.5–0.8 mm high, densely pubescent all over; style 6–6.8 mm long; pistil head 0.6–0.7 mm long. *Fruit* with 1 or 2 articles in each string and then close together, stalks 2.9–8.2 mm long; articles with thin flesh, 6.4–13.4 by 5.7–8 mm, ellipsoid or globose, apex rounded to acuminate, black or purple, sparsely puberulent at ends or all over. *Seeds* 7.1–9.5 by 4.8–6.8 by 4.8–6.3 mm. Embryo linear, 8 mm long, cotyledons 0.5 of embryo length.
(Description based on 141 specimens.)

Distribution — Peninsular Malaysia, Borneo, Sulawesi (? – see note), Mindanao.

Habitat — In forest, often disturbed, or kerengas on sandy, podsolic or poorly drained soils, sometimes ultramafic at 5–1500 m altitude.



Map 13. Distribution of *Alyxia ganophylla* Markgr.

Vernacular names — Kedari, akar (Dayak).

Typification — The neotype of *A. ganophylla* from L which has been selected for this species comes from the same location as the original type and has rather long peduncles for the species, a feature also recorded in its original description. Unfortunately the specimen only bears immature flowers and fruits but the original description makes no mention of corolla characters at all.

Notes — It is not always easy to distinguish this species from *A. reinwardtii* and more research based on better collections is needed in the whole of the *A. reinwardtii* complex. In *A. ganophylla* the outside of the corolla always has hairs more than just dotted around the top of the tube and these hairs are usually extensive and much longer than those in the rare occasions when hairs occur on the tube in *A. reinwardtii*. In addition the ovary is always densely hairy all over in *A. ganophylla*, again a character of rare occurrence in *A. reinwardtii*. *Alyxia ganophylla* has often been included in *A. pilosa*. These two species differ in the pubescence of the outside of the corolla tube and the size and shape of the fruits.

There is a fruiting specimen from SW Sulawesi, *Kjellberg 1585* (S), which may belong here. It is densely pubescent all over the branches and leaves but there are only two fruits and the specimen has rather long narrow leaves. Further collecting may show that this specimen is not best placed in *A. ganophylla*.

**16. Alyxia globosa** D.J. Middleton, *spec. nov.* — Fig. 3, Map 14

Frutex scandens. Folia 3–4-verticillata coriacea vel subcoriacea elliptica vel obovata apice saepe emarginato. Inflorescentiae axillares graciles 6–8-florae sparsim pubescentes 1.3–1.9 cm longi. Corolla tubo 1.1–2.2 mm longo lobis linearibus 1.8–2.2 mm longis. Ovarium pubescens. Mericarpia 1–2-articulata articulis globosis 5.8–7.4 × 4.8–7 mm. — Typus: *Van Balgooy 3685* (holo L; iso A, BO, K) from Indonesia, Sulawesi Selatan, Lake Matana, Nuhakampi Otede.

Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3 or 4; petiole 0.3–0.8 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic or obovate, apex emarginate to shortly acuminate with an obtuse acumenor acuminate but notched at the apex, base cuneate or decurrent onto petiole, margin weakly inrolled or flat, weakly undulate; blade 1.4–7.4 by 0.5–2.8 cm, 1.8–6.4 times as long as wide, midrib sunken above, intramarginal nerve absent, secondary veins 16–24 pairs, 80–85° from midrib, weakly prominent above, weakly visible or prominent beneath, tertiary usually obscure above; glabrous beneath, glabrous above. *Inflorescences* axillary, with several clear internodes and unbranched side branches, delicate, sparsely puberulent all over, 1.3–1.9 cm long; peduncle 0.5–1 cm by 0.7–0.9 mm; bracts caducous or persistent, deltoid, 0.9–1 by 0.6–0.7 mm; bracteoles absent; flowers 6–8; pedicels 0.6–2 mm long. *Sepals* not fleshy, ovate, apex acute or acuminate, not keeled, 1–1.2 by 0.6–0.8 mm, 1.4–1.8 times as long as wide, ciliate, sparsely puberulent on centre line or all over, glabrous inside. *Corolla* bud head 1.9 mm long, 0.63 of bud length, lanceolate, apex acuminate; tube slightly inflated, 1.1–2.2 by 0.9 mm, 1.1–2 times as long as sepals, 0.61–1.1 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; throat with thickening; lobes linear, apex acuminate, not base auriculate, 1.8–2.2 by 0.6 mm, 3 times as long as wide, glabrous outside,

glabrous inside, not ciliate. *Stamens* inserted at 0.6–1.6 mm from corolla base, 0.4–0.55 of tube length; anther apex 0.2–0.6 mm from corolla mouth, anthers 0.7–0.8 by 0.25–0.3 mm, 2.3 times as long as wide; filaments 0.3 mm long. *Ovary* 0.5 mm high, densely pubescent all over; style 1.2 mm long; pistil head 0.4 mm long. *Fruit* black or purple, stalks 1.7–3.2 mm long, with 1 or 2 articles in each string, glabrous or sparsely puberulent at ends, articles with thin flesh, 5.8–7.4 by 4.8–7 mm, globose, symmetrical, rounded at apex. *Seeds* ovoid, ruminate, 4.7–6.6 by 4.2–5 by 3.8–4.5 mm. (Description based on 4 collections made into 14 specimens.)

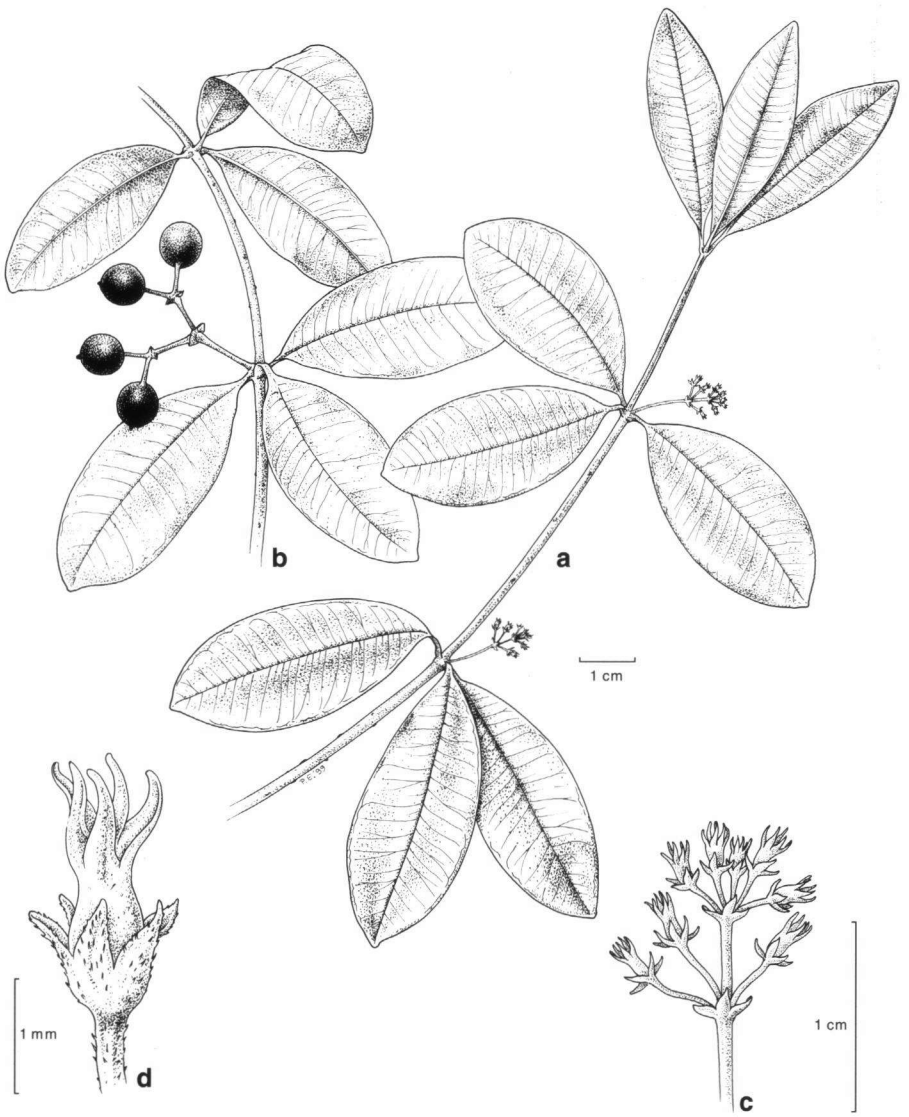
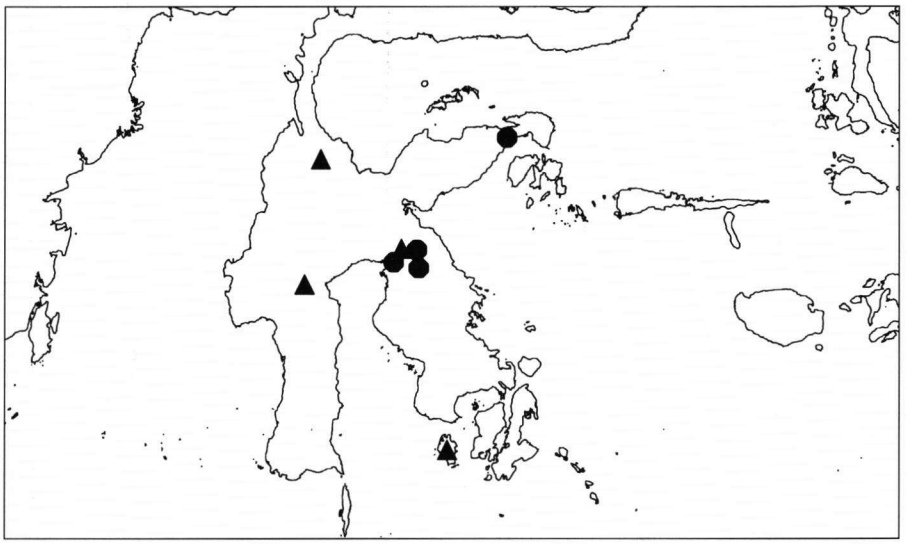



Fig. 3. *Alyxia globosa* D.J. Middleton. a. Habit with flowers; b. habit with fruits; c. inflorescence; d. open flower.



Map 14. Distribution of *Alyxia globosa* D.J. Middleton (●) and *A. kabaenae* Markgr. (▲).

Distribution — Sulawesi.

Habitat — In secondary or primary forest or on river banks on limestone or ultrabasic soils at 275–400 m altitude.

Note — This new species is somewhat perplexing in that *Meijer 11253*, the only flowering specimen known, shows some extremely small flowers with a corolla tube only about 1 mm long and some larger flowers with a corolla tube about 2 mm long. Those with the smaller flowers appear to be somewhat mutated in that the top of the ovary has a small wizened style and the longer ones still have a somewhat malformed corolla tube. These flowers do not appear to be parasitised or otherwise damaged by insects. Even though the flowers appear anomalous the collections of this species do appear to form quite a distinct new species possibly related to *A. palawanensis* but differing from it in the inflorescence structure and the smaller flowers and fruits. It is also reported to grow on basic soils whilst *A. palawanensis* is reported from schists, shales and sandstones at higher altitude. A fruiting collection has been chosen as the type for the reason that the only flowering specimen has the anomalous flowers described above and that the description of the flowers may in the future change substantially.

*Specimens studied*:

INDONESIA: Sulawesi Selatan: Lake Matana, Nuhakampi Otede, *Van Balgooy 3685* (type A, BO, K, L); Towuti Lake, *Kjellberg 2183* (BO, S); Larona, West of Towuti Lake, *Meijer 11253* (BO, L, MO, US). – Sulawesi Tengah: Luwuk, *Coode 5900* (A, BO, K, L).

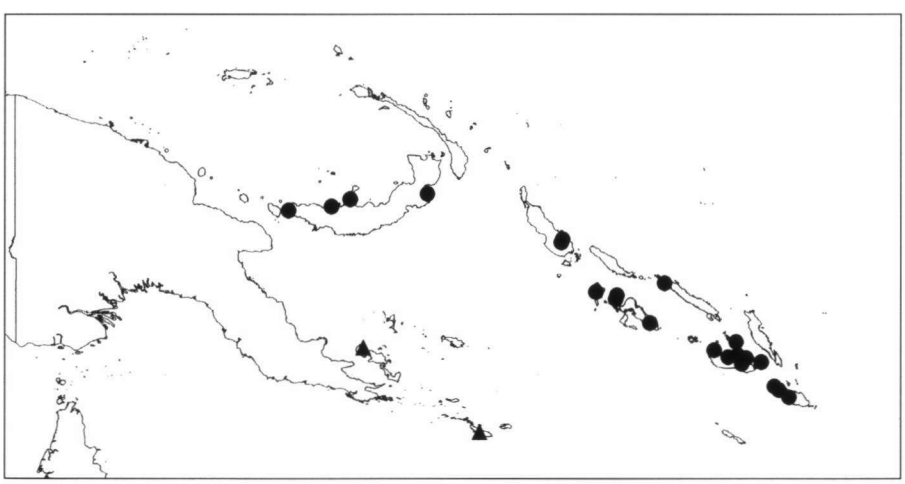
## 17. **Alyxia graciliflora** D.J. Middleton, *spec. nov.* — Map 15

Frutex scandens. Folia ternata subcoriacea elliptica. Inflorescentiae axillares graciles 4–12-florae sparsim ad dense pubescentes 1–2.9 cm longae. Corolla tubo 2.7–3.1 mm longo basi loborum 1.3–2.1 mm longorum pubescente. Ovarium pubescens. Mericarpia

1-articulata articulis ellipticis 15–16.2 × 6.9–8.2 mm. — Typus: *Benjamin LAE 67976* (holo US; iso A, BISH, BRI, CANB, E, K, L, LAE , M) from Papua New Guinea, Milne Bay Province, Goodenough Island, Mt Oiamadawa'a.

*Alyxia acuminata* auct. non K. Schum.: Markgr., Blumea 23 (1977) 390, p.p.

Climbers. *Bark* brown. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3; petiole 0.3–0.6 cm long, glabrous or pubescent; blade subcoriaceous, elliptic, apex obtuse or shortly acuminate, acumen obtuse, base cuneate, margin weakly inrolled or flat, weakly undulate, 1.7–7.2 by 0.4–2.9 cm, 1.8–4.3 times as long as wide; midrib slightly sunken or raised and with a central groove above, intramarginal nerve absent, secondary veins 24–38 pairs, 70–75° from midrib, weakly prominent above, obscure to weakly prominent beneath, tertiary venation weakly prominent or flattened above, parallel to secondary veins; glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium with clear internodes or with 1 or 2 internodes and unbranched side branches, delicate, sparsely to densely puberulent, 1–2.9 cm long; peduncle 0.3–0.9 cm by 0.7–0.9 mm; bracts caducous or persistent, deltoid, 0.9–1 by 0.6–0.8 mm wide; bracteoles absent; flowers 4–12; pedicels 0.9–2 mm long. *Sepals* ovate, apex acute, keeled or not keeled, 1–1.2 by 0.4–0.8 mm, 1.5–2.5 times as long as wide, ciliate, glabrous to densely puberulent. *Corolla* tube brown with green lobes or with pink tube and white lobes; bud head 1.9 mm long, 0.48 of bud length, lanceolate, apex obtuse or acute; tube slightly or strongly inflated, throat without thickening or with a narrow ring of tissue, 2.7–3.1 by 1–1.7 mm, 2.3–2.8 times as long as sepals, 1.5–2.1 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, glabrous inside or very sparsely pubescent in upper half of tube; lobes elliptic, apex obtuse, base auriculate, 1.3–2.1 by 1.1–1.3 mm, 1.2–1.6 times as long as wide, glabrous or sparsely puberulent outside, pubescent at base of lobes inside, ciliate or ciliate near



Map 15. Distribution of *Alyxia graciliflora* D.J. Middleton (▲) and *A. kwalotabaa* D.J. Middleton (●).

tips only. *Stamens* inserted at 1.6–1.9 mm from corolla base, 0.51–0.57 of tube length; anther apex 0–0.5 mm from corolla mouth, anthers 0.9–1 by 0.3–0.4 mm, 2.5–3 times as long as wide; filaments 0.5–0.6 mm long. *Ovary* 0.8 mm high, densely pubescent all over; style 0.6–0.7 mm long; pistil head 0.5 mm long, glabrous or pubescent. *Fruit* stalks 1.8 mm long, with 1 article in each string, glabrous, articles fleshy, 15–16.2 by 6.9–8.2 mm, ellipsoid, symmetrical, apex rounded.
(Description based on 23 specimens.)

Distribution — New Guinea.

Habitat — In forest at 500–1400 m altitude.

Note — This new species is similar to another new species, *A. papuana*, differing from it most noticeably in the absence of bracteoles and the densely pubescent ovary. It is also similar to *A. defoliata* from which it differs in the size and shape of the sepals and the pubescence on the inside of the corolla lobes.

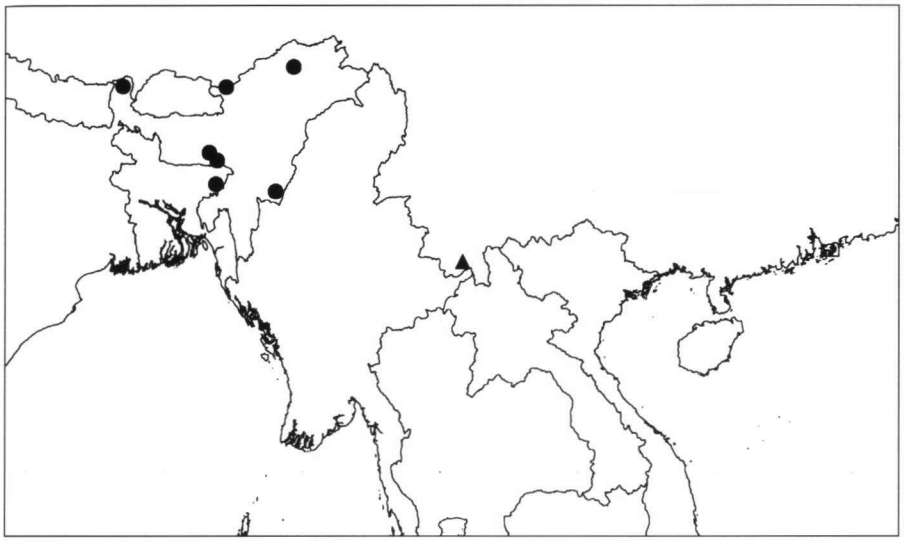
*Specimens studied*:

PAPUA NEW GUINEA: Milne Bay Province: Sudest Island, Mt Riu, *Brass 28006* (A, CANB, K, L, PNH, S, US); Goodenough Island, Mt Oiamadawa'a, *Benjamin LAE 67976* (type A, BISH, BRI, CANB, E, K, L, LAE , M, US), *Benjamin LAE 67995* (A, CANB, E, K, L, LAE).

## 18. Alyxia gracilis (Wall. ex A.DC.) Benth. ex Hook.f. — Map 16

*Alyxia gracilis* (Wall. ex A.DC.) Benth. ex Hook.f., Fl. Brit. Ind. 3 (1882) 634. — *Hunteria gracilis* Wall. ex A.DC., Prodr. 8 (1844) 350. — *Pulassarium gracile* (Wall. ex A.DC.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon gracilis* (Wall. ex A.DC.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — Type: *Wallich 1613* (holo G-DC; iso BM, K, K-W, G; photo E) from Bangladesh, Sylhet.

Climbers. *Branchlets* terete or weakly angled, sparsely lenticellate, glabrous. *Leaves* in whorls of 3; petiole 0.5–0.9 cm long, glabrous; blade subcoriaceous or papery, elliptic, obovate or oblong, apex long acuminate to caudate, acumen rounded, base cuneate, margin weakly inrolled or flat, weakly undulate or not, 3.7–14 by 1.3–4.3 cm, 2–5.1 times as long as wide, midrib deeply sunken above, intramarginal nerve weak, secondary veins 19–36 pairs, 75° from midrib, distinct to indistinct above, weakly prominent or flattened above, obscure to weakly prominent beneath, tertiary venation weakly prominent or obscure, parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescences* axillary, an aggregate pleiochasium forming lax panicles, delicate, glabrous, 2.3–9.5 cm long; peduncle 1–2.5 cm by 0.8–1 mm; bracts persistent; bracteoles on pedicel; flowers 8–28; pedicels 4–8 mm long. *Sepals* ovate, apex acute, 0.8–1.4 by 0.6–1.1 mm, 1.2–2 times as long as wide, ciliate, glabrous. *Corolla* bud head 1.3–1.8 mm long, deltoid, apex acuminate, 0.42–0.45 of bud length; tube slightly inflated, 1.8–2.8 mm long, 1–1.4 mm wide, glabrous outside, glabrous inside, 1.4–1.5 times as long as sepals, 1.2–1.4 times as long as lobes; lobes ovate, apex obtuse, not ciliate, 1.2–2 by 1.2–1.6 mm, 1–1.3 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 1.1 mm from corolla base, 0.55 of tube length; filaments 0.4 mm long; anther apex at corolla mouth, anthers 0.6–0.7 by 0.3 mm, 2.3 times as long as wide. *Ovary* 0.6 mm high, pubescent around base only; style 0.5 mm long; pistil head 0.2 mm long. *Fruit* with 1 article in each string; stalks 2.5–3.5 mm long; articles 11–14 by 9–13.5 mm, ellipsoid, glabrous. *Seeds* not seen.
(Description based on 28 specimens.)



Map 16. Distribution of *Alyxia gracilis* (Wall. ex A.DC.) Benth. ex Hook.f. (●) and *A. menglungensis* Tsiang & P.T. Li (▲).

Distribution — North-East India.

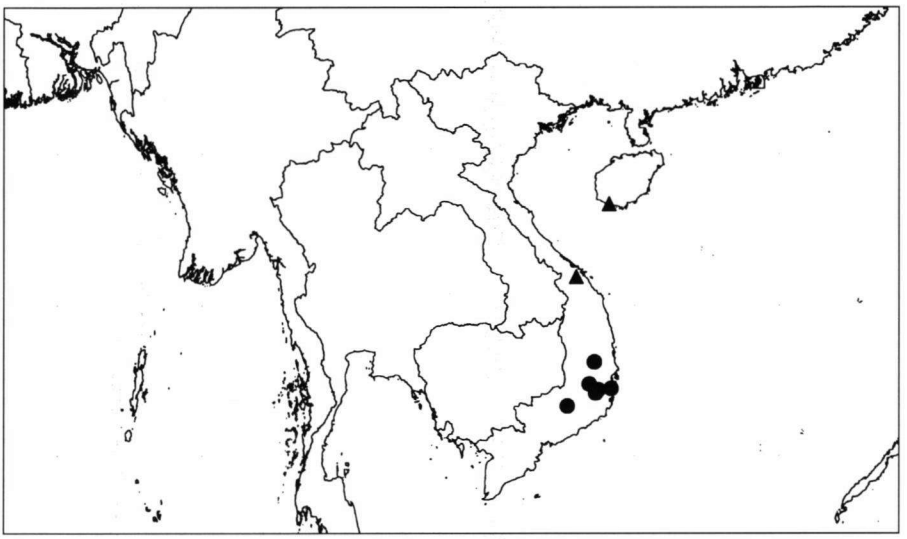
Habitat — Altitude range: 610–1555 m.

Note — This is quite a distinctive species with its branched, lax inflorescences with tiny flowers, and long leaf apices.

### 19. Alyxia hainanensis Merr. & Chun — Map 17

*Alyxia hainanensis* Merr. & Chun, Sunyatsenia 2 (1935) 309; Tsiang, Sunyatsenia 3 (1936) 136; Anonymous, Fl. Hainanica 3 (1974) 226; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 70, p.p.; Lý, Feddes Repert. 97 (1986) 435; P.T. Li, J. S. China Agric. Univ. 11 (1990) 28. — Type: *How & N.K. Chun 70186* (holo NY; iso A, K, P, US) from China, Hainan, Ngai Yuen.

Climbers. *Branchlets* weakly angled, sparsely or densely lenticellate, glabrous. *Leaves* in whorls of 3, coriaceous; petiole 0.7–1 cm long, glabrous; leaf blade elliptic or ovate, apex long acuminate, acumen obtuse, base obtuse to cuneate, margin weakly inrolled, weakly undulate, dark or pale dull green above, pale green beneath, 6–11.8 by 2.2–4.4 cm, 2.1–3.1 times as long as wide, midrib deeply sunken above, secondary veins 33–39 pairs, 75–80° from midrib, weakly distinguishable or indistinct above, not prominent, weakly prominent or not beneath, tertiary venation parallel to secondary veins, glabrous beneath, not punctate, glabrous above. *Inflorescences* axillary or terminal, a compound pleiochasium with clear internodes, robust, glabrous, 2–3.7 cm long; peduncle 1.2–2 cm by 1.5 mm; bracts persistent, deltoid, 1.3–1.7 by 1.3 mm; bracteoles absent; flowers 10–20; pedicels 1.5–1.7 mm long. *Sepals* not fleshy, ovate, apex acute, 1.3 by 0.8 mm, 1.6 times as long as wide, ciliate or not, glabrous outside, glabrous inside. *Corolla* with a pink tube and white lobes; bud head ovate, apex acute; tube slightly inflated, 2.6 by 1.6–1.8 mm, 2 times as long as sepals, 1.7–1.9 times as long as lobes, glabrous outside, very sparsely pubescent beneath filaments inside, throat



Map 17. Distribution of *Alyxia hainanensis* Merr. & Chun (▲) and *A. marginata* Pit. (●).

without thickening; lobes elliptic, base auriculate, apex acute, not ciliate, 1.4–1.5 by 0.9–1.1 mm, 1.6–1.7 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 1.5 mm from corolla base, 0.56 of tube length; anther apex 0.2 mm from corolla mouth, anthers 0.8 by 0.4 mm, 2 times as long as wide; filaments 0.5 mm long. *Ovary* 0.7 mm high, pubescent in tuft between carpels; style 0.8 mm long; pistil head 0.4 mm long. *Fruit* with 1 article in each string; stalks 1.5–3.3 mm long; articles with thin flesh, 9–14 by 7–8 mm, ellipsoid or globose, symmetrical, black or purplish red, glabrous. *Seeds* ovoid, ruminate, 7.5 by 4.9 by 3.8 mm.
(Description based on 2 collections made into 7 specimens.)

Distribution — China (Hainan), Vietnam.

Habitat — Altitude range: 600–1400 m.

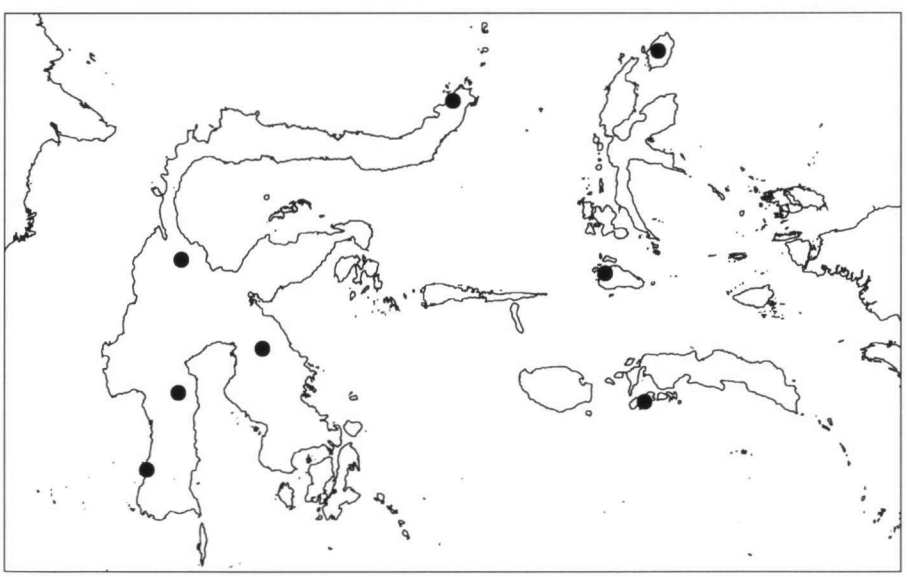
Note — This is a distinct species but most of the material from Hainan and elsewhere in China previously identified as *A. hainanensis* is actually *A. sinensis*, a widespread and very variable species. I considered *A. hainanensis* to be a synonym of *A. sinensis* until coming upon the flowering specimen from the Paris herbarium which is quite distinct with its robust inflorescence and small flowers. The only flowering specimen known is *Poilane 29048* (P) from Vietnam. Its affinities are with *A. annamensis* and *A. racemosa*. Sterile material is very difficult to distinguish from *A. sinensis*.

### 20. Alyxia halmaheirae Miq. — Map 18

*Alyxia halmaheirae* Miq., Ann. Mus. Bot. Lugd. Bat. 4 (1869) 140; Markgr., Blumea 23 (1977) 408, p.p.; Widjaya, Sispipan Floribunda 2 (1992) 6. — *Pulassarium halmaheirae* (Miq.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Teijsmann HB 5647* (lecto U, designated here; iso BO, L) from Indonesia, Maluku, Halmahera.

*Alyxia stellata* auct. non (J.R. Forst. & G. Forst.) Roem. & Schult.: Koord., Meded. Lands Plantentuin 19 (1898) 528.

Climbers. *Bark* grey. *Branchlets* weakly angled, sparsely lenticellate or not, glabrous to sparsely and minutely puberulent, sometimes glabrescent. *Leaves* opposite or in whorls of 3 or 4, never all opposite on a branch; petiole 0.1–1 cm long, glabrous or pubescent; blade coriaceous or subcoriaceous, elliptic, apex acuminate, base acute to decurrent onto petiole, margin weakly inrolled or flat, weakly or strongly undulate, 2.7–13.5 by 0.4–3 cm, 2.3–7 times as long as wide; midrib sunken above, intramarginal nerve strong and inset from margin to obscure, secondary veins 19–80 pairs, 65–85° from midrib, weakly prominent or not above, obscure, weakly visible or prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous above. *Inflorescences* axillary or terminal, a simple unbranched pleiochasium or with few internodes and unbranched side branches, delicate, sparsely to densely puberulent all over, 1–2.2 cm long; peduncle 0.5–4.5 cm by 0.5–0.8 mm; bracts persistent, deltoid or lanceolate, 1.3–3.5 by 0.8–1.2 mm; bracteoles absent or only on pedicel of terminal flower; flowers 4–7; pedicels 1.8–4.3 mm long. *Sepals* ovate, apex acute or acuminate, 1.2–1.8 by 0.8–1.1 mm, 1.4–1.6 times as long as wide, ciliate, glabrous or sparsely to densely puberulent, sometimes only on centre line, glabrous inside. *Corolla* tube yellowish, lobes white; bud head 2.2–2.6 mm long, 0.37–0.4 of bud length, lanceolate, apex acuminate; tube cylindrical or slightly inflated, throat with or without thickening, 4.2–4.9 by 1.3–1.5 mm, 2.4–3.6 times as long as sepals, 0.5–2.1 times as long as lobes, glabrous outside, pubescent in upper part, sometimes almost to base, or only in a band beneath the stamens inside; lobes elliptic or ovate, apex obtuse or acute, base auriculate, 2.1–2.4 by 1.2–1.6 mm, 1.4–1.9 times as long as wide, glabrous outside, glabrous or pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 2.4–3.1 mm from corolla base, 0.56–0.61 of tube length; anther apex 0.4–0.8 mm from corolla mouth, anthers



Map 18. Distribution of *Alyxia halmaheirae* Miq.

0.9–1.1 by 0.4 mm, 2.25–2.8 times as long as wide; filaments 0.4–0.7 mm long. *Ovary* 0.7–0.8 mm high, densely pubescent all over; style 1.7–1.9 mm long; pistil head 0.3–0.4 mm long, pubescent. *Fruit* orange, turning black when mature, stalks 2.3–3.2 mm long, with 1 article in each string, glabrous, articles with thin flesh, 9.3–14.5 by 7–10 mm, ellipsoid, globose or cylindrical, rounded at apex. *Seeds* ruminate, 7.5–9.3 by 6.1–6.4 by 5.3–5.4 mm. Embryo cotyledons wider than radicle, strongly to weakly undulate, embryo 6.5–7.5 mm long, cotyledons 0.6–0.71 of embryo length. (Description based on 30 specimens.)

Distribution — Sulawesi, Moluccas.

Habitat — In open or dense primary or secondary forest at 20–2000 m altitude. Reported from porous nickel and thin sandstone soils.

Note — This is a rather poorly known species in that the type is from Halmahera and is a fruiting specimen. No flowering material is known from Halmahera. I have linked this specimen to some flowering specimens from Sulawesi which I was initially inclined to describe as a new species but on reflection decided they were probably the same species as *A. halmaheirae*. Only further collecting from Halmahera itself will confirm this conclusion.

### 21. Alyxia kabaenae Markgr. — Map 14

*Alyxia kabaenae* Markgr., Blumea 23 (1977) 398. — Type: *Elbert 3415* (holo L; iso A, BO, K) from Indonesia, Sulawesi Tenggara, Kabaena Island, Balo District, Eempuhu.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, glabrous. *Leaves* in whorls of 3 or 4; petiole 0.2–1.2 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic, apex short to long acuminate, acumen obtuse, base acute or cuneate, margin weakly inrolled or flat, weakly undulate, 2.2–15 by 0.6–5.4 cm, 2.3–3.8 times as long as wide; midrib sunken above, intramarginal nerve clear at margin; secondary veins 27–58 pairs, 65–80° from midrib, weakly prominent above, sometimes weakly prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescences* axillary, a compound pleiochasium with clear internodes or with several clear internodes and unbranched side branches, delicate, sparsely to densely short puberulent, 1.1–2.7 cm long; peduncle 0.3–0.9 cm by 1–1.3 mm; bracts persistent, ovate or lanceolate, 1.4–2.9 by 0.8–1.4 mm; bracteoles absent; flowers 7–11, reported as being unpleasant in smell, sometimes 4-merous with 5-merous flowers in same inflorescences; pedicels 0.6–2 mm long. *Sepals* fused into a 2-lipped tube or partial tube, not keeled, 1.9–2 mm long, ciliate, glabrous or sparsely puberulent, pubescent only at tips or glabrous inside. *Corolla* white or tube yellowish, lobes white; bud head 1.5–2.4 mm long, 0.35–0.44 of bud length, ellipsoid or ovate, apex acute; tube cylindrical, throat with thickening, 2.8–3 by 1.1–1.4 mm, 1.5 times as long as sepals, 1.1–1.6 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, glabrous or pubescent only around stamens inside; lobes elliptic or orbicular, apex rounded or obtuse, base auriculate, 1.8–2.8 by 1.2–2 mm, 0.9–1.6 times as long as wide, glabrous or sparsely puberulent outside, glabrous or pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 1.9–2.1 mm from corolla base, 0.57–0.63 of tube length; anther apex 0.3–0.5 mm from corolla mouth, anthers 0.7 by 0.3 mm, 2.3 times as long as wide; filaments

0.4–0.6 mm long. *Ovary* 0.5–0.8 mm high, densely pubescent all over; style 1–1.5 mm long; pistil head 0.4–0.5 mm long. *Fruit* with 1 article in each string, glabrous, articles with thin flesh, 24.5–27 by 14–16 mm wide, ellipsoid, symmetrical, apex obtuse. *Seeds* elliptic, ruminate, 21.5 by 12 by 10 mm.
(Description based on 23 specimens.)

Distribution — Sulawesi.

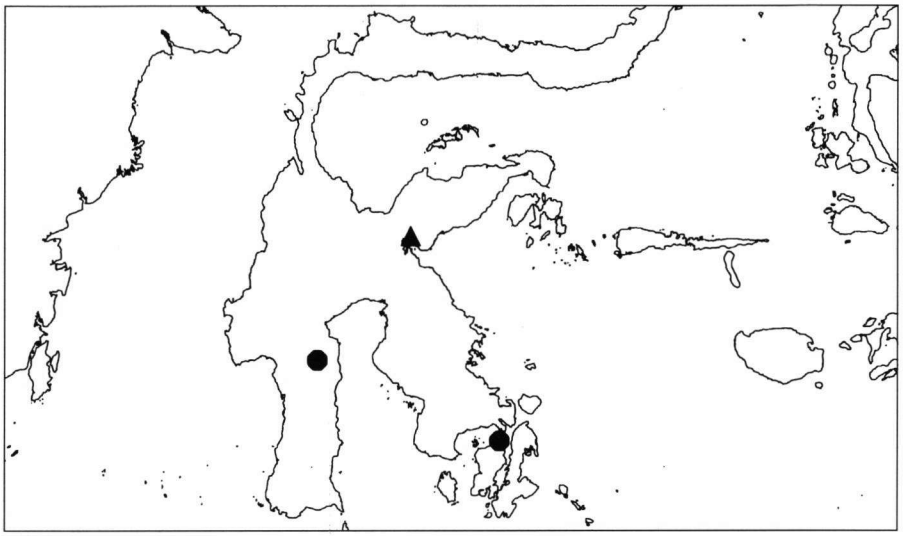
Habitat — Coastal forest, mixed grassland and short forest on limestone, serpentine or karst from 200–1500 m altitude.

Note — This is one of the most distinctive species of *Alyxia* due to a calyx which is partially fused into two lobes like in a Labiatae flower, one with three teeth, the other with two. There are also occasional 4-merous flowers. There are two flowering collections known but as the collecting locality is exactly the same only from two different dates there is a possibility that they are from the same plant. It would seem to be closest to *A. halmaheirae* from which it differs, quite apart from in the calyx, in its more congested and richer-flowered inflorescences, smaller flowers and glabrous inside of the corolla tube. The calyx character is also found in *A. celebica* which differs from this species in the more robust inflorescences and the very much larger flowers. It could be that this calyx character, considering also the occasional 4-merous flowers, is some sort of genetic mutation but the fact that the same character appears in a number of specimens from different places which share other suites of characters suggests that, whatever its origin, the character has now stabilised.

### 22. **Alyxia kendarica** Markgr. — Map 19

*Alyxia kendarica* Markgr., Blumea 23 (1977) 410. — Type: *Beccari 6365* (holo FI, n.v.; photo L) from Wawo-Sondu to Mar Amu, near Kendari, Sulawesi Tenggara, Indonesia.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, glabrous or sparsely puberulent, glabrescent. *Leaves* in whorls of 4; petiole 0.3–6 cm long, glabrous; blade subcoriaceous, elliptic, usually narrowly so, apex long acuminate, acumen obtuse, base cuneate, margin flat, weakly undulate, blade 3.1–12 by 0.8–3.4 cm, 2.3–5.8 times as long as wide, midrib sunken above, secondary veins 29–55 pairs, 70° from midrib, weakly prominent above, weakly visible beneath; tertiary venation weakly prominent above, parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescences* axillary, with several clear internodes and unbranched side branches, delicate, sparsely puberulent all over, 2–2.8 cm long; peduncle 0.9–1.3 cm by 0.6 mm; bracts caducous or persistent, deltoid, 0.9–1.2 by 0.6–0.7 mm; bracteoles absent; flowers 6 or 7; pedicels 2.4–4.5 mm long. Calyx of free sepals, ovate, apex acute, not keeled, 1.2–1.4 by 0.6–0.7 mm, 1.9–2 times as long as wide, ciliate, sparsely puberulent, glabrous inside. *Corolla* white with orange tube; bud head 2.8 mm long, 0.44 of bud length, lanceolate, apex acuminate; tube slightly inflated, throat with thickening, 4.2–4.6 by 1.2–1.3 mm, 3.5 times as long as sepals, 0.9–0.93 times as long as lobes, glabrous outside, pubescent in upper half and around stamens inside; lobes linear, apex acuminate, base auriculate, 4.5–4.8 by 1 mm wide, 4.5–4.6 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 2.3 mm from corolla base, 0.53 of tube length; anther apex 0.8 mm from corolla mouth, anthers



Map 19. Distribution of *Alyxia kendarica* Markgr. (●) and *A. lackii* D.J. Middleton (▲).

1 by 0.4 mm, 2.5 times as long as wide; filaments 0.6 mm long. *Ovary* 1 mm high, densely pubescent all over; style 1.4 mm long; pistil head 0.4 mm long, pubescent. *Fruit* not seen.

(Description based on 2 collections made into 9 specimens.)

Distribution — Sulawesi.

Habitat — Altitude: 1850 m.

Note — This species is related to *A. halmaheirae* which is found in the same area. The main difference between them is in the very long thin corolla lobes of *A. kendarica* compared to the ovate to elliptic corolla lobes of *A. halmaheirae*. There are also some differences in pubescence of the inflorescences, branchlets and flowers.

### 23. Alyxia kwalotabaa D.J. Middleton, *spec. nov.* — Fig. 4, Map 15

Frutex scandens. Folia 3–4-verticillata coriacea elliptica vel obovata. Inflorescentiae axillares robustae 4-florae glabrae vel sparsim ad dense pubescentes 1.7–2.4 cm longae. Corolla tubo 8.1–11.2 mm longo lobis 3 mm longis. Ovarium pubescens. Mericarpia 1-articulata articulis ellipticis 16.5–36 × 13–21 mm. — Typus: *Schodde & Craven 3803* (holo CANB; iso A, K, L, LAE) from Papua New Guinea, Bougainville Island, Lake Loloru, c. 15 miles N of Buin.

*Alyxia acuminata* auct. non K. Schum.: Markgr., Blumea 23 (1977) 390, p.p.
*Alyxia clemensiae* auct. non Markgr.: Markgr., Blumea 23 (1977) 396, p.p.

Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous. *Leaves* in whorls of 3 or 4; petiole 0.8–1.3 cm long, glabrous; blade coriaceous or thickly coriaceous, elliptic or obovate, apex short or long acuminate, acumen obtuse, not mucronate, base acute to cuneate, margin flat or weakly undulate, 4.3–14 by 1.8–7.4 cm, 1.5–3.6 times as long as wide, midrib sunken above, intramarginal nerve clear at margin, secondary veins 35–70 pairs, 70–80° from midrib, weakly prominent above, obscure to prominent

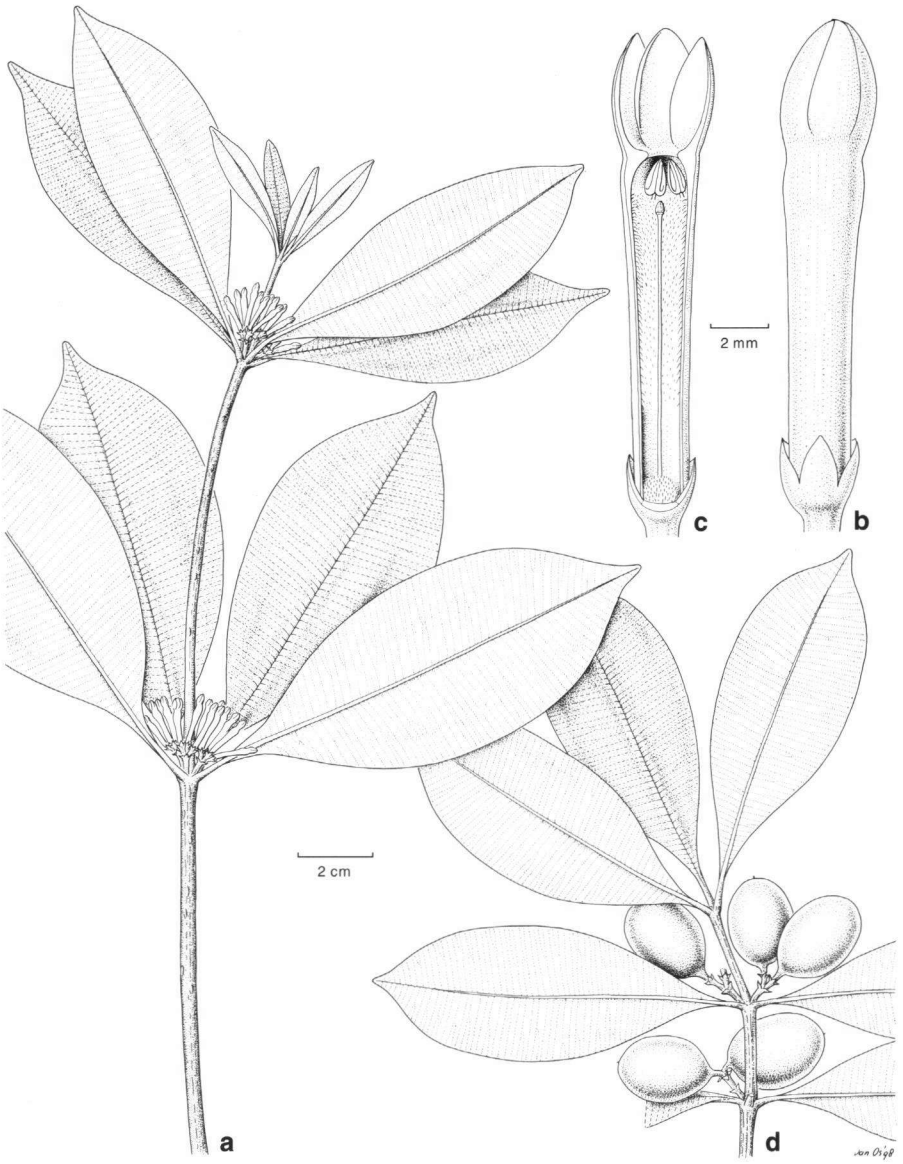



Fig. 4. *Alyxia kwalotabaa* D.J. Middleton. a. Habit; b. flower bud; c. flower dissection; d. fruit (fl. *Schodde & Craven 3803*; fr. *Mauriasi et al. BSIP 12231*).

beneath, tertiary venation weakly prominent above, reticulate or parallel to secondary veins. Leaf glabrous beneath, not punctate, glabrous above. *Inflorescence* axillary, a simple unbranched pleiochasium, robust, glabrous to sparsely or densely puberulent all over, 1.7–2.4 cm long; peduncle 0.2–2.2 cm by 1.3–2.8 mm; bracts persistent, deltoid, 1.4–2.6 by 1.4–2 mm; bracteoles absent; flowers 4; pedicels 1.2–1.8 mm long. *Sepals* not fleshy, ovate, apex obtuse to acute, 1.5–2.6 by 1–2 mm, 1.1–1.7

times as long as wide, ciliate, glabrous outside, glabrous inside. *Corolla* white or cream; bud head 3.6–3.8 mm long, 0.25–0.32 of bud length, ovate, apex acute; tube cylindrical, throat with thickening, 8.1–11.2 by 1.6–2.2 mm, 4.3–5.4 times as long as sepals, 2.7 times as long as lobes, glabrous outside, pubescent in upper half and around stamens or in a band below the stamens inside; lobes ovate, apex obtuse to acute, base auriculate, 3 by 2.7 mm, 1.1 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 6.6–10 mm from corolla base, 0.82–0.83 of tube length; anther apex 0.1–0.4 mm from corolla mouth, anthers 1.1–1.4 by 0.5 mm, 2.2–2.8 times as long as wide; filaments 0.8 mm long. *Ovary* 0.9–1.1 mm high, densely pubescent all over; style 6–9 mm long; pistil head 0.4 mm long. *Fruit* black; stalks 1.5–5 mm long; with 1 article in each string; glabrous or sparsely puberulent all over, fleshy or with thin flesh, 16.5–36 by 13–21 mm, ellipsoid, symmetrical, apex rounded to acuminate and hooked. *Seeds* elliptic, ruminate, 18.5–22 by 12.5–16 by 11.2–14.5 mm. Embryo cotyledons wider than radicle, strongly undulate, embryo 19 mm long, cotyledons 0.81 of embryo length.

(Description based on 103 specimens.)

Distribution — New Guinea (New Britain, Bougainville), Solomon Islands.

Habitat — In a wide range of primary and secondary forest types and scrub on well drained and ridge top soils at 30–1524 m altitude.

Note — Specimens of this species have been identified as *A. acuminata* and *A. clemensiae* in the literature and frequently as *A. maluensis* on the actual specimens. These various names are synonymous with *A. acuminata* taking priority. Most of the material which has been collected is in fruit, in which state it does bear a slight resemblance to *A. acuminata* except that its fruits are generally larger and fleshier. The flowering material is very distinctive, with the robust inflorescence and long corolla tubes, and the two species cannot be easily confused. The name of this species is taken from the vernacular name Kwalo Taba'a in the Kwara'ae language on the island of Guadalcanal, the Solomon Islands. It is most similar to *A. efatensis* from Vanuatu although that species has an ovary which is glabrous or only very sparsely pubescent around the base and fewer secondary veins in the leaves.

*Specimens studied (including specimens from the Solomon Islands)*:

PAPUA NEW GUINEA: West New Britain, Talasea Subprovince: 10 miles S of Cape Ruge, *Frodin NGF 26741* (A, BO, BRI, CANB, L, LAE, NY, SING); Mt Tangis, Western slopes, *Frodin NGF 26899* (A, BM, BO, BRI, CANB, L, LAE, NY, SING); Track from Ganeboku to summit of Mt Bagum, *Barker & Vinas LAE 66635* (BRI, L, LAE). – East New Britain: Wide Bay, Mt Kavangi, near Malpas, *Weiblen 439* (A, L). – Bougainville: Lake Loloru, c. 15 miles N of Buin, *Craven & Schodde 171* (CANB, L, LAE), *3803* (type A, CANB, K, L, LAE); Crown Prince Mts, *Corner NGF 13740* (BRI, LAE).

SOLOMON ISLANDS: Kolombangara: s.l., *Mauriasi et al. BSIP 9826* (K, L, LAE, SING), *Whitmore 6366* (A, K, L); Ridge West of Vila River, *Gafui et al. BSIP 8418* (K, L, LAE, SING); Poitete Forest Reserve, along access trail to Mt Veve, *Regalado & Sirikolo 764* (K, L). – Small Nggele: South of Kombe, *Gafui et al. BSIP 15318* (K, L, LAE, SING). – San Cristobal: Balego-Nagonago, *Brass 2703* (A, BISH, BM, BO, L); Marogu Area, *Runikera et al. BSIP 11092* (K, L, LAE, SING); Tetere Makira Bay, *Runikera et al. BSIP 12564* (K, L, LAE, SING); Onebia, SW San Cristobal, *Runikera et al. BSIP 12714* (K, L, SING); Irorauri Ridge, *Runikera et al. BSIP 12821* (K, L, LAE, SING). – Santa Isabel: Tiratona, *Brass 3331* (A, BISH, BRI, L). – Vangunu Island: Inland from Merusu Islet, *Whitmore BSIP 1212* (K, L, LAE, SING). – Baga Island, *Whitmore BSIP 1372* (L, LAE). Guadalcanal: Rere River, c. 3 miles inland, *Whitmore BSIP 2779* (K, L, LAE, SING);

Mt Gallego, *Whitmore RSS 2080* (A, K, L, LAE, P); Wanderer Bay area, *Mauriasi et al. BSIP 12231* (K, L, LAE); Duidui Area, *Farodo et al. BSIP 12035* (K, L, LAE, SING); Tina/Toni River Area, North Central Guadalcanal, *Nakisi & Babala BSIP 8242* (K, L, LAE, SING); Mbokokimbo River, logging road c. 6 km SE of main road, *P.I. Forster & Liddle PIF 8650* (K). – Barora Ite Island, *Mauriasi et al. BSIP 16186* (K, L, SING).

## 24. Alyxia lackii D.J. Middleton, *spec. nov.* — Fig. 5, Map 19

Frutex erectus vel scandens. Folia 6-verticillata coriacea vel subcoriacea elliptica vel obovata apice emarginato. Inflorescentiae axillares robustae circiter 10-florae dense pubescentes 2.8–3 cm longae. Corolla tubo circa 4.5 mm longo lobis circa 2.5 mm longis. Ovarium pubescens. — Typus: *Lack & Grimes 1760* (holo K) from Indonesia, Sulawesi Tengah, Mt Tambusisi.

Erect shrubs or climbers. *Branchlets* terete, weakly or strongly angled, sparsely lenticellate or not, glabrous or densely and minutely puberulent. *Leaves* in whorls of 6; petiole 0.4–0.5 cm long, glabrous or pubescent; blade subcoriaceous to thickly coriaceous, broadly elliptic to obovate, apex emarginate to obtuse, base cuneate or decurrent onto petiole, margin strongly inrolled, weakly undulate, 3–5.3 by 1.6–3 cm, 1.5–2 times as long as wide; midrib sunken above, intramarginal nerve strong and inset from margin, secondary veins 14–19 pairs, 60–75° from midrib, weakly prominent above, obscure, weakly visible or prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins; glabrous beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium with clear internodes, robust, densely puberulent, 2.8–3 cm long; peduncle 0.7–0.8 cm by 2.3 mm; bracts caducous, deltoid, 1.1–1.5 by 1.1–1.5 mm;

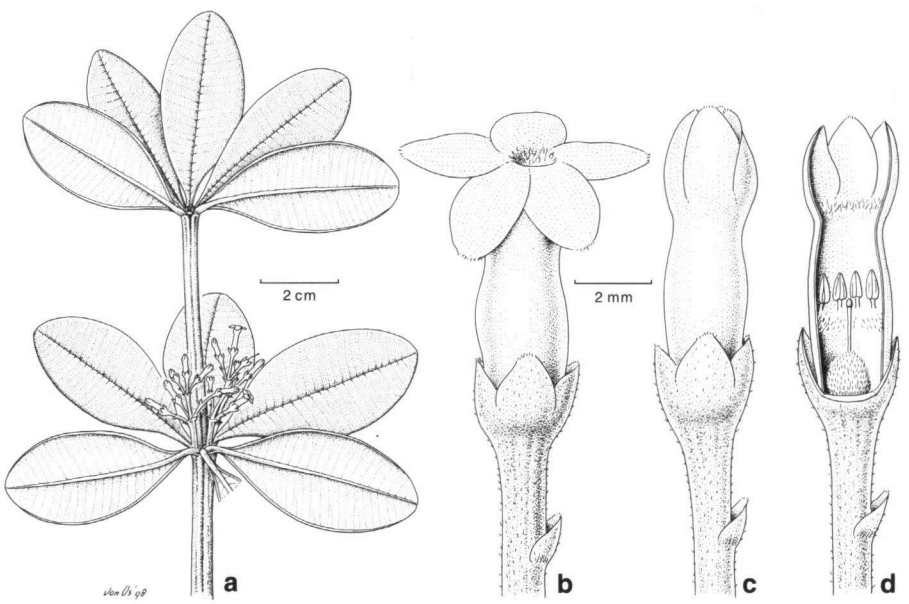



Fig. 5. *Alyxia lackii* D.J. Middleton. a. Habit (with one leaf removed from each whorl); b. flower; c. flower bud; d. flower dissection.

bracteoles one on pedicel; flowers c. 10; pedicels 4–6 mm long. *Sepals* of free sepals, ovate, apex obtuse, not keeled, c. 1.2 by 0.9 mm, 1.3 times as long as wide, ciliate, glabrous or sparsely puberulent, pubescent only at tips inside. *Corolla* white; bud head 2.6 mm long, 0.45 of bud length, ellipsoid, apex obtuse; tube cylindrical, throat with thickening, c. 4.5 by c. 1.4 mm, 3.75 times as long as sepals, 1.8 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them; lobes elliptic, apex obtuse, base auriculate, c. 2.5 by 1.6 mm, 1.6 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at c. 2.7 mm from corolla base, 0.57 of tube length; anther apex 0.8 mm from corolla mouth, anthers 1 by 0.4 mm, 2.5 times as long as wide; filaments 0.5 mm long. *Ovary* 0.9 mm high, densely pubescent all over; style 1.3 mm long; pistil head 0.4 mm long. *Fruit* unknown.

(Description based on 1 specimen.)

Distribution — Sulawesi.

Note — This new species is known only from one collection. It is characterised by the leaves with an emarginate apex, the high number of leaves in a whorl, and the robust, pubescent inflorescence.

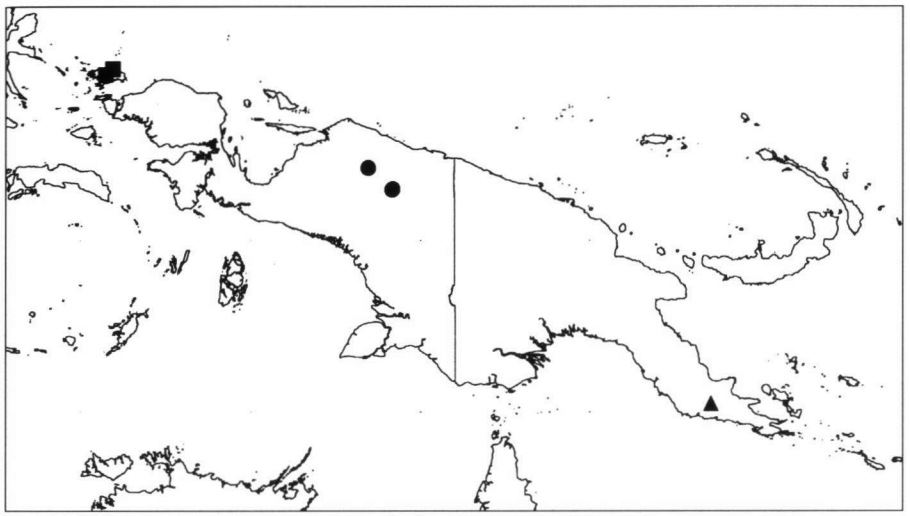
*Specimen studied*:

INDONESIA: Sulawesi Tengah: Mt Tambusisi, *Lack & Grimes 1760* (type K).

### 25. **Alyxia laurina** Gaudich. — Map 20

*Alyxia laurina* Gaudich., Voy. Uranie, Bot. (1829) 451, t. 62; G. Don, Gen. Hist. (1837) 96; A.DC., Prodr. 8 (1844) 347; Miq., Fl. Ned. Ind. 2 (1857) 408; Markgr., Bot. Jahrb. Syst. 61 (1927) 186; Blumea 23 (1977) 391. — *Pulassarium laurinum* (Gaudich.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon laurinus* (Gaudich.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — Type: *Gaudichaud s.n.* (lecto P, designated here; iso G, G-DC) from Indonesia, Irian Jaya, Waigeo, Rawak Island (= Pulau Lawak).

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, sparsely or densely minutely puberulent. *Leaves* in whorls of 3; petiole 0.2–0.3 cm long, glabrous or pubescent; blade coriaceous or subcoriaceous, elliptic, apex emarginate, acute or acuminate, sometimes notched at the apex, base acute or cuneate, margin weakly inrolled or flat, weakly undulate or not, sometimes yellowish-green beneath, 1.1–9.2 by 0.4–2.7 cm, 1.8–5.9 times as long as wide, midrib sunken above, intramarginal nerve absent, secondary veins 28–46 pairs, 65–70° from midrib, weakly prominent or indistinct above, obscure or weakly visible beneath, tertiary venation reticulate and parallel to secondary veins or obscure; glabrous beneath, puberulent only on midrib above. *Inflorescence* terminal, a short congested compound pleiochasium, robust, densely puberulent, 1.1–1.5 cm long; peduncle 0.3–0.6 cm by 1.4–1.6 mm; bracts persistent, deltoid; bracteoles present, two immediately beneath calyx; flowers 4–10; pedicels 0–0.8 mm long. *Sepals* ovate, apex acute, keeled, 1.6 by 1.1 mm, 1.5 times as long as wide, ciliate, densely puberulent, glabrous inside. *Corolla* with tube purplish-brown, lobes creamy; bud head 1.7–2.1 mm long, 0.24–0.25 of bud length, ovate, apex acute; tube cylindrical, throat with thickening, 6.7–7.4 by 1 mm, 4.6 times as long as sepals, 2.7–2.8 times as long as lobes, glabrous outside, continuously pubescent except for base inside; lobes ovate, apex obtuse, base auriculate, 2.4–2.7 by 1.2–2.1 mm, 1.3–2 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at



Map 20. Distribution of *Alyxia laurina* Gaudich. (■), *A. longiloba* D.J. Middleton (▲) and *A. microphylla* Markgr. (●).

5.3–6.3 mm from corolla base, 0.79–0.81 of tube length; anther apex 0.2–0.4 mm from corolla mouth, anthers 1 by 0.5 mm, 2 times as long as wide; filaments 0.5–0.6 mm long. *Ovary* 0.9 mm high, densely pubescent all over; style 5.2–5.4 mm long; pistil head 0.6 mm long, pubescent. *Fruit* stalks 2 mm long, with 1 article in each string, articles dry smooth, 8.7–9.3 by 7.5–8 mm, ellipsoid, rounded. *Seeds* not seen. (Description based on 11 specimens.)

Distribution — New Guinea (Waigeo and surrounding islands).

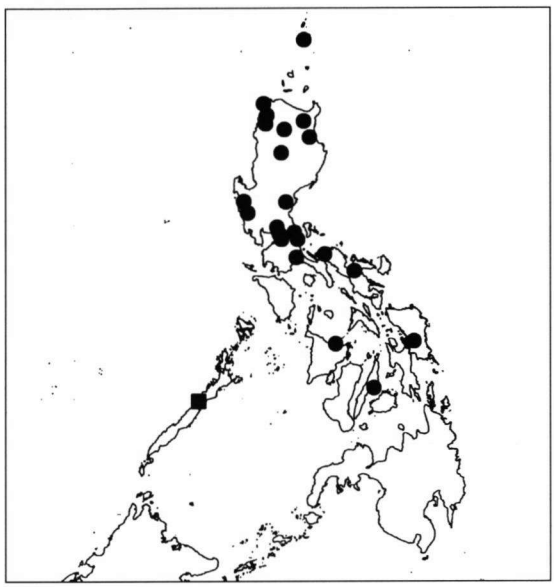
Habitat — In xerophytic vegetation at 25–40 m altitude.

Note — In the Paris herbarium there are some excellent drawings and illustrated analyses of this species with Gaudichaud's handwriting on them. It is characterised by the short, terminal, relatively robust inflorescence.

### 26. Alyxia linearis Markgr. — Map 21

*Alyxia linearis* Markgr., Blumea 23 (1977) 406. — *Alyxia rosmarinifolia* Merr. & Quisumb., Philipp. J. Sci. 82 (1954) 335 non *Alyxia rosmarinifolia* (Baill.) Guillaumin. — Type: *Edaño 176* (holo A; iso A, L, PNH) from the Philippines, Palawan, Puerto Princesa District, Bacuñgan.

Delicate climbers or scramblers. *Branchlets* weakly angled, sparsely lenticellate, glabrous. *Leaves* opposite, coriaceous; petiole 0.2–0.3 cm long, glabrous; blade linear or very narrowly elliptic, apex rounded, base obtuse, margin weakly revolute, not undulate, 1.9–5.8 by 0.2–0.45 cm, 10.7–20 times as long as wide, midrib slightly sunken above, secondary veins indistinct above, obscure beneath, tertiary venation obscure; glabrous beneath, glabrous above. *Sepals* ovate, apex obtuse, c. 1.2 by 0.8 mm, 1.5 times as long as wide, ciliate, glabrous. Flowers solitary. *Corolla* unknown. *Fruit* with 1 article in each string, stalks c. 2 mm long; articles 6–7 by 5.2–5.7 mm, globose, yellow, glabrous. *Seeds* c. 4.4 by 3.2 by 3.3 mm.
(Description based on 2 collections made into 7 specimens.)



Map 21. Distribution of *Alyxia linearis* Markgr. (■) and *A. luzoniensis* Merr. (●).

Distribution — Philippines (Palawan).

Habitat — Vegetation types: forest.

Note — This species would appear to be close to *A. angustissima*: both species have solitary flowers with long delicate peduncles but in neither are there mature flowers to compare. They differ in the shape of the leaves, the position of the flowers, the shape of the sepals and seemingly in the pubescence of the ovary (only seen in this species from one inadequate flower without a corolla) but further collections may lead to a re-evaluation of the specific limits here. In herbaria it is only known from the type specimen. However, I have seen sterile plants of this species on Thumb Peak, Barangay Simpocan, Puerto Princessa, Palawan at around 1000 m where it is reasonably common. This site is very close to the type locality. Collections should be made there when the plants are flowering and fruiting, probably in March and April.

**27. Alyxia longiloba** D.J. Middleton, *spec. nov.* — Fig. 6, Map 20

Frutex scandens. Folia 5-verticillata coriacea elliptica vel spathulata apice emarginato ad cuspidato. Inflorescentiae axillares robustae circiter 20-florae dense pubescentes 2.3–2.8 cm longae. Corolla tubo 5–6 mm longo lobis linearibus 4.1–4.3 mm longae. Ovarium pubescens. Fructus ignotus. — Typus: *Paijmans 129* (holo CANB; iso LAE) from Papua New Guinea, Northern Province, North of Aiari, Upper Musa Valley.

Climbers. *Branchlets* strongly angled, sparsely lenticellate, sparsely and minutely puberulent. *Leaves* in whorls of 5; petiole 0.7–1.6 cm long, pubescent; blade coriaceous, elliptic to spathulate, apex emarginate, rounded, apiculate or cuspidate, base cuneate or decurrent onto petiole, margin flat, not undulate, 5.2–8.6 by 2.8–4.9 cm, 1.7–2.1 times as long as wide, midrib slightly sunken or raised and with a central groove above, intramarginal nerve clear at margin, secondary veins 30–39 pairs, 65° from midrib, weakly prominent above, obscure beneath, tertiary venation flattened above,

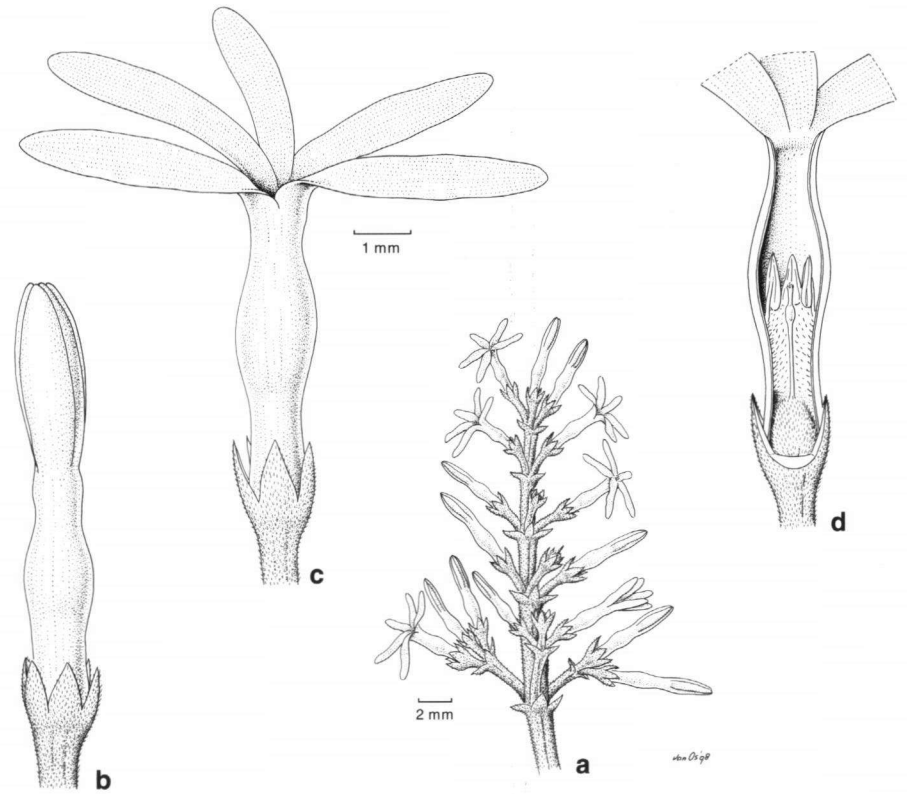



Fig. 6. *Alyxia longiloba* D.J. Middleton. a. Inflorescence; b. flower bud; c. open flower; d. flower dissection (*Paijmans 129*).

parallel to secondary veins or obscure; sparsely puberulent only on midrib beneath, sparsely puberulent or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium with clear internodes, robust, densely puberulent, 2.3–2.8 cm long; peduncle 0.4–0.5 cm by 1.4–1.5 mm; bracts persistent, 0.8–1 by 0.6–0.7 mm; bracteoles present or absent, one on pedicel; flowers 20; pedicels 1–1.5 mm long. *Sepals* ovate, apex acute or acuminate, not keeled, 1.1–1.4 by 0.8–0.9 mm, 1.2–1.75 times as long as wide, ciliate, densely puberulent, glabrous inside. *Corolla* white; bud head 5 mm long, 0.5 of bud length, lanceolate, apex acute; tube cylindrical, throat without thickening, 5–6 by 1.5 mm, 3.6–4.5 times as long as sepals, 0.96–1.2 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes linear, apex acute, 4.1–4.3 by 1–1.1 mm, 4.1–4.7 times as long as wide, glabrous outside, glabrous inside, ciliate near tips only. *Stamens* inserted at 2.1–2.7 mm from corolla base, 0.45–0.47 of tube length; anther apex 1.2–2.2 mm from corolla mouth, anthers 1.1–1.2 by 0.4–0.5 mm, 2.4–2.75 times as long as wide; filaments 0.5 mm long. *Ovary* 0.9 mm high, densely pubescent all over; style 1.2 mm long; pistil head 0.6 mm long, pubescent. *Fruit* not known.

(Description based on 1 collection made into 2 specimens.)

Distribution — New Guinea.

Habitat — Collected once in forest at 610 m.

Note — This new species is one of the most distinct in New Guinea because of the extremely long corolla lobes for the genus and the low position of the stamens in the corolla tube. Its affinities are most probably with *A. spicata* from which it differs in the much larger flowers and the position of the stamens. It is only known from the one collection although the label on the specimen notes that it is a 'common climber'.

*Specimen studied*:

PAPUA NEW GUINEA: Northern Province: North of Aiari, Upper Musa Valley, *Paijmans 129* (type CANB, LAE).

## 28. Alyxia luzoniensis Merr. — Fig. 7, Map 21

*Alyxia luzoniensis* Merr., Philipp. J. Sci., Bot. 4 (1909) 313; Enum. Philipp. Fl. Pl. 3 (1923) 328; Markgr., Blumea 23 (1977) 392, p.p. — Type: *Ramos 7007* (holo PNH†). Neotype: *Ramos 5107* (neo P, designated here; isoneo NY) from the Philippines, Luzon, Mountain Province, Bontoc.

*Brabejum lucidum* Blanco, Fl. Filip. ed. 2 (1845) 40. — *Alyxia blancoi* Merr., Philipp. J. Sci., Bot. 7 (1912) 330; Enum. Philipp. Fl. Pl. 3 (1923) 327; Markgr., Blumea 23 (1977) 401, p.p. — Type: Not traced. *Ramos 11118* (neo L, designated here; isoneo A, BM, K, P, US) from the Philippines, Cebu Province, hills above Cebu City.

*Alyxia lanceolata* Merr., Philipp. J. Sci., Bot. 13 (1918) 53; Philipp. Fl. Pl. 3 (1923) 328. — Type: *Ramos & Edaño 29209* (lecto A, designated here; iso BO, K, NY, P, US) from the Philippines, Luzon, Tayabas Province, Infanta-Siniloan trail.

*Alyxia laxiflora* Merr., Philipp. J. Sci., Bot. 13 (1918) 54; Enum. Philipp. Fl. Pl. 3 (1923) 328; Markgr., Blumea 23 (1977) 408. — Type: *Fénix 28371* (lecto A, designated here; iso BO, K, L, NY, P, US) from the Philippines, Luzon, Apayao, Mt Sulu.

*Alyxia stenophylla* Merr., Philipp. J. Sci. 17 (1921) 305; Enum. Philipp. Fl. Pl. 3 (1923) 329; Markgr., Blumea 23 (1977) 410. — Type: *Martelino & Edaño 35574* (lecto A, designated here; iso BM, BO, K, L, P, US) from the Philippines, Panay Island, Capiz Province, Mt Salibongbong.

*Alyxia ecostata* Merr. & Quisumb., Philipp. J. Sci. 82 (1954) 335; Markgr., Blumea 23 (1977) 408. — Type: *Sulit 6421* (holo A; iso BM, K, L, PNH, US) from the Philippines, Samar, Mt Calbiga, near Wright.

*Alyxia halmaheirae* auct. non Miq.: Markgr., Blumea 23 (1977) 408, p.p.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent. *Leaves* opposite to whorls of 4; petiole 0.2–0.8 cm long, glabrous or pubescent; blade coriaceous, subcoriaceous or papery, very narrowly elliptic, more broadly elliptic, obovate or spathulate, apex emarginate to acuminate or caudate, acuminate apex sometimes notched, base acute or cuneate, margin weakly inrolled, weakly undulate or not, blade 1.3–7 by 0.5–2.8 cm, 1.6–8.8 times as long as wide, midrib sunken above, intramarginal nerve clear at margin, secondary veins 17–38 pairs, 55–70° from midrib, weakly prominent or indistinct above, obscure or weakly visible beneath, tertiary venation weakly prominent to obscure above, parallel to secondary veins; glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary or terminal, a simple unbranched pleiochasium or with clear internodes and unbranched side branches, delicate, glabrous to sparsely puberulent, 1.5–5.2 cm long; peduncle 0.5–2.3 cm by 0.4–0.8 mm; bracts caducous or persistent, ovate, deltoid or linear; bracteoles present, two immediately beneath calyx or several along pedicel; flowers 3–6; pedicels 1–8 mm long. *Sepals* ovate, apex acute or acuminate, keeled, 1.3–2 by 0.7–1.1 mm,

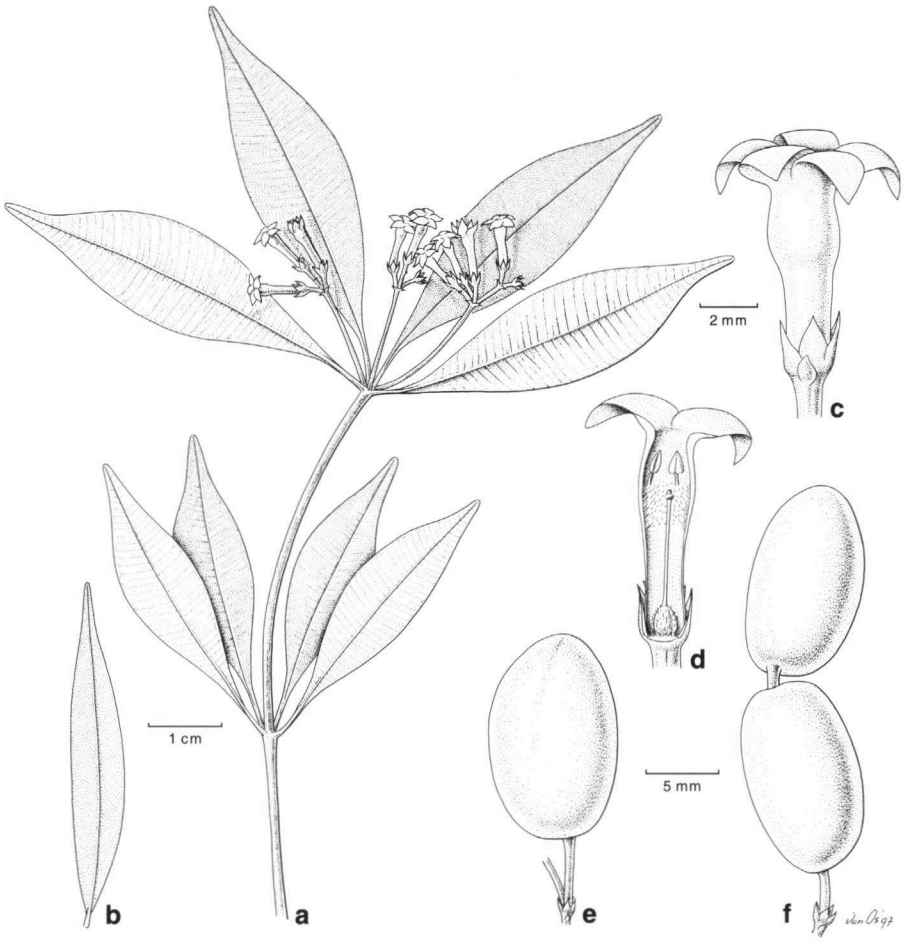



Fig. 7. *Alyxia luzoniensis* Merr. a. Habit; b. narrow leaf form; c. open flower; d. flower dissection; e. & f. fruits (fl. *Edaño 18076*; fr. *Gaerlan et al. PPI 9874*).

1.4–2.1 times as long as wide, ciliate, glabrous to sparsely puberulent. *Corolla* white; bud head 2.2–3.2 mm long, 0.26–0.34 of bud length, lanceolate, ovate or deltoid, apex acuminate; tube cylindrical, throat with thickening, 5.9–7.6 by 1.4–1.8 mm, 3.6–5 times as long as sepals, 1.9–2.6 times as long as lobes, glabrous outside, pubescent in upper half and around stamens or pubescent in a band below the stamens inside, sometimes very sparsely so; lobes elliptic or ovate, apex acuminate, base auriculate, 2.3–3.8 by 1–2.2 mm, 1.4–2.3 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 4.5–5.7 mm from corolla base, 0.73–0.81 of tube length; anther apex 0–0.4 mm from corolla mouth, anthers 1–1.2 by 0.4–0.5 mm, 2–2.5 times as long as wide; filaments 0.5–0.7 mm long. *Ovary* 0.7–0.9 mm high, sparsely or densely pubescent all over; style 2.4–4.7 mm long; pistil head 0.3–0.6 mm long, glabrous or pubescent. *Fruit* green or yellow-orange, stalks 2.8–5.5 mm long, with 1 or 2 articles in each string, 1.5 mm between articles, glabrous or

sparsely puberulent at ends, articles fleshy, 6.6–15 by 6.6–9.6 mm, ellipsoid, symmetrical. *Seeds* ovoid, ruminate, 9.4–10.2 by 5–5.3 by 4.6–4.7 mm.
(Description based on 126 specimens.)

Distribution — The Philippines.

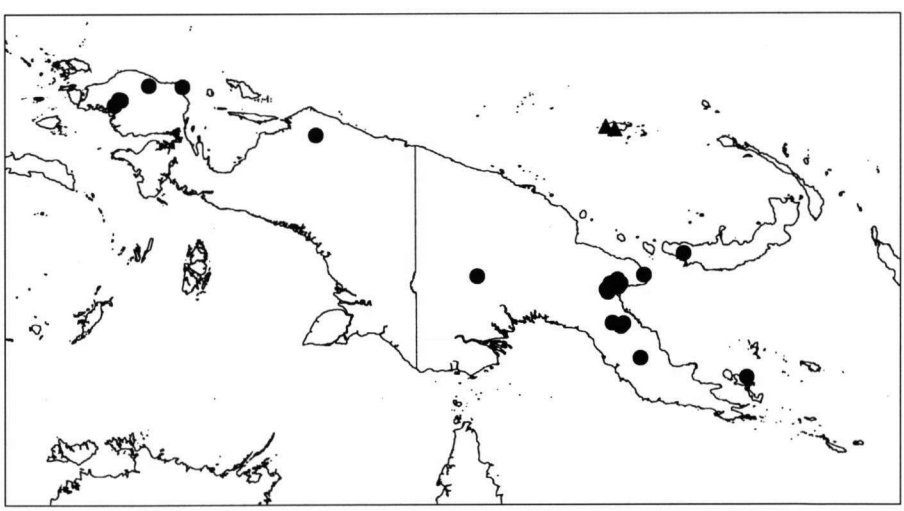
Habitat — In forest from 600–700 m altitude. One specimen reported on clay.

Note — This species is very variable in leaf shape but not particularly in other characters. There is, on the face of it, a large difference between the very narrowly elliptic leaves in the type of *A. stenophylla* and the broadly elliptic leaves of *A. laxiflora* but more recent collections, as well as some of the other synonyms, show almost the entire range of variation between these two extremes.

### 29. Alyxia manusiana D.J. Middleton, *spec. nov.* — Fig. 8, Map 22

Frutex scandens. Folia 4–5-verticillata subcoriacea elliptica apice longe acuminato. Inflorescentiae axillares laxae graciles 30–40-florae glabrae 3.5–7 cm longae. Corolla ignota. Mericarpia 1–2-articulata articulis globosis vel subglobosis vel cylindriceis 5.3–7.3 × 4.8–6.2 mm. — Typus: *Kerenga et al. LAE 77516* (holo L; iso CANB, K, LAE) from Papua New Guinea, Manus Island, Mt Dremsel.

Climbers. *Branchlets* strongly angled, not lenticellate, glabrous. *Leaves* in whorls of 4 or 5; petiole 0.7–1 cm long, glabrous; blade subcoriaceous, elliptic, apex long acuminate, not mucronate, base cuneate or decurrent onto petiole, margin weakly inrolled, weakly undulate, 7–12 by 2.5–4.5 cm, 0.4–3.3 times as long as wide, midrib sunken above, intramarginal nerve clear at margin, secondary veins 55–79 pairs, 75° from midrib, weakly prominent above, weakly visible beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, large lax panicles frequently branched, delicate, glabrous, 3.5–7 cm long; flowers 30–40. Calyx of free sepals. *Corolla* unknown. *Fruit* orange, stalks 1.7–3.8 mm long, with 1 or 2 articles in each string, glabrous, articles dry smooth or with thin flesh, 5.3–7.3 by 4.8–6.2 mm, globose,



Map 22. Distribution of *Alyxia manusiana* D.J. Middleton (▲) and *A. markgrafii* Tsiang (●).

Fig. 8. *Alyxia manusiana* D.J. Middleton. Habit (fr. *Kerenga et al. LAE 77516*).

subglobose or cylindrical, symmetrical, apex rounded or apiculate. *Seeds* ovoid, ruminate, 4.7–9.8 by 4–4.4 by 3.7–4.1 mm.

(Description based on 2 collections made into 9 specimens.)

Distribution — New Guinea (Manus Island).

Habitat — In lower montane or evergreen forest at 30–610 m altitude.

Note — There are two fruiting collections from the island of Manus off the northern coast of Papua New Guinea, *Foreman & Katik LAE 59235* and *Kerenga et al. LAE 77516*, previously identified as *A. rostrata* but which have shorter, more delicate inflorescences and more globose fruits than that species. Unfortunately there are no flowering specimens although the specimens known are sufficiently distinct from *A. rostrata* to be recognised as a separate species.

*Specimens studied*:

PAPUA NEW GUINEA: Manus: Lorengau Subprovince, Mt Dremsel, *Kerenga et al. LAE 77516* (type CANB, K, L, LAE); Kaguli Ridge, *Foreman & Katik LAE 59235* (A, BRI, CANB, L, LAE).

## 30. Alyxia marginata Pit. — Map 17

*Alyxia marginata* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1123; Lý, Feddes Repert. 97 (1986) 435. — Type: *Poilane 3783* (lecto P, designated here; iso P) from Vietnam, Dac-Lac Province, between Song-tan and Do-ut, west of Nha-trang.

Climbers. *Branchlets* weakly or strongly angled, sparsely or densely lenticellate, sparsely to densely covered in long hairs, sometimes glabrescent. *Leaves* in whorls of 3 or 4, subcoriaceous to thickly coriaceous; petiole 0.3–1.7 cm long, pubescent; leaf blade elliptic, broadly elliptic or obovate, apex shortly acuminate or apiculate, base acute or cuneate, margin weakly or strongly inrolled, weakly undulate or not, dark green above, pale green beneath, 3.5–15 by 1.2–5.7 cm, 1.7–3.7 times as long as wide, midrib sunken above, 18–29 pairs of secondary veins, 80° from midrib, weakly distinguishable or indistinct above, not prominent, obscure or weakly visible beneath, tertiary venation flattened above, obscure, leaf glabrous, sparsely puberulent only on midrib or sparsely to densely tomentose all over beneath and glabrous, puberulent on midrib only or all over above. *Inflorescences* axillary, rarely also terminal, a simple unbranched pleiochasium, sometimes with the terminal inflorescence having one extra node giving a paniculate appearance with the axillary inflorescences, very rarely also the axillary inflorescences with an extra node, densely covered in long straight hairs, 2–3 cm long; peduncle 0.7–1.5 cm by 0.8–1.1 mm; bracts caducous or persistent, deltoid, c. 1.9 by 1 mm; bracteoles immediately beneath calyx but not on all flowers; flowers 4–7; pedicels 4–6 mm long. *Sepals* not fleshy, ovate, apex acute, 1.3–1.4 by 0.9–1 mm, 1.4 times as long as wide, ciliate, glabrous or sparsely puberulent along the central line, glabrous inside. *Corolla* white; bud head c. 4.5 mm long when mature, ellipsoid, apex acute or acuminate, 0.41 of bud length; tube cylindrical, 6.3–6.5 by 1.6–1.8 mm, tube 4.5–5 times as long as sepals, 1.4–1.5 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside, throat without thickening; lobes elliptic, base auriculate, apex acute, 4.4–4.5 by 2.2 mm, c. 2 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 4.8–5 mm from corolla base, 0.62–0.63 of tube length; anther apex 1.3 mm from corolla mouth, anthers 1.4 by 0.5 mm, 2.8 times as long as wide; filaments 0.4–0.6 mm long. *Ovary* 1–1.1 mm high, pubescent around base only; style 3 mm long; pistil head 0.7 mm long. *Fruit* with 1 article in each string; stalks c. 10 mm long; articles symmetrical, acuminate, densely puberulent (only known immature).
(Description based on 12 specimens.)

Distribution — Vietnam.

Habitat — In primary or secondary forest on granitic soil from 1200–2150 m altitude.

Note — This species is characterised by its thickly coriaceous leaves and the thickened leaf margin, often also strongly revolute. The indumentum is variable but is most often densely tomentose on the branchlets and the leaves. Mature fruits are not known but immature fruits would indicate that they are large and densely pubescent when mature with long stalks.

### 31. Alyxia markgrafii Tsiang — Map 22

*Alyxia markgrafii* Tsiang, Sunyatsenia 2 (1934) 105; Markgr., Blumea 23 (1977) 409. — *Alyxia schlechteri* Markgr., Bot. Jahrb. Syst. 61 (1927) 184, non H. Lév. (1911). — *Alyxia novoguineensis* Tsiang, Sunyatsenia 6 (1941) 115. — Type: *Schlechter 19243* (holo B†; lecto K) from China, Guizhou, Lo-fou, south of Tinfan.

*Alyxia sleumeri* Markgr., Blumea 23 (1977) 409, p.p. (not including type).

*Alyxia rostrata* auct. non (Markgr.) Markgr.: Markgr., Blumea 23 (1977) 411, p.p.

*Alyxia ridleyana* auct. non Wernham: Markgr., Blumea 23 (1977) 411, p.p.

Climbers. *Branchlets* weakly to strongly angled, sparsely lenticellate or not, glabrous. *Leaves* in whorls of 3–6, coriaceous; petiole 0–2 cm long, glabrous; blade narrowly to broadly elliptic, obovate or spathulate, apex emarginate, rounded, obtuse, acute, acuminate or apiculate, base cuneate to decurrent onto petiole, margin weakly revolute to flat, weakly or strongly undulate, dark green, dull or shining above, dark or pale green beneath, 3–13 by 0.7–5.7 cm, 1.9–5 times as long as wide, midrib sunken or raised and with a central groove above, secondary veins 45–90 pairs, 60–80° from midrib, strongly or weakly prominent to indistinct above, obscure, weakly visible or weakly prominent beneath, tertiary venation weakly prominent or flattened above, parallel to secondary veins; glabrous. *Inflorescences* axillary, with several clear internodes and unbranched side branches or, very rarely, an aggregate pleiochasium forming lax panicles (see note), delicate, glabrous, 2.4–6.7 cm long; peduncle 0.7–4.5 cm by 0.5–1.5 mm; bracts caducous or persistent, ovate or deltoid, 1.3 by 0.8 mm wide; bracteoles present on pedicel or absent; flowers 9–12; pedicels 0.7–5 mm long. *Sepals* ovate, apex rounded to obtuse, not keeled, 1.1–1.8 by 0.8–1.5 mm, 1.2–2 times as long as wide, ciliate or not, glabrous, glabrous inside. *Corolla* white, cream or with a pink tube and white lobes; bud head 1.8–2 mm long, ellipsoid, apex obtuse to acute, 0.32–0.38 of bud length; tube cylindrical or slightly inflated, 1.8–3.8 by 0.9–1.4 mm, glabrous outside, pubescent in a band below the stamens inside or sparsely pubescent around stamens and more densely in a band beneath them, tube 1.6–2.8 times as long as sepals, 1.3–2 times as long as lobes, throat without thickening; lobes elliptic or ovate, apex rounded to acute, not ciliate, 1.4–2 by 0.8–1.5 mm, 1.3–1.9 times as long as wide, glabrous outside, glabrous or pubescent at base of lobes inside. *Stamens* inserted at 1.4–2.5 mm from corolla base, 0.56–0.71 of tube length; filaments 0.3–0.5 mm long; anther apex 0–0.5 mm from corolla mouth, anthers 0.7–0.9 by 0.3–0.4 mm, 2–3 times as long as wide. *Ovary* 0.6–0.9 mm high, pubescent in tuft between carpels or very sparsely pubescent around base only; style 1.2–1.9 mm long; pistil head 0.3–0.4 mm long. *Fruit* with 1–7 articles in a string, 1.6–9.3 mm between articles, stalks 2.8–7 mm long; articles dry smooth, 4.7–11.7 by 4.6–8.3 mm, ellipsoid or sub-globose, apex rounded, yellow or orange, maturing black, glabrous. *Seeds* oblong, 4.9–8.1 by 4–5.3 by 3.5–4.2 mm. Embryo linear or with cotyledons wider, not undulate, embryo 4.4–6.6 mm long, cotyledons 0.52–0.68 of embryo length.
(Description based on 224 specimens.)

Distribution — New Guinea.

Habitat — In primary, secondary, swamp or montane forest, or in scrub or savannah on clay, volcanic or sandy soils at 15–1200 m altitude.

Note — The inflorescence of this species is usually a single axis with whorls of flowers at the nodes. Specimens with a more complex branched inflorescence may actually represent another species or a variety of this species but unfortunately the material is too poor to be sure.

### 32. Alyxia menglungensis Tsiang & P.T. Li — Map 16

*Alyxia menglungensis* Tsiang & P.T. Li, Acta Phytotax. Sin. 11 (1973) 364; Fl. Reipubl. Popul. Sin. 63 (1977) 63; Anonymous, Fl. Yunnanica 3 (1983) 517; P.T. Li, Fl. China 16 (1995) 160. — Type: *C.W. Wang 78269* (holo PE; iso A, IBSC, n.v.) from China, Yunnan, Yun-Ching-Hung, Dah-Meng-Lung.

Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous. *Leaves* in whorls of 3, coriaceous, petiole 1–1.6 cm long, glabrous; blade elliptic, apex long acuminate, acumen obtuse, base cuneate, margin flat, not undulate, 7–11.4 by 2.6–4.2 cm, 2.6–3.1 times as long as wide, midrib deeply sunken or raised and with a central groove above, intramarginal nerve present, inset from margin, secondary veins 33–42 pairs, 70° from midrib, weakly prominent above, weakly visible beneath, tertiary venation weakly prominent above, parallel to secondary veins, glabrous beneath, glabrous above. *Inflorescences* axillary or terminal, an aggregate pleiochasium forming lax panicles, densely puberulent, 3–4.8 cm long; peduncle 0.9–2.3 cm by 1–1.2 mm; bracts caducous or persistent, lanceolate, 1.8–3.4 by 0.8–1.4 mm wide; bracteoles 2 on the pedicel; pedicels 1.2–1.4 mm long. *Sepals* ovate, apex acuminate, not keeled, 1.9–2 by 0.8–1 mm, 1.9–2.5 times as long as wide, ciliate, densely puberulent. *Corolla* white; bud head 2 mm long, ovate or deltoid, apex acute or acuminate, 0.33 of bud length; tube slightly inflated, 4.1–4.5 mm long, 1.7–1.9 mm wide, sparsely puberulent on top of tube outside, sparsely pubescent inside, tube 2.1–2.3 times as long as sepals, 2.3–2.6 times as long as lobes; lobes elliptic, apex obtuse, ciliate, 1.7–2 by 1.1–1.6 mm, 1.5 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 3.3 mm from corolla base, 0.69 of tube length; filaments 0.7 mm long; anther apex 0.5 mm from corolla mouth, anthers 1 by 0.5 mm, 2 times as long as wide. *Ovary* 1 mm high, glabrous; style 2.2 mm long; pistil head 0.7 mm long. *Fruit* unknown.
(Description based on 1 collection.)

Distribution — China (Yunnan).

Habitat — The one collection was collected at 1950 m altitude.

Note — This species is very close to *A. balansae* from which it differs in the corolla pubescence and the glabrous ovary. There are relatively few collections of both species and the distinction between them may break down when further collections are made.

### 33. Alyxia microphylla Markgr. — Map 20

*Alyxia microphylla* Markgr., Blumea 23 (1977) 405 (but not including all paratypes). — Type: *Brass 12180* (holo L; iso A, BM, BO, BRI, K, LAE) from Indonesia, Irian Jaya, Idenburg River, 18 km SW of Bernhard Camp.

*Alyxia subalpina* auct. non Markgr.: Merr. & L.M. Perry, J. Arnold Arbor. 24 (1943) 212.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, densely long puberulent. *Leaves* in whorls of 4; petiole 0.1–0.3 cm long, pubescent; blade coriaceous, elliptic, apex acuminate and notched at the apex, base acute or cuneate, margin weakly inrolled or flat, weakly undulate, 1.2–2.8 by 0.4–1.2 cm, 1.9–2.7 times as long as wide, midrib sunken above, intramarginal nerve clear at margin, secondary veins 14–17 pairs, 60° from midrib, weakly prominent above, weakly prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescence* axillary, a simple unbranched pleiochasium, delicate, sparsely long pubescent all over, 1.2–2 cm long; peduncle 0.5–0.9 cm by 0.4–0.6 mm; bracts persistent, lanceolate, c. 1.4 by 1 mm; bracteoles present, one on pedicel; flowers 4; pedicels 5–6.5 mm long. *Sepals* ovate, apex obtuse, not keeled, 1.1–1.2 by 0.9–1 mm, 1.2 times as long as wide, ciliate, glabrous, glabrous inside. *Corolla* with orange tube and yellow lobes; bud head 1.8 mm long, 0.42 of bud length, deltoid, apex acute; tube slightly inflated, throat with thickening, 2.7 by 1.5 mm, 2.2

times as long as sepals, 1.8 times as long as lobes, sparsely puberulent around top of tube outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes orbicular, apex rounded, base auriculate, 1.5 by 1.3 mm, 1.2 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 1.4 mm from corolla base, 0.5 of tube length; anther apex 0.5 mm from corolla mouth, anthers 0.7 by 0.3 mm, 2.3 times as long as wide; filaments 0.5 mm long. *Ovary* 0.5 mm high, pubescent around base only; style 1 mm long; pistil head 0.4 mm long, pubescent. Articles ellipsoid (only immature fruit seen).
(Description based on 3 collections made into 11 specimens.)

Distribution — New Guinea.

Habitat — In scrub or mossy forest at 1700–2150 m altitude.

Note — Related to *A. luzoniensis* from the Philippines from which it differs in its much smaller flowers and generally smaller leaves. It also shows some affinities to *A. royeniana*. There is a collection from Irian Jaya, *Brass 12361*, which has extremely immature fruits formed from seemingly solitary flowers. In other respects it appears to be similar to *A. microphylla*. If it is this species it will change the range of variation of the inflorescences and give a somewhat larger leaf size range but further collecting in the Idenburg River area is needed for clarification. This collection may, however, represent a new solitary-flowered species.

**34. Alyxia minutiflora** D.J. Middleton, *spec. nov.* — Fig. 9, Map 23

> Frutex scandens. Folia 4–5-verticillata subcoriacea elliptica apicibus acuminatis. Inflorescentiae axillares graciles circa 15-flores pubescentes 1.1–1.6 cm longi. Corolla extus pubescens tubo 2.3–2.7 mm longo lobis 1.4–1.5 mm longis. Ovarium pubescens. Fructus ignotu. — Typus: *Kjellberg 2418* (holo S; iso BO) from Indonesia, Sulawesi Tenggara, Waroe Waroe.

Climbers. *Branchlets* terete or weakly angled, sparsely lenticellate, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 4 or 5; petiole 0.3–0.5 cm long, glabrous; blade subcoriaceous, elliptic, apex shortly acuminate, acumen rounded, base cuneate to decurrent onto petiole, margin flat, weakly undulate, 5.5–9.8 by 1.7–3.3 cm, 2.6–4.2 times as long as wide, midrib sunken above, intramarginal nerve weakly present, inset from margin, secondary veins 40–48 pairs, 50–60° from midrib, distinct and weakly prominent above, weakly prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescence* axillary, with several clear internodes and unbranched side branches, delicate, densely and minutely puberulent, 1.1–1.6 cm long; peduncle 0.3–0.6 cm by 0.8–1.1 mm; bracts persistent, deltoid, 0.6–0.8 by 0.7–0.9 mm; bracteoles absent, flowers c. 15 in an inflorescence; pedicels 1.8–2.2 mm long. *Sepals* ovate, apex acute, not keeled, c. 0.6 by 0.6 mm, 1 times as long as wide, ciliate, densely puberulent all over outside, glabrous inside. *Corolla* with a yellow tube and white lobes; bud head 1.3–1.4 mm long, 0.35–0.38 of bud length, ellipsoid, apex acute to acuminate; tube slightly inflated around stamens, throat with thickening, 2.3–2.7 by 0.8 mm, 3.8–4.2 times as long as sepals, 1.6–1.8 times as long as lobes, sparsely to densely pubescent around top of tube outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes elliptic, apex acute, base auriculate, 1.4–1.5 by 0.5–

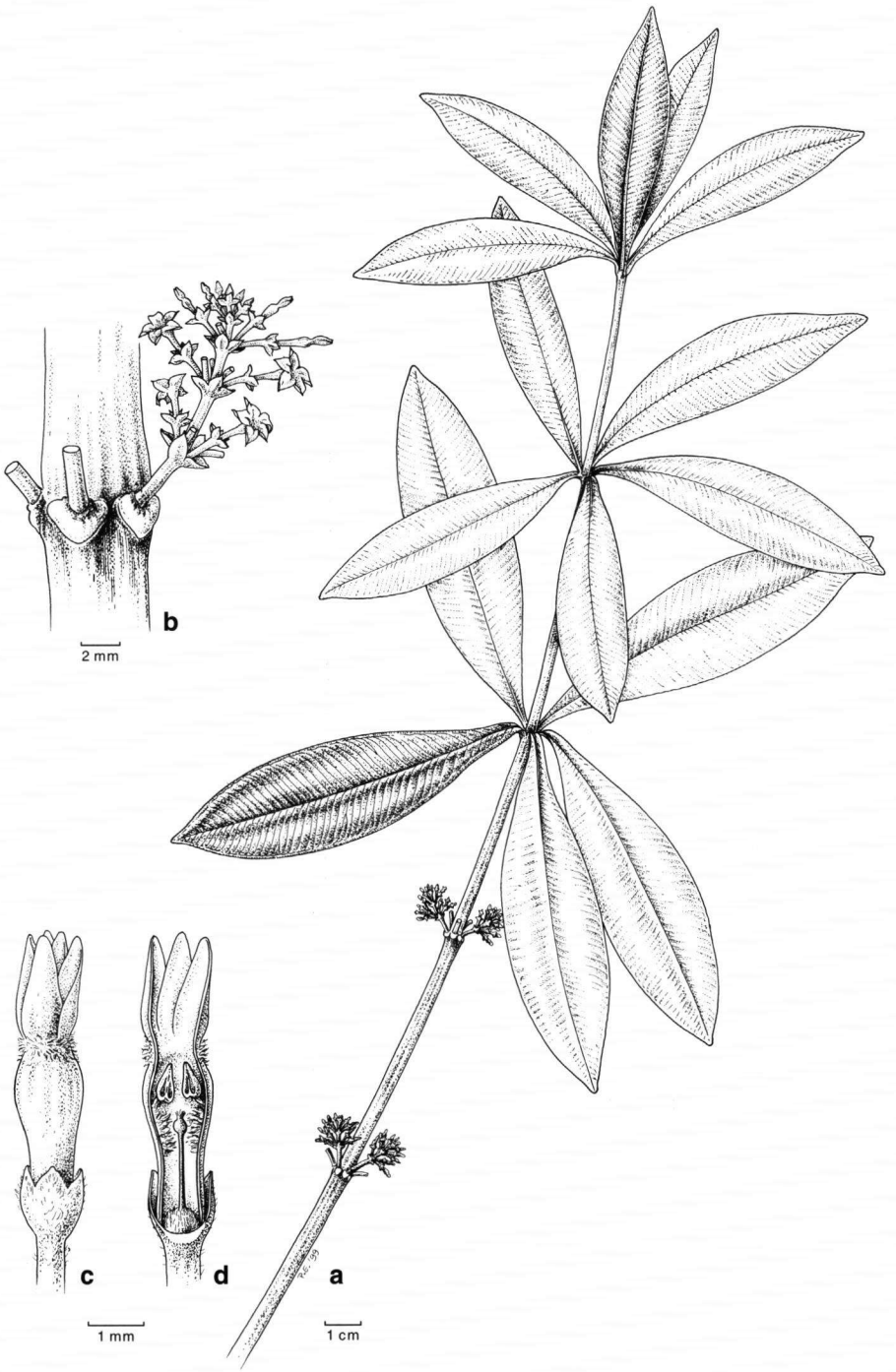
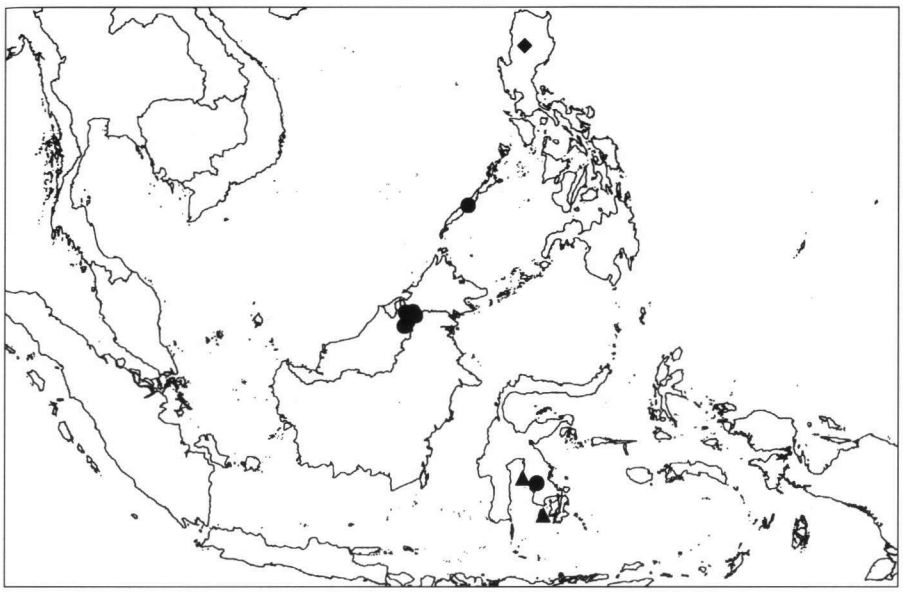



Fig. 9. *Alyxia minutiflora* D.J. Middleton. a. Habit; b. inflorescence; c. partially open flower; d. flower dissection.



Map 23. Distribution of *Alyxia minutiflora* D.J. Middleton (▲), *A. muguma* D.J. Middleton (◆) and *A. palawanensis* Markgr. (●).

0.6 mm wide, 2.3–3 times as long as wide, sparsely puberulent outside, sparsely pubescent at the tips and base of lobes inside, ciliate near tips only. *Stamens* inserted at 1.4–1.7 mm from corolla base, c. 0.6 of tube length; anther apex 0.4 mm from corolla mouth, anthers 0.6–0.7 by 0.3 mm wide, 2–2.3 times as long as wide; filaments 0.5 mm long. *Ovary* 0.4–0.5 mm high, densely pubescent all over; style 1–1.1 mm long; pistil head 0.2 mm long. *Fruit* unknown.
(Description based on 2 collections made into 3 specimens.)

Distribution — Sulawesi.

Note — This species shows affinities with *A. halmaheirae* and *A. kabaenae*. It differs from both in the smaller flowers, the tiny bracts and the narrower, longer corolla lobes; from the former in the higher number of leaves in a whorl and the pubescent outside to the corolla tube, and from the latter in the 5-merous calyx which is densely pubescent.

*Specimens studied*:

INDONESIA: Sulawesi Tenggara: Kabaena Island, Balo District, Eempuhu, *Elbert 3339* (L); Waroe Waroe, *Kjellberg 2418* (type BO, S).

## 35. Alyxia muguma D.J. Middleton, *spec. nov.* — Map 23

Frutex scandens. Folia ternata coriacea elliptica apicibus acute acuminatis nervis prominentibus numerosis. Inflorescentiae axillares dense pubescentes floribus congestis pedicellis multibracteolatis. Flores maturi ignoti. Ovarium pubescens inter carpella fasciculis positis. Mericarpia 1–3-articulata articulis ellipticis vel subglobosis 6.7–7.6 × 4.6–5.3 mm. — Typus: *Conklin & del Rosario 72704* (holo L; iso A, K, PNH) from the Philippines, Luzon, Mountain Province, Sumigar, near Banaue.

Climbers. *Branchlets* weakly angled, densely lenticellate, glabrous. *Leaves* in whorls of 3, coriaceous; petiole 1–1.3 cm long, glabrous; blade broadly elliptic, apex long sharp acuminate, base obtuse to acute, margin flat, weakly undulate, dark green, pale green beneath, 6–10 by 3.1–5.3 cm, 1.6–2.3 times as long as wide, midrib deeply sunken above, secondary veins 39–55 pairs, 70° from midrib, weakly prominent above, weakly prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous. *Inflorescences* axillary, once or twice branched and congested at top of peduncle, delicate, densely puberulent; bracts persistent, deltoid; bracteoles multiple, on all flowers. *Sepals* apex acute, keeled, ciliate, glabrous, glabrous inside. *Corolla* only known from immature flowers, bud head deltoid, apex acute, tube glabrous outside, very sparsely pubescent beneath filaments inside, throat with thickening; lobes ovate, base auriculate, apex acute, not ciliate, glabrous outside, glabrous inside. *Ovary* pubescent in tuft between carpels. *Fruit* with 1–3 articles in each string, 2.5 mm between articles; stalks 2–2.1 mm long; articles with thin flesh, 6.7–7.6 by 4.6–5.3 mm, ellipsoid or subglobose, apex rounded or obtuse. *Seeds* 6.2–7.5 by 4.6–5 by 3.8–4.3 mm. Embryo linear, straight at base, 4.1 mm long, cotyledons 0.63 of embryo length.

(Description based on 1 collection made into 4 specimens.)

Distribution — Philippines.

Habitat — Reported from a slope at 1680 m altitude.

Vernacular name — Mugum (Ifugao).

Note — This new species is only known from the type collection which has fruits and immature flowers. Although this is hardly ideal it is so distinctive as to be clearly a new species. It is characterised by its broadly elliptic leaves with numerous secondary veins, its densely pubescent inflorescences with numerous bracts and bracteoles and having anthers which appear as if they could be slightly exserted when mature. It is alone in the Philippines in having an almost glabrous ovary, only pubescent in a small tuft between the carpels. The name derives from mugum, the Ifugao language name for the plant. The label describes it as a parasitic vine but what is actually intended is somewhat ambiguous.

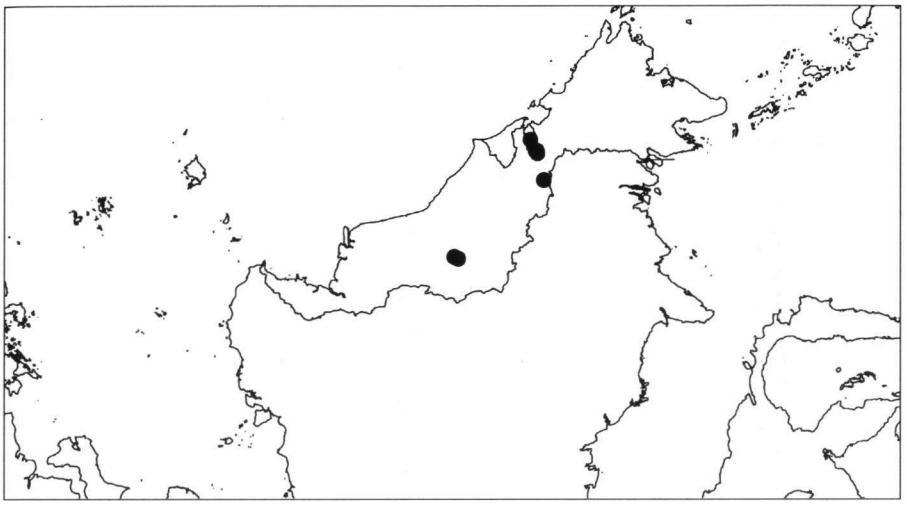
*Specimen studied*:

PHILIPPINES: Mountain Province: Sumigar, near Banaue, *Conklin & del Rosario 72704* (type A, K, L, PNH).

### 36. Alyxia mujongensis Markgr. — Map 24

*Alyxia mujongensis* Markgr., Blumea 23 (1977) 384. — Type: *A. ak Unyong S 21186* (holo L; iso K, SAR, SING) from Malaysia, Sarawak, 3rd Division, Ulu Chenaning, Amau, Mujong, Balleh.

Climbers. *Bark* grey. *Branchlets* terete or weakly angled, sparsely lenticellate or not, densely and minutely puberulent or with longer hairs, sometimes glabrescent. *Leaves* in whorls of 3 or 4; petiole 0.2–0.4 cm long, pubescent; blade coriaceous or thickly coriaceous, elliptic, ovate or oblong, apex rounded to obtuse, rarely to shortly acuminate, acumen obtuse, base rounded to acute, margin weakly inrolled or flat, weakly undulate or not, dark green and shining above, dark or pale green beneath, 0.9–4.5 by 0.35–1.6 mm, 1.5–4 times as long as wide, midrib flattened or very slightly sunken above, intramarginal nerve clear at margin, secondary veins 8–11 pairs, indistinct above, obscure or weakly visible beneath, tertiary venation obscure, rarely weakly



Map 24. Distribution of *Alyxia mujongensis* Markgr.

reticulate; leaf glabrous, sparsely puberulent on midrib and major venation to puberulent all over beneath, puberulent only on midrib or all over above, not punctate beneath. *Inflorescence* axillary, flowers solitary or a simple unbranched pleiochasium, delicate, glabrous to densely puberulent, 0.7–1.2 cm long; peduncle 0.1–1.4 cm by 0.7–0.8 mm; bracts persistent, deltoid, 0.9 by 0.6 mm; bracteoles only on pedicel of terminal flower; flowers 1–4; pedicels 1.1–2.3 mm long. *Sepals* not fleshy, of free sepals, ovate, apex acute, not keeled, 0.9–1 by 0.6 mm, 1.5–1.7 times as long as wide, ciliate or not ciliate, glabrous, glabrous inside. *Corolla* white with orange tube or with a pale orange tube and cream lobes; bud head 1.6 mm long, 0.36 of bud length, ovate, apex acute; tube cylindrical, throat with a narrow ring of tissue, 5.2 by 1.3 mm, 5.8 times as long as sepals, 3.5 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes orbicular, apex rounded, base auriculate, 1.5 by 1.6 mm, 0.9 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 4.1 mm from corolla base, 0.72 of tube length; anther apex 0.6 mm from corolla mouth, anthers 0.8–0.9 by 0.4 mm, 2–2.25 times as long as wide; filaments 0.5 mm long. *Ovary* 0.5 mm high, pubescent in tuft between carpels or very sparsely pubescent around base only; style 2.4–3.6 mm long; pistil head 0.4–0.5 mm long. *Fruit* with 1 article in each string, articles with thin flesh, 7–8.2 by 5.5–6.5 mm, ellipsoid, subglobose or cylindrical, symmetrical, apex rounded. *Seeds* elliptic, ruminate, 6.2–7.7 by 4.7–6.2 by 4.1–4.8 mm. Embryo linear, straight at base, 6.3 mm long, cotyledons 0.51 of embryo length.
(Description based on 23 specimens.)

Distribution — Borneo.

Habitat — On open ridges and kerengas with a sandstone or shale substrate at 900–1770 m altitude.

Note — This species is generally rather distinct due to its thick, almost perfectly oval leaves, equally rounded at both ends, although there are some variations from this theme.

## 37. Alyxia multistriata Markgr. — Map 25

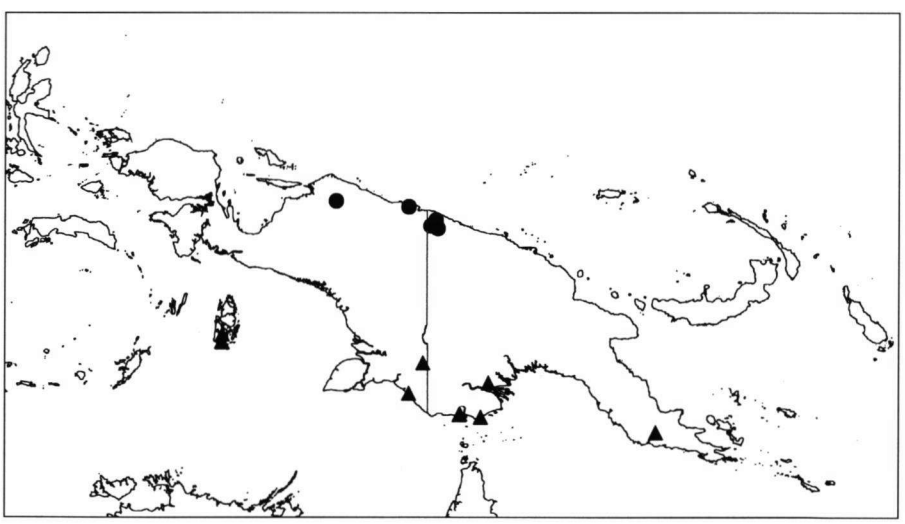
*Alyxia multistriata* Markgr., Notizbl. Bot. Gart. Berlin-Dahlem 15 (1940) 131; Blumea 23 (1977) 397, p.p. — Type: *Docters van Leeuwen 11293* (lecto U, designated here; isolecto A (scrap), BO, K, L) from Indonesia, Irian Jaya, Mamberamo, Albatros Bivak.

Climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate, glabrous. *Leaves* opposite or in whorls of 3; petiole 0.5–0.8 cm long, glabrous; blade subcoriaceous or papery, elliptic, obovate or oblong, apex long acuminate to caudate, acumen rounded, not mucronate, flat, base rounded to cuneate, margin mostly strongly undulate, 4.9–20 by 1.6–7.2 cm, 1.7–4 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve strong or weakly present, inset from margin, secondary veins 100–120 pairs, 80–85° from midrib, weakly prominent or indistinct above, weakly visible or prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a short congested compound pleiochasium or compound pleiochasium with clear internodes, delicate, sparsely puberulent in upper parts or densely puberulent, short straight, 1–2.5 cm long (but only known with immature flowers). Calyx of free sepals, sepal apex rounded. *Corolla* tube glabrous outside. *Fruit* orange turning black, stalks 3–3.8 mm long, with 1 article in each string, glabrous, articles with thin flesh, 12.8–17.6 by 10–12.7 mm, ellipsoid, symmetrical, apex rounded. *Seeds* ovoid, ruminate, 12–14.2 by 8–9.1 by 6.8–8.3 mm. Embryo cotyledons wider, strongly undulate, embryo 10.9 mm long, cotyledons 0.59 of embryo length.

(Description based on 42 specimens.)

Distribution — New Guinea.

Habitat — In forest on heavy clay loam at 30–450 m altitude.



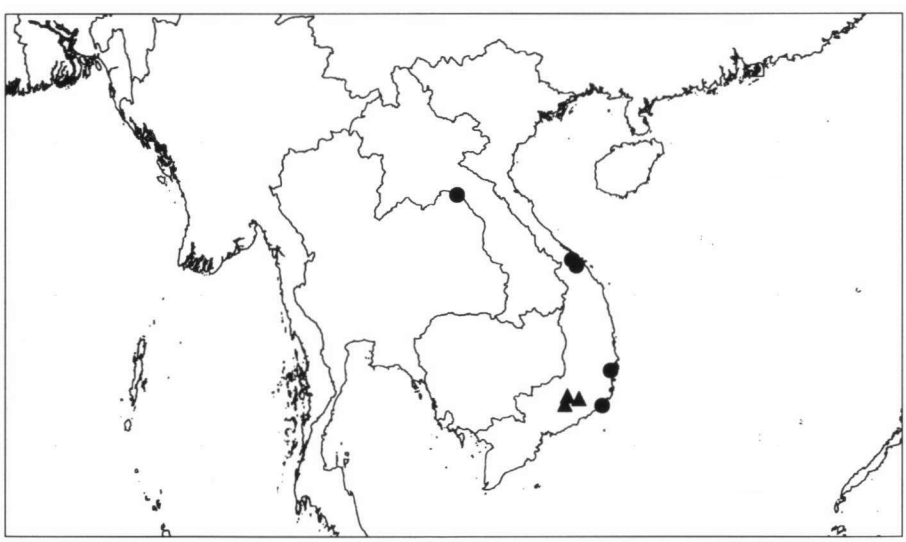
Map 25. Distribution of *Alyxia multistriata* Markgr. (●) and *A. oblongata* Domin (▲) (not including Australian distribution).

Note — Markgraf (1977) describes flowers for this species but the type specimen and all other collections I have seen (which include all the specimens cited by Markgraf) only bear very immature flowers so no description of mature flowers is given. It would appear from the buds that the flowers are very small. It is undoubtedly close to *A. sleumeri*. Further collecting may lead to a re-evaluation of the specific limits of these species and possibly also of *A. sogerensis* and *A. pugio* which are also closely related.

### 38. Alyxia nathoi Lý — Map 26

*Alyxia nathoi* Lý, Feddes Repert. 96 (1985) 173; 97 (1986) 431. — Type: *Ha Tue 448* (holo HN, n.v.; iso HN, n.v.) from Vietnam, Ha Bac Province, Lamdong, Dilinh, Dinh Trang Thuong.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, densely covered in long hairs, sometimes glabrescent. *Leaves* in whorls of 3 or 4, subcoriaceous or papery; petiole 0.3–0.8 cm long, pubescent; blade narrowly elliptic, elliptic or oblong, apex sharp acuminate, base obtuse to cuneate, margin weakly inrolled or flat, weakly undulate, 1.6–10.2 by 0.6–2.7 cm, 2.3–4.7 times as long as wide, midrib slightly to deeply sunken above, 16–25 pairs of secondary veins, 50–60° from midrib, weakly distinguishable or indistinct above, obscure or weakly visible beneath, tertiary venation reticulate or obscure, beneath sparsely puberulent only on midrib or puberulent all over, not punctate, above glabrous or puberulent on midrib only. *Inflorescences* axillary or terminal, a simple unbranched pleiochasium to an aggregate pleiochasium forming lax panicles, delicate or robust, densely covered in long hairs, 1.4–3.7 cm long; peduncle 0.4–1 cm by 0.7–1.1 mm; bracts caducous, deltoid, 1.2–1.5 by 0.7–1.2 mm wide; bracteoles one at base; flowers 4–20; pedicels 1.2–2.8 mm long. *Sepals* not fleshy, linear or ovate, apex acute or acuminate, 2.1–2.8 by 0.9–1.2 mm, 2.2–2.3 times as long as wide, ciliate, tomentose or pubescent only at tips inside. *Corolla* with



Map 26. Distribution of *Alyxia nathoi* Lý (▲) and *A. pseudosinensis* Pit. (●).

a dark yellow tube and white lobes; bud head lanceolate or ovate, apex acute or acuminate, 0.34 of bud length; tube cylindrical, 7.2–7.4 by 1.2–1.5 mm, 3.5 times as long as sepals, 1.6–1.7 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, pubescent around and below anthers and in throat inside with a glabrous gap between or very sparsely pubescent only beneath filaments inside, throat with thickening; lobes linear or elliptic, base auriculate, apex acuminate, not ciliate, 4.3–4.5 by 1.7–1.9 mm, 2.3–2.6 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at c. 5.5 mm from corolla base, 0.79 of tube length; filaments 0.4 mm long; anther apex right at corolla mouth, anthers 1.4 by 0.5 mm, 2.8 times as long as wide. *Ovary* 1 mm high, densely pubescent all over; style 4.7 mm long; pistil head 0.7 mm long, pubescent. *Fruit* with 1 or 2 articles in each string, 1.9–2.6 mm between articles, stalks 1.9–2 mm long; articles with thin flesh, 12–15 by 7.7–8.3 mm, ellipsoid, symmetrical, rounded, sparsely puberulent all over. *Seeds* ruminate, 8.6 by 5.9 by 5 mm. Embryo linear, 7.4 mm long, cotyledons 0.53 of embryo length.
(Description based on 3 collections made into 7 specimens studied.)

Distribution — Vietnam.

Habitat — Altitude range: 800–1500 m.

Note — I have been unable to get hold of the type material but from the description it would appear to be the same as three previously unidentified *Alyxia* specimens found in the Paris herbarium with duplicates now in Leiden. However, the illustration given in Lý's original description only bears immature flowers and it seems that he has seen no mature flowers so the identification of these specimens with Lý's *A. nathoi* will need to be reviewed when the type is available. The plants studied are distinctive in the densely pubescent branchlets, the pubescent leaves, the very long and thin sepals, and the long acuminate corolla lobes. In these characters it is very similar to *A. thailandica* which differs in having larger sepals and more densely pubescent inflorescences and in the generally broader leaves and slightly shorter corolla tubes.

### 39. **Alyxia oblongata** Domin — Map 25

*Alyxia oblongata* Domin, Biblioth. Bot. 89 (1928) 523. — Type: *Domin Iter Australiense 7831* (holo PR) from Australia, Queensland, Cook District, Waterfall Creek.

*Alyxia ruscifolia* R.Br. subsp. *major* P.I. Forst., Austral. Syst. Bot. 5 (1992) 557; Fl. Austral. 28 (1996) 128. — Type: *P.I. Forster & Tucker 5574* (holo BRI; iso BISH, DNA, LAE, MO) from Australia, Queensland, Cook District, Big Tableland road, near First Falls.

*Alyxia ruscifolia* auct. non R.Br.: Markgr., Blumea 23 (1977) 412.

Erect shrubs or treelets to 2 m high. *Branchlets* weakly angled, not to densely lenticellate, glabrous to densely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 3 or 4; petiole 0.1–0.4 cm long, glabrous; blade coriaceous, narrowly elliptic, elliptic, ovate or obovate, apex long acuminate, sharply mucronate, base acute or cuneate, margin weakly to strongly inrolled or flat, 0.4–7.8 by 0.15–2.8 cm, 1.5–5.7 times as long as wide, midrib flattened or somewhat sunken above, intramarginal nerve absent, secondary veins 9–29 pairs, 35–40° from midrib, distinct or weakly distinguishable and prominent above, strongly or weakly prominent above, tertiary venation weakly prominent above, parallel to or branching off from secondary veins, glabrous beneath, glabrous above. *Inflorescence* terminal or, rarely, axillary; flowers solitary, in a simple unbranched or a short congested compound pleiochasium, delicate,

glabrous, 1.2–1.4 cm long; peduncle 0.1–0.5 cm by 1.2 mm, more or less terete; bracts caducous or persistent, lanceolate, 1–1.8 by 0.6–0.8 mm; bracteoles one on pedicel; flowers 1–5 in an inflorescence; pedicels 0.1–0.5 mm long. *Sepals* not fleshy, ovate or lanceolate, apex acute or acuminate, apex not reflexed, 1.8–2.6 by 0.9–1.5 mm, 1.4–2.6 times as long as wide, of similar sizes, glabrous outside and inside, ciliate. *Corolla* white, not fleshy; bud head 4.7–6.8 mm long, 0.37–0.44 of bud length, lanceolate, apex acuminate; tube cylindrical, throat with thickening, 5.8–9.5 by 1–1.5 mm, 3.1–4.8 times as long as sepals, 1.5–2.2 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside or pubescent around and below anthers and in throat with a glabrous gap between; lobes linear, elliptic or oblong, apex obtuse, acute or acuminate, 3.5–5.9 by 1–2 mm, 2.3–4.8 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 3.2–5.9 mm from corolla base, 0.37–0.58 of tube length; anther apex 2.5–4.2 mm from corolla mouth, anthers 1–1.3 by 0.35–0.4 mm, 2.5–3.4 times as long as wide; filaments 0.3–0.5 mm long. *Ovary* 0.5–0.7 mm high, sparsely or densely pubescent all over; style 2–2.7 mm long; pistil head 0.4–0.6 mm long. *Fruit* red; stalks c. 1.5 mm long, with 1 or 2 articles in each string; articles with thin flesh, 6–9.6 by 4.5–7.5 mm, ellipsoid or subglobose, symmetrical, rounded or obtuse at apex. *Seed* ruminate, c. 5.3 by 3.9 by 3 mm.

(Description based on 110 specimens including Australian specimens studied.)

Distribution — Moluccas, New Guinea, Australia.

Habitat — In swamp forest or dry forest at 10–1370 m altitude.

Note — Forster (1992) included the New Guinean and Moluccan specimens of this species in his *A. ruscifolia* subsp. *tropica*. I feel this is incorrect on two grounds: firstly that both of his new subspecies, *tropica* and *major*, are substantially different from *A. ruscifolia*, albeit closely related, and deserve specific status, and secondly that the Malesian specimens actually belong to the taxon he described as subsp. *major* and not to subsp. *tropica*. When *A. ruscifolia* subsp. *major* is raised to specific rank *A. oblongata* takes priority. This taxon is characterised by its relatively long, narrow corolla lobes, stamens inserted below the middle of the corolla tube, and a glabrous corolla tube on the outside. A fuller discussion of the reasons for recognising this species as distinct from *A. ruscifolia* and the relationship between Forster's two northerly subspecies will appear in the second part of the revision of *Alyxia* which will deal more closely with the Australian taxa.

### 40. Alyxia oleifolia King & Gamble — Map 27

*Alyxia oleifolia* King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 419; Ridl., Fl. Malay Pen. 2 (1923) 333; Markgr., Blumea 23 (1977) 384. — Type: *Wray 3846* (lecto K) from Malaysia, Perak, Gunong Bubu.

*Alyxia kinabaluensis* Markgr., Mitt. Bot. Staatssamml. München 1 (1950) 26. — Type: *J. Clemens & M.S. Clemens 33817* (holo M; iso A, B, BM, BO, G, HBG, K, L, NY, UC) from Malaysia, Sabah, Mt Kinabalu, Colombon.

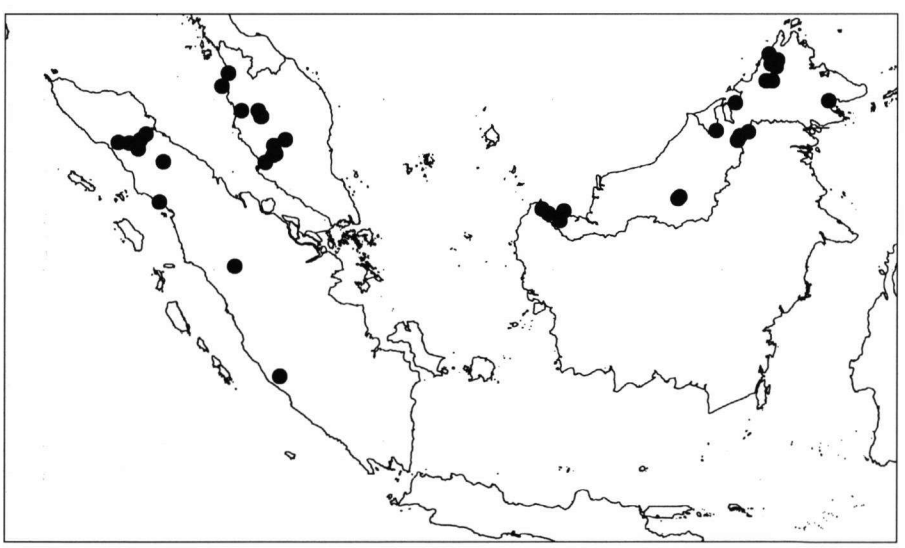
*Alyxia atjehensis* Markgr., Blumea 23 (1977) 393, p.p. (not including type).

*Alyxia pachyphylla* auct. non Merr.: Merr., Bibl. Enum. Bornean Pl. (1921) 499.

*Alyxia oleifolia* var. *tenuifolia* auct. non Ridl.: Markgr., Blumea 23 (1977) 385, p.p.

*Alyxia angustifolia* auct. non Ridl.: Markgr., Blumea 23 (1977) 385, p.p.

Climbers. *Branchlets* weakly angled, sparsely lenticellate or not, glabrous, sparsely or densely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 3; petiole 0.2–0.7 cm long, glabrous; blade thickly coriaceous, narrowly elliptic to ovate, apex acute or acuminate, not mucronate, base obtuse to cuneate, margin weakly or strongly inrolled, weakly undulate or not, blade 1–13.3 by 0.7–4.2 cm, 1.4–10 times as long as wide, midrib sunken above, intramarginal nerve absent, secondary veins 20–60 pairs, 80° from midrib, weakly prominent or indistinct above, obscure or weakly visible beneath, tertiary venation flattened above, obscure; glabrous beneath, glabrous or puberulent only on midrib above. *Inflorescence* axillary or terminal, a simple unbranched pleiochasium or with 1 or 2 internodes and unbranched side branches, glabrous, rarely to densely puberulent, 1.6–6 cm long; peduncle 0.2–3 cm by 0.9–1.3 mm; bracts caducous or persistent, deltoid, linear or lanceolate, c. 2.5 by 1 mm; bracteoles absent or only on pedicel of terminal flower; flowers 3–7; pedicels 1.3–7 mm long. *Sepals* not fleshy, ovate or lanceolate, apex acute or acuminate, keeled or not keeled, 1.3–3.4 by 0.7–1.4 mm, 1.2–2.8 times as long as wide, ciliate or not ciliate, glabrous to densely puberulent or puberulent on tips only, pubescent only at tips inside. *Corolla* white, cream, yellow or with a purplish-brown tube and creamy lobes, somewhat fleshy; bud head 2.9–5 mm long, 0.27–0.41 of bud length, ellipsoid, lanceolate or ovate, apex obtuse, acute or acuminate; tube cylindrical, throat with thickening, 6.6–10.5 by 1.6–2.2 mm, 3.1–5 times as long as sepals, 1.4–3.1 times as long as lobes, glabrous outside, pubescent in upper half and around stamens inside or sparsely pubescent around stamens and more densely in a band beneath them; lobes elliptic or ovate, apex rounded, obtuse or acute, base auriculate, 2.7–5.5 by 2–3 mm, 1.2–2.2 times as long as wide, glabrous outside, glabrous, papillate or pubescent at tips of lobes inside, not ciliate or ciliate near tips only. *Stamens* inserted at 4.9–7.1 mm from corolla base, 0.63–0.78 of tube length; anther apex 0.3–1.2 mm from corolla mouth, anthers 1.2–1.4 by 0.5–0.6 mm, 2–2.8 times as long as wide; filaments 0.6–1 mm



Map 27. Distribution of *Alyxia oleifolia* King & Gamble.

long. *Ovary* 0.6–1.1 mm high, pubescent all over or pubescent around base only; style 1.5–6 mm long; pistil head 0.6–1 mm long. *Fruit* black or purple, stalks 3.4–15 mm long, with 1 article in each string, glabrous, articles fleshy or with thin flesh, 13–28.2 by 7.3–15.7 mm, ellipsoid or cylindrical, symmetrical or asymmetrical, apex rounded or obtuse. *Seeds* ovoid or elliptic, ruminate, 6.6–21 by 5–14 by 4.6–13 mm.
(Description based on 157 specimens.)

Distribution — Peninsular Malaysia, Sumatra, Borneo.

Habitat — In forest or scrub at 600–3400 m altitude.

Note — There are some specimens from northern Sumatra which resemble *A. pilosa* in the leaves where the venation is, unusually for the species, visible adaxially. However, the blades are thicker and more coriaceous and the fruits are much smaller.

### 41. Alyxia palawanensis Markgr. — Map 23

*Alyxia palawanensis* Markgr., Blumea 23 (1977) 400. — Type: *Sulit 12397* (holo A; iso A, BO, PNH, SING) from the Philippines, Palawan, Victoria Mts.

Climbers. *Branchlets* terete or weakly angled, sparsely lenticellate or not, sparsely and minutely puberulent. *Leaves* in whorls of 3–5; petiole 0.2–0.4 cm long, pubescent; blade coriaceous or papery, narrowly elliptic or lanceolate, apex acute or acuminate, acumen obtuse, base cuneate, margin weakly inrolled, weakly undulate, 0.6–5.1 by 0.3–1 cm, 2.9–6 times as long as wide, midrib sunken above, intramarginal nerve absent, secondary veins 17–31 pairs, 70° from midrib, weakly prominent or indistinct above, obscure or weakly visible beneath, tertiary venation weakly prominent or not above, parallel to secondary veins or obscure; glabrous, sparsely puberulent only on midrib to puberulent all over beneath, sparsely puberulent, glabrous or puberulent only on midrib above. *Inflorescence* axillary or terminal, a simple unbranched pleiochasium, delicate, sparsely to densely puberulent, 1.2–1.7 cm long; peduncle 0.55–1 cm by 0.5–0.8 mm; bracts caducous or persistent, deltoid, c. 1.4 by 0.8 mm; bracteoles one on pedicel or absent; flowers 3–5; pedicels 1.2–3.4 mm long. *Sepals* ovate, apex acute, not keeled, 0.7–1.4 by 0.5 mm, 1.4–2.8 times as long as wide, ciliate, sparsely puberulent all over or only on centre line, glabrous inside. *Corolla* white; bud head 1.2–1.3 mm long, 0.35–0.49 of bud length, ellipsoid or ovate, apex acute; tube slightly inflated, throat with thickening, 1.8–3.8 by 0.8–1.1 mm, 2.7–4.3 times as long as sepals, 1.6–2.5 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, sparsely pubescent around stamens and more densely in a band beneath them; lobes orbicular, apex obtuse, base auriculate, 1.1–1.2 by 0.9 mm, 1.2–1.3 times as long as wide, sparsely puberulent outside, sparsely pubescent at the tips and base of lobes inside, not ciliate or ciliate at tips only. *Stamens* inserted at 2.2 mm from corolla base, 0.63 of tube length; anther apex 0.2 mm from corolla mouth, anthers 0.8 by 0.4 mm, 2 times as long as wide; filaments 0.5 mm long. *Ovary* 0.6 mm high, densely pubescent all over; style 1.5 mm long; pistil head 0.5 mm long. *Fruit* stalks 2.8 mm long, with 1 article in each string, sparsely puberulent all over, articles with thin flesh, 9–11.5 by 5.1–7.8 mm, ellipsoid, symmetrical, apex rounded, obtuse or apiculate. *Seeds* elliptic, ruminate, c. 7.6 by 5 by 4.4 mm.
(Description based on 22 specimens.)

Distribution — Palawan, Borneo, Sulawesi.

Habitat — In primary or mossy forest on sandstone or schist at 900–1950 m altitude.

## 42. Alyxia papuana D.J. Middleton, *spec. nov.* — Fig. 10, Map 28

Frutex scandens. Folia ternata coriacea vel subcoriacea elliptica. Inflorescentiae axillares graciles 4–12-florae glabrae vel sparsim pubescentes 1.1–3 cm longae. Corolla tubo 2.7–3 mm longo lobis 0.9–1.1 mm longis. Ovarium pubescens solus circum basim vel inter carpella fasciculis positis. Mericarpia 1–2-articulata articulis ellipticis vel subglobosis 10.7–12.6 × 6.6–7.5 mm. — Typus: *Craven & Schodde 1166* (holo L; iso A, BRI, CANB, G, K, LAE) collected on 4th April 1966 from Papua New Guinea, Morobe Province, near Haumga.

*Alyxia defoliata* subsp. *orientalis* Markgr., Blumea 23 (1977) 399, p.p. (not including type).
*Alyxia purpureoclada* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 400, p.p.

Climbers. *Branchlets* terete or weakly angled, sparsely lenticellate or not, glabrous. *Leaves* in whorls of 3; petiole 0.2–0.8 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic, apex acuminate, acumen obtuse, base cuneate, margin weakly inrolled or flat, weakly undulate, 1.3–6.6 by 0.4–2.6 cm, 2.2–5 times as long as wide, midrib sunken above, intramarginal nerve clear at margin or absent, secondary veins 23–42 pairs, 65–70° from midrib, weakly prominent above, weakly prominent beneath, terti-

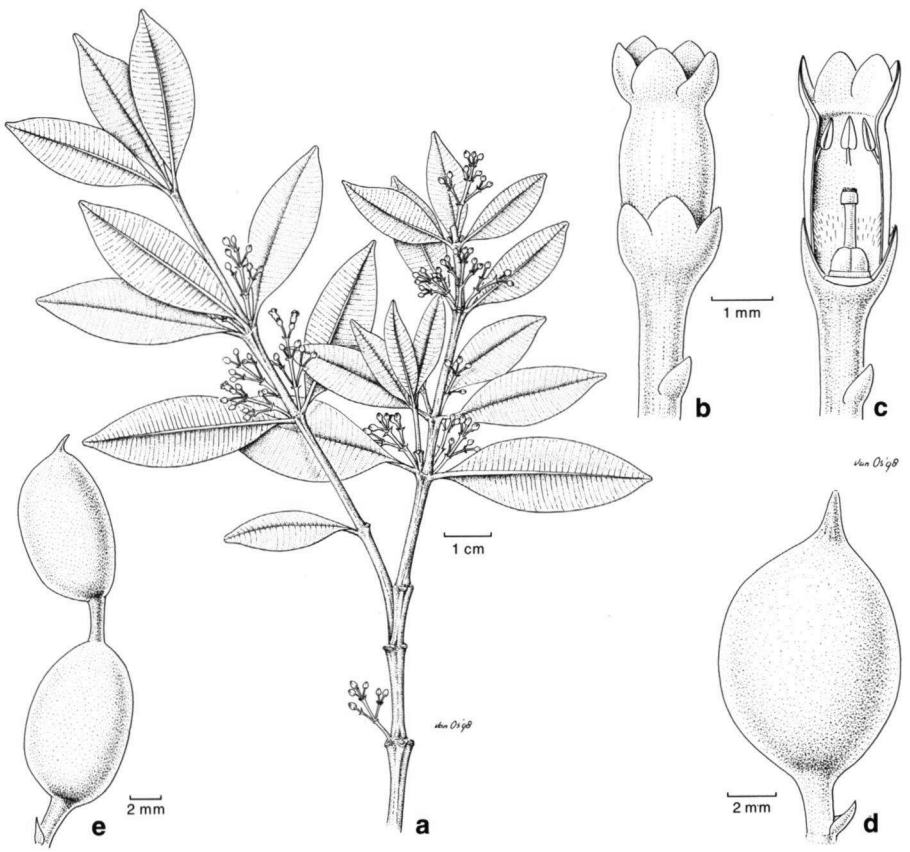


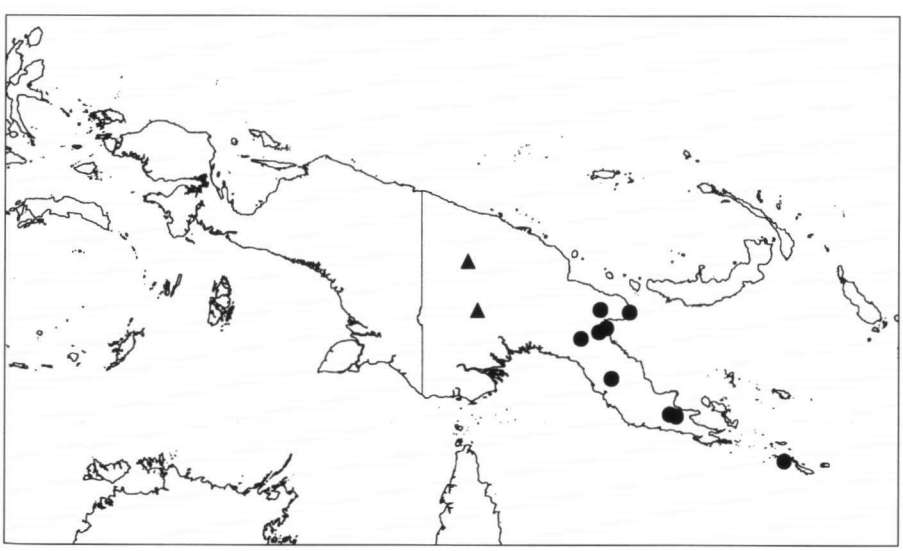

Fig. 10. *Alyxia papuana* D.J. Middleton. a. Habit; b. flower; c. flower dissection; d. & e. fruits (fl. *Craven & Schodde 1166*; fr. *Woods 2719*).

ary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above. *Inflorescence* axillary, a simple unbranched pleiochasium, compound pleiochasium with clear internodes, or with 1 or 2 internodes and unbranched side branches, delicate, glabrous or sparsely puberulent all over, 1.1–3 cm long; peduncle 0.3–1.3 cm by 1–1.1 mm; bracts caducous or persistent, deltoid, 0.9–1.3 by 0.7–1.3 mm; bracteoles present, one immediately beneath calyx; flowers 4–12; pedicels 1.7–5 mm long. *Sepals* ovate, apex rounded or obtuse, not keeled, 1–1.2 by 0.8–1.4 mm, 0.9–1.3 times as long as wide, ciliate, glabrous, glabrous inside. *Corolla* cream or tube yellowish and lobes white; bud head ovate, apex obtuse or acute; tube cylindrical or slightly inflated, throat with thickening, 2.7–3 by 0.9–1 mm, 2.25–3 times as long as sepals, 2.5–3.3 times as long as lobes, glabrous outside, pubescent in a band below the stamens inside or sparsely pubescent around stamens and more densely in a band beneath them; lobes ovate or orbicular, apex obtuse, base auriculate, 0.9–1.1 by 0.7–1 mm, 1.1–1.3 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 1.5–1.6 mm from corolla base, 0.53–0.56 of tube length; anther apex 0.2–0.3 mm from corolla mouth, anthers 0.8 by 0.3 mm, 2.7 times as long as wide; filaments 0.8–1 mm long. *Ovary* 0.5–1 mm high, pubescent around base only or in a tuft between the carpels; style 0.8–1.1 mm long; pistil head 0.5 mm long. *Fruit* black or yellowish-green, stalks 2.3–3.2 mm long, with 1 or 2 articles in each string, 2.5 mm between articles, glabrous, dry smooth, 10.7–12.6 by 6.6–7.5 mm, ellipsoid or subglobose, symmetrical, apex acuminate or apiculate. *Seeds* not seen.

(Description based on 44 specimens.)

Distribution — New Guinea.

Habitat — In open or dense forest, mossy forest, at the forest edge, lower montane forest, *Araucaria* forest or *Nothofagus* forest at 1220–2300 m altitude.



Map 28. Distribution of *Alyxia papuana* D.J. Middleton (●) and *A. pugio* Markgr. (▲).

Vernacular name — Vouma (Daga).

Note — This species is close to *A. defoliata* from which it differs in the indumentum on the ovary and the presence of bracteoles.

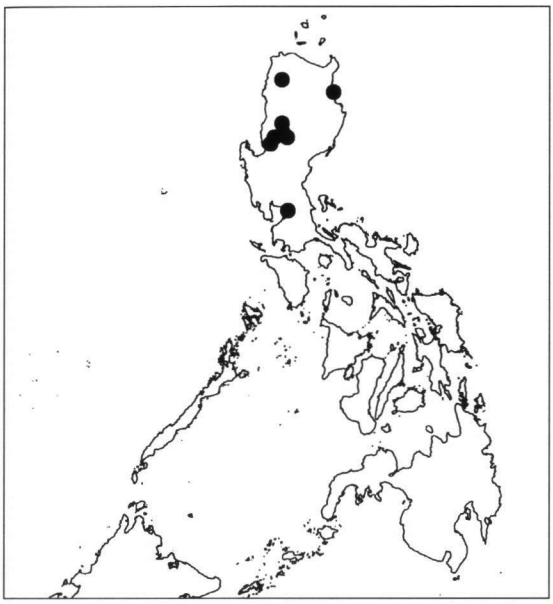
*Specimens studied*:

PAPUA NEW GUINEA: Morobe Province: Head of Baime Creek, Yamap, *Kairo NGF 44099* (A, BO, BRI, K, L, LAE, SING), near Haumga, *Craven & Schodde 1166* (type A, BRI, CANB, G, K, L, LAE); Sattelberg, *Clemens 8314a* (A, B); Boana, *Clemens 8423* (B); Matap, *Clemens 11128A* (A, E, US). – Central Province: Mt Wosa, road from Woitape to Kosipi, *Van Royen NGF 20267* (A, BO, BRI, CANB, K, L, LAE); Mt Tafa, *Brass 4117* (A, BO, BRI, NY). – Milne Bay Province: Maneau Range, Mt Dayman, N slopes, *Brass 22945* (A, CANB, L, LAE, US); Rabaraba Subprovince, Mt Daga, Donana, Dayman area, *Woods 2719* (BO, E, L); Rabaraba Subprovince, Suckling Complex, *Stevens & Veldkamp LAE 54967* (A, BISH, BRI, CANB, K, L, LAE, SING).

## 43. Alyxia parvifolia (Merr.) Merr. — Map 29

*Alyxia parvifolia* (Merr.) Merr., Philipp. J. Sci., Bot. 4 (1909) 313; Enum. Philipp. Fl. Pl. 3 (1923) 328; Markgr., Blumea 23 (1977) 392. — *Gynopogon parvifolius* Merr., Publ. Bur. Sci. Gov. Lab. 29 (1905) 46. — Type: *Elmer 5800* (lecto US, designated here; iso BO, G, K, NY, P, PNH, PR) from the Philippines, Luzon, Benguet Province, Mt Santo Tomas.

Climbers. *Branchlets* weakly or strongly angled, densely lenticellate or not, sparsely or densely and minutely puberulent. *Leaves* in whorls of 4 or 5; petiole 0.1–0.3 cm long, pubescent; blade coriaceous, elliptic, apex rounded to shortly acuminate, acumen obtuse, not mucronate, folded back or flat, base cuneate, margin weakly or strongly inrolled, weakly undulate, 0.7–4.7 by 0.3–1.3 cm, 1.8–6.8 times as long as wide, midrib slightly sunken or raised and with a central groove above, intramarginal nerve clear at margin or absent, secondary veins 8–22 pairs, 45–55° from midrib, weakly prominent above, obscure or weakly visible beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins or obscure; glabrous or sparsely puberulent all over beneath, puberulent only on midrib above, not punctate beneath. *Inflorescence* of solitary axillary flowers, sparsely to densely pubescent, 1.3–1.5 cm long; bracteoles caducous or persistent, deltoid, 1.3–1.8 by 1.2–1.8 mm, several along pedicel; pedicels 1–3 mm long. *Sepals* not fleshy, of free sepals, ovate, apex obtuse, keeled, 2.3–2.8 by 1–1.7 mm, 1.5–2.3 times as long as wide, ciliate, sparsely or densely puberulent, pubescent only at tips inside. *Corolla* white with orange tube; bud head 2.3 mm long, 0.23 of bud length, lanceolate, apex acute; tube cylindrical, throat with a narrow ring of tissue, 6–8 by 1.9–2.2 mm, 2.1–3.7 times as long as sepals, 2.2–3.3 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes ovate, apex acuminate, base auriculate, 2.4–3.4 by 1.6–2.4 mm, 1–1.7 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 7.1 mm from corolla base, 0.78 of tube length; anther apex 0.6–0.9 mm from corolla mouth, anthers 1.2–1.3 by 0.5–0.6 mm, 2.2–2.4 times as long as wide; filaments 0.6–0.7 mm long. *Ovary* 0.7–1 mm high, densely pubescent all over; style 5.5–5.6 mm long; pistil head 0.6–0.7 mm long. *Fruit* yellow or purple, stalks 1–3.7 mm long, with 1–3 articles in each string, glabrous, articles with thin flesh, 5.2–8.4 by 4.8–7.7 mm, globose or cylindrical, symmetrical, apex rounded or apiculate. *Seed* ruminate, 4.7–5.3 by 3.9–4.1 by 3.7–4.1 mm.
(Description based on 66 specimens.)



Map 29. Distribution of *Alyxia parvifolia* (Merr.) Merr.

Distribution — Philippines.

Habitat — Primary forest at 1700–2500 m altitude on rotting tree stumps or sandy-loamy soil.

Note — The flowers are solitary but often in all the leaf axils of a node so appear as several clumped together. This species is close to *A. luzoniensis* from which it differs in the generally smaller leaves and solitary flowers. The pedicels have several bracteoles near the apex but this character is also found in some individuals of *A. luzoniensis* and is probably caused by having empty bracts plus the bracteoles.

### 44. Alyxia pilosa Miq. — Fig. 11, Map 30

*Alyxia pilosa* Miq., Fl. Ned. Ind. 2 (1857) 408; Fl. Ned. Ind. Suppl. 1 (1861) 228; Markgr., Blumea 23 (1977) 382, p.p. — *Pulassarium pilosum* (Miq.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Teijsmann HB 983* (lecto U, designated here; iso BO, K (without number), L) from Indonesia, Sumatera Barat, Alahan Panjang.

*Alyxia scortechinii* King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 421; Ridl., Fl. Malay Pen. 2 (1923) 334; Markgr., Blumea 23 (1977) 394. — Type: *Scortechini s.n.* (lecto K, designated here) from Malaysia, Perak.

*Alyxia selangorica* King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 422; Ridl., Fl. Malay Pen. 2 (1923) 334. — Type: *Ridley 8558* (lecto K, designated here; iso SING) from Malaysia, Selangor, Gua Batu.

*Alyxia triptera* Merr., Pap. Michigan Acad. Sci. 24, 1938 (1939) 88. — Type: *Rahmat si Boeea 8619* (holo A; iso L, NY, UC, US) from Indonesia, Sumatera Utara, Dolok.

*Alyxia atjehensis* Markgr., Blumea 23 (1977) 393 (but not all paratypes). — Type: *Yates 2005* (holo B; iso B, BM, BO, K, NY, UC) from Indonesia, Sumatra, Aceh, Berastagi.

Climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous, sparsely puberulent or hispid. *Leaves* opposite or in whorls of 3–6; petiole 0.3–1.3 cm long, glabrous or pubescent; blade coriaceous or subcoriaceous, narrowly to broadly

elliptic, ovate, obovate or oblong, apex rounded to caudate, base obtuse to cuneate, margin weakly to strongly inrolled or flat, weakly undulate, dark, 2.5–17 by 1–6.8 cm, 1.4–7.9 times as long as wide, midrib deeply sunken above, intramarginal nerve clear at margin or absent, secondary veins 42–53 pairs, 70–80° from midrib, weakly prominent above, obscure, weakly visible or prominent beneath, tertiary venation weakly prominent to obscure above, reticulate and parallel to secondary veins; glabrous, sparsely puberulent only on midrib or puberulent all over beneath, glabrous, puberulent only on midrib or all over above, not punctate beneath. *Inflorescence* axillary or terminal, a compound pleiochasium with clear internodes, sometimes congregated together

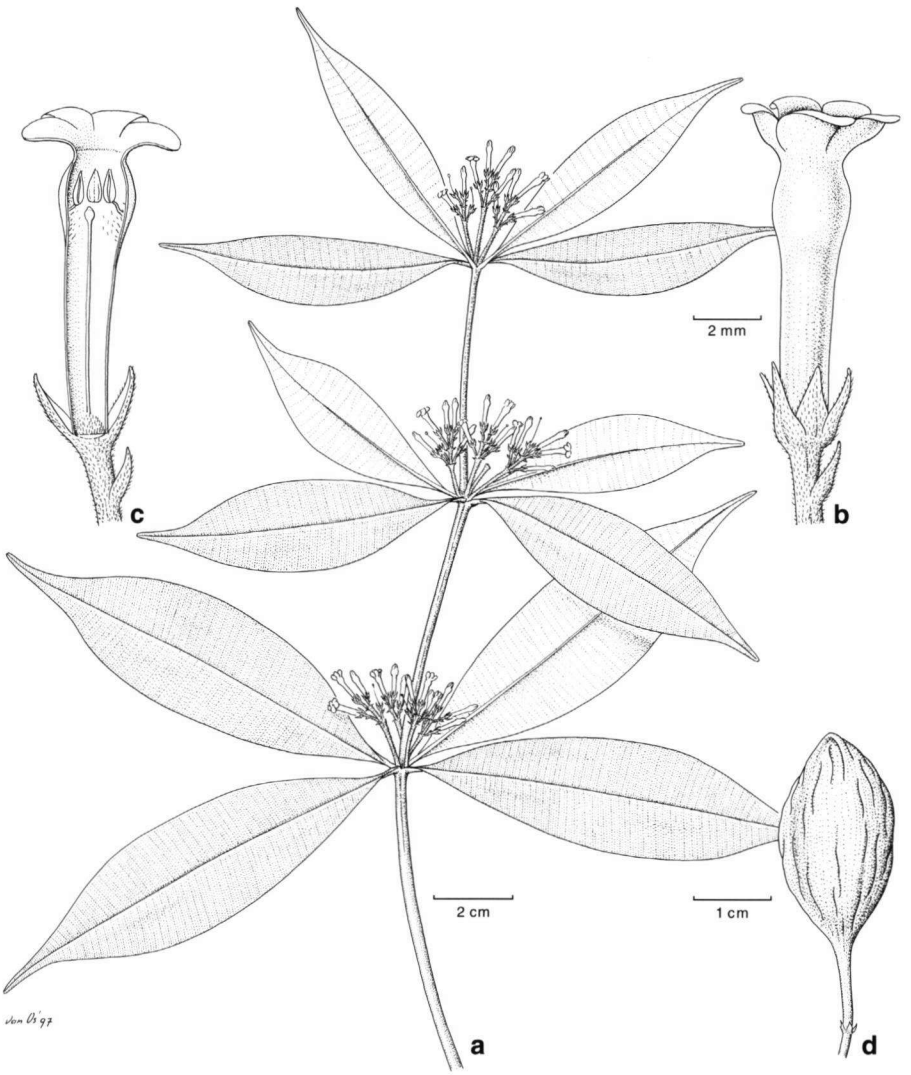



Fig. 11. *Alyxia pilosa* Miq. a. Habit; b. open flower; c. flower dissection; d. fruit (fl. *Lörzing 6125*; fr. *Laumonier TFB.3638*).

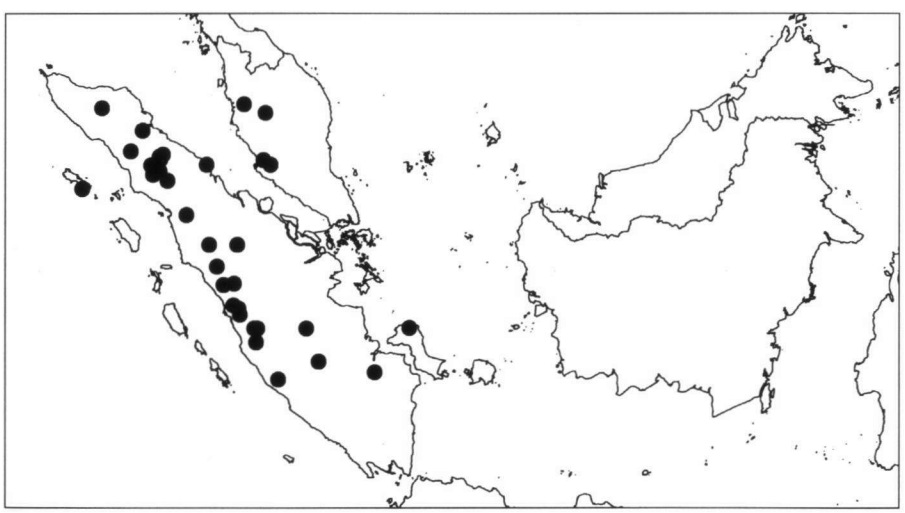
forming lax panicles, or with several clear internodes and unbranched side branches, glabrous or sparsely to densely puberulent all over, 2.5–9 cm long; peduncle 0.6–6.3 cm by 1.1–2.3 mm; bracts caducous or persistent, ovate, deltoid, linear or lanceolate, 1.5–14 by 0.8–1.1 mm; bracteoles one on pedicel or absent; flowers 6–15; pedicels 0–8.5 mm long. *Sepals* not fleshy, linear, ovate or lanceolate, apex acute or acuminate, not keeled, 1.8–3.2 by 0.8–1.3 mm, 2–3.2 times as long as wide, ciliate, sparsely to densely long pubescent or puberulent on tips only. *Corolla* white or cream; bud head 2.8–3.2 mm long, 0.26–0.27 of bud length, ovate, apex obtuse or acuminate; tube cylindrical, throat with thickening or a narrow ring of tissue, 8.5–9.1 by 1.7–2.2 mm, 3.4–4.9 times as long as sepals, 2.8–3.4 times as long as lobes, glabrous or very sparsely puberulent around top of tube outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes elliptic or orbicular, apex rounded or obtuse, base auriculate, 2.5–3.4 by 1.7–2.8 mm, 1.2–1.6 times as long as wide, glabrous outside, glabrous inside, not ciliate or ciliate near tips only. *Stamens* inserted at 7.5–7.9 mm from corolla base, 0.77–0.81 of tube length; anther apex 0.4–0.6 mm from corolla mouth, anthers 1.2–1.4 by 0.5–0.6 mm, 2–2.8 times as long as wide; filaments 0.6–0.8 mm long. *Ovary* 0.8 mm high, densely pubescent all over; style 6–7 mm long; pistil head 0.6–0.7 mm long. *Fruit* black or purple, stalks 6.3–12 mm long, with 1 article in each string, glabrous, articles fleshy, 17–37 by 9–14 mm, ellipsoid, symmetrical, apex rounded to acuminate, often hooked at the top. *Seeds* ruminate, 15–22.5 by 10–11.1 by 8–10.2 mm.

(Description based on 132 specimens.)

Distribution — Peninsular Malaysia, Sumatra.

Habitat — In primary, mossy, ridge or open forest at 100–2700 m altitude.

Note — This species has been quite radically altered from the sense it has often been used. When working on the *A. reinwardtii* group I found it quite difficult to distinguish many of the species as recognised by Markgraf (1977) until I came to the



Map 30. Distribution of *Alyxia pilosa* Miq.

conclusion that the large fruited *A. scortechinii* and *A. atjehensis,* which he had placed in series Megalocarpae, are synonyms of *A. pilosa,* a species he had placed in series Reinwardtianae. *Alyxia atjehensis* bears quite a remarkable similarity to the type specimen of *A. pilosa* but not to most of the specimens which have been included in *A. pilosa* by various authors. I have concluded that the type of *A. pilosa* plus most of the specimens generally recognised as *A. atjehensis* make up the species *A. pilosa* but that most of the specimens usually identified as *A. pilosa* actually belong to *A. ganophylla,* commonly but incorrectly, in my opinion, placed in synonymy of *A. pilosa. Alyxia ganophylla* is more closely related to *A. reinwardtii* and has much smaller fruits like *A. reinwardtii. Alyxia pilosa* has very large fruits for this genus although the series Megalocarpae has been abandoned.

### 45. Alyxia pseudosinensis Pit. — Map 26

*Alyxia pseudosinensis* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1125; Lý, Feddes Repert. 97 (1986) 435. — Type: *Poilane 8488* (lecto P, designated here; isolecto A, NY, P) from Vietnam, Phang-rang, Ca-Na.

*Alyxia crassifolia* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1124. — Type: *Poilane 7268* (lecto P, designated here; isolecto P) from Vietnam, Mt Bana.

Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous. *Leaves* in whorls of 3; petiole 0.4–0.6 cm long; glabrous; blade subcoriaceous or papery, elliptic or obovate, apex emarginate to shortly acuminate, acumen obtuse, base obtuse to acute, margin weakly inrolled, weakly undulate, 1–8.6 by 0.7–4.4 cm, 1.1–2.5 times as long as wide, midrib flattened or slightly sunken above, intramarginal nerve weakly present, inset from margin, secondary veins 10–29 pairs, 70° from midrib, weakly prominent or not above, obscure or weakly visible beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a short congested compound pleiochasium, robust, sparsely puberulent all over, 0.8–1.2 cm long; peduncle 0.1–0.25 cm by 0.8 mm; bracts persistent, deltoid, 2.3 by 1.4 mm; bracteoles 2 immediately beneath calyx; flowers 4–6; pedicels 0.2–0.3 mm long. *Sepals* ovate, apex acute to acuminate, keeled, 1.9–2.3 by 0.8–1.2 mm, 1.6–2.7 times as long as wide, ciliate, glabrous or sparsely puberulent on centre line. *Corolla* white; bud head 2.9 mm long, 0.54 of bud length, lanceolate, apex acuminate; tube cylindrical, throat with thickening, 5.5 by 0.7–1.2 mm, 2.9 times as long as sepals, 2.4 times as long as lobes, glabrous outside, pubescent in upper half and around stamens inside; lobes elliptic, apex obtuse, base auriculate, 2.3 by 1.4 mm, 1.6 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted in upper half of tube; anthers 0.9 by 0.3 mm, 3 times as long as wide; filaments 1 mm long. *Ovary* pubescent around base only; pistil head 0.4 mm long. *Fruit* reported on one specimen to be white; stalks 2 mm long, with 1 or 2 articles in each string, glabrous, fleshy, 8.9–11.5 by 8–8.3 mm, ellipsoid or globose, symmetrical, apex rounded. *Seeds* ovoid, ruminate, 6.3–7.6 by 5.3–5.4 by 4.5–5 mm. Embryo linear, 4.5 mm long, cotyledons 0.56 of embryo length.

(Description based on 20 specimens.)

Distribution — Vietnam, Laos.

Habitat — Altitude range: 300–1450 m.

Note — This species is known from several specimens but only one of which has mature flowers, *Poilane 8300* (P), and then only one flower on the specimen. Stamen and ovary dimensions are not given as only buds have been dissected. Close to *A. reinwardtii* (see note there).

### 46. Alyxia pugio Markgr. — Map 28

*Alyxia pugio* Markgr., Bot. Jahrb. Syst. 61 (1927) 182; Blumea 23 (1977) 406. — Type: *Ledermann 9941* (holo B†; lecto L; iso WRSL) from Papua New Guinea, East Sepik Province, Lordberg.

Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous. *Leaves* in whorls of 3; petiole 0.2–0.3 cm long, glabrous; blade coriaceous or subcoriaceous, narrowly elliptic or elliptic, apex long acuminate to caudate, acumen obtuse, base cuneate, margin flat to weakly undulate, 2.7–7.7 by 0.3–1.8 cm, 3.7–7.8 times as long as wide, midrib slightly or very clearly sunken above, intramarginal nerve absent, secondary veins indistinct above, obscure or weakly visible beneath, tertiary venation parallel to secondary veins or obscure above; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium with clear internodes, delicate, sparsely puberulent, 2–2.5 cm long; peduncle 1.1–1.4 cm by 0.6–0.7 mm; bracts caducous; bracteoles absent; flowers 7–10; pedicels 1.6–2.2 mm long. *Sepals* ovate, apex obtuse, not keeled, c. 0.9 by 0.5 mm, 1.8 times as long as wide, ciliate, glabrous or sparsely puberulent on centre line, glabrous inside. *Corolla* bud head c. 1 mm long, 0.32 of bud length, ellipsoid, apex obtuse; tube slightly inflated, throat with thickening, 2.2 by 1 mm, 2.4 times as long as sepals, 2.4 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them; lobes ovate, apex rounded, base auriculate, 0.9 by 0.7 mm, 1.3 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 1.2 mm from corolla base, 0.55 of tube length; anther apex 0.2 mm from corolla mouth, anthers 0.6 by 0.3 mm, 2 times as long as wide; filaments 0.4 mm long. *Ovary* 0.8 mm high, pubescent in tuft between carpels; style 0.8 mm long; pistil head 0.3 mm long. *Fruit* black, stalks 1.2–1.6 mm long, with 1 or 2 articles in each string, 1 mm between articles, glabrous, articles dry smooth, 8–10 by 7–7.9 mm, globose, symmetrical, apex rounded. *Seed* ruminate, 6.7 mm long.

(Description based on 2 collections made into 3 specimens.)

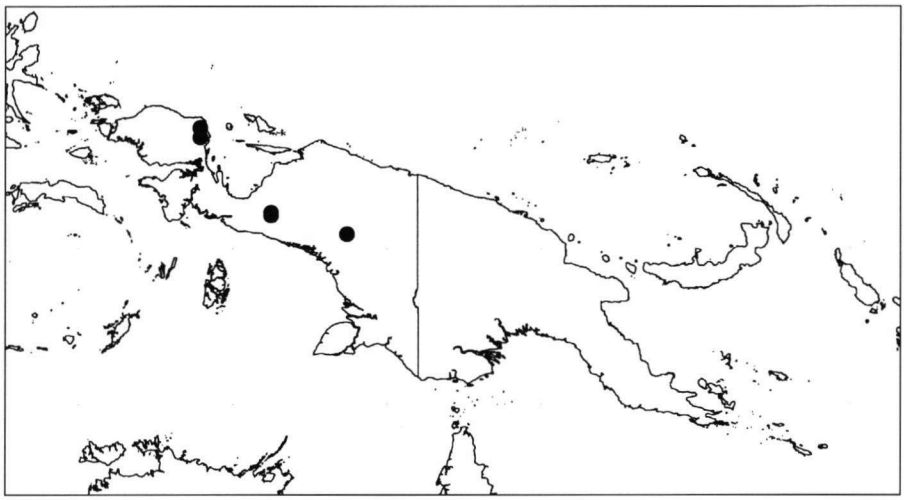
Distribution — New Guinea.

Habitat — Reported in forest on well drained soil at 1000–1350 m altitude.

Note — This species is related to *A. sleumeri* and *A. multistriata* but the lack of good material makes it difficult to really clarify this relationship. It differs from these species in its small flowers but this difference may break down once further collections are available.

### 47. Alyxia pullei Markgr. — Map 31

*Alyxia pullei* Markgr., Nova Guinea 14, 2 (1927) 281; Bot. Jahrb. Syst. 61 (1927) 186; Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 492; Markgr., Blumea 23 (1977) 384; P. Royen, Alpine Fl. New Guinea 4 (1983) 2849. — Type: *Pulle 952* (holo B†; lecto L, designated here; iso A, BO, K, U) from Indonesia, Irian Jaya, Mt Hellwig.



Map 31. Distribution of *Alyxia pullei* Markgr.

Climbers. *Branchlets* strongly angled, sparsely lenticellate or not, glabrous. *Leaves* in whorls of 4–6; petiole 0–0.9 cm long, glabrous; blade coriaceous or subcoriaceous, obovate or spathulate, apex emarginate and not folded back, rounded, obtuse or cuspidate, base decurrent onto petiole, margin weakly or strongly inrolled, weakly undulate or not, 4.3–11.7 by 1.5–4.1 cm, 2.1–3.3 times as long as wide, midrib sunken above, intramarginal nerve weakly present or absent, secondary veins 19–43 pairs, 55–70° from midrib, weakly prominent above, obscure, weakly visible or prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a simple unbranched pleiochasium or with 1 or 2 internodes and unbranched side branches, delicate to robust, glabrous or sparsely puberulent in upper parts, 1.8–3.6 cm long; peduncle 0.6–2 cm by 1–2.1 mm; bracts caducous or persistent, deltoid or lanceolate, 1.6–2.4 by 1–1.6 mm; bracteoles absent; flowers 4–10; pedicels 0.5–6.5 mm long. *Sepals* ovate, apex rounded to acute, not keeled, 1.5–2 by 1.1–1.8 mm, 0.9–1.7 times as long as wide, ciliate, glabrous outside, glabrous inside. *Corolla* with pink tube and white lobes; bud head 3.1–3.2 mm long, 0.34–0.39 of bud length, ellipsoid or ovate, apex acute to acuminate; tube cylindrical or slightly inflated, throat with or without thickening, or with a narrow ring of tissue, 6.3–6.9 by 1.4–2.2 mm, 3.4–4.4 times as long as sepals, 2–3.3 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them; lobes elliptic, ovate or orbicular, apex rounded to acute, base auriculate, 2–3.5 by 1.7–2.6 mm, 1–1.7 times as long as wide, glabrous outside, glabrous or pubescent at tips of lobes inside, not ciliate or ciliate near tips only. *Stamens* inserted at 4.1–5.1 mm from corolla base, 0.59–0.69 of tube length; anther apex 0.6–1.2 mm from corolla mouth, anthers 1.4–1.9 by 0.5 mm wide, 2.8–3.8 times as long as wide; filaments 0.6–1.2 mm long. *Ovary* 0.8–1.1 mm high, pubescent in tuft between carpels; style 2.6–3.4 mm long; pistil head 0.6–1 mm long. *Fruit* yellow turning black, stalks 1.7–3.5 mm long, with 1–3 articles in each string, 0–1.3 mm between articles, glabrous, articles with thin

flesh, 8–13 by 6.2–8 mm, ellipsoid or globose, symmetrical, apex rounded. *Seed* ruminate, c. 8.6 by 4.4 by 4.3 mm.
(Description based on 29 specimens.)

Distribution — New Guinea.

Habitat — Reported from forest on clay at 1760–2600 m altitude.

Vernacular names — Aidemot (Sougb), Benggrai (Hatam).

Note — Close to *A. cacuminum* (see note there).

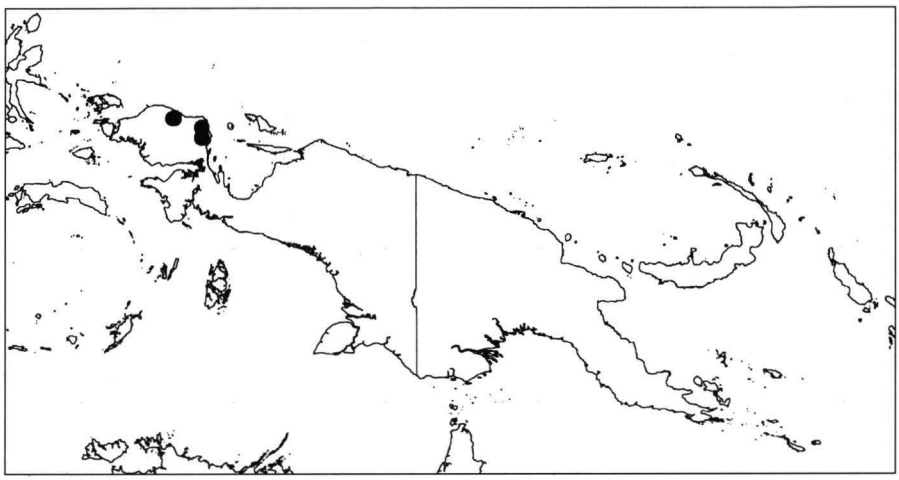
### 48. Alyxia punctata Kaneh. & Hatus. — Map 32

*Alyxia punctata* Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 491; Markgr., Blumea 23 (1977) 404, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2853, p.p. — Type: *Kanehira & Hatusima 13717a* (holo FU, n.v.; photo of holotype in L) from Indonesia, Irian Jaya, Arfak Mts, Mt Koebre.

*Alyxia sleumeri* Markgr., Blumea 23 (1977) 409, p.p. (not including type).

*Alyxia purpureoclada* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 400, p.p.

Erect shrubs or climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous to densely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 3 or 4; petiole 0.1–0.6 cm long, glabrous or pubescent; blade coriaceous or subcoriaceous, elliptic or obovate, apex rounded to acuminate and not folded back, not mucronate, base cuneate, margin weakly inrolled or flat, weakly undulate or not, 1–7.3 by 0.4–2.1 cm, 1.8–4 times as long as wide, midrib prominent, flattened, sunken or raised and with a central groove above, intramarginal nerve clear at margin, secondary veins 14–23 pairs, 70° from midrib, weakly prominent to obscure above, obscure beneath, tertiary venation obscure above; glabrous and punctate beneath, glabrous or puberulent only on midrib above. *Inflorescence* axillary, flowers solitary or a simple unbranched pleiochasium, sparsely to densely puberulent, 1–2 cm long; peduncle 0.7–0.8 cm by 1.1–1.2 mm; bracts persistent, ovate, deltoid or lanceolate, 1.6–2.9 by 0.8–1.8 mm; bracteoles present, 2 on pedicel; flowers 1–3; pedicels 1.7–4 mm long. *Sepals* not fleshy, of free sepals, ovate, apex rounded or obtuse, not keeled, 1.2–1.3 by 1–1.4 mm, 0.9–1.2 times as long as wide, ciliate, glabrous or sparsely puberulent, pubescent only at tips or glabrous inside. *Corolla* yellow or with buff tube and white lobes; bud head 1.8–2.5 mm long, 0.26–0.37 of bud length, ellipsoid or ovate, apex obtuse or acute; tube cylindrical, throat with thickening, 4.2–5.2 by 1.4–1.7 mm, 3.5–4 times as long as sepals, 1.9–2.9 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes ovate or orbicular, apex obtuse, base auriculate, 1.8–2.2 by 1.4–1.8 mm, 1–1.6 times as long as wide, glabrous outside, glabrous or pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 3.1–3.7 mm from corolla base, 0.6–0.66 of tube length; anther apex 0.3–0.5 mm from corolla mouth, anthers 1.2–1.3 by 0.4 mm, 3–3.25 times as long as wide; filaments 0.9–1 mm long. *Ovary* 0.8–1.1 mm high, densely pubescent all over; style 0.6–1.9 mm long; pistil head 0.4–0.6 mm long. *Fruit* green or yellowish-green (probably immature), stalks 2.4–3.6 mm long, with 1 or 2 articles in each string, 0.5–1 mm between articles, glabrous or sparsely puberulent at ends, with thin flesh, 9.6–16.2 by 8–11.2 mm, ellipsoid or cylindrical, symmetrical, apex rounded or apiculate. *Seeds* elliptic, ruminate, 8.2–13.4 by 7.5–8.7 by 6.6–8 mm. Embryo



Map 32. Distribution of *Alyxia punctata* Kaneh. & Hatus.

cotyledons wider, strongly undulate, embryo 8.5–9 mm long, cotyledons 0.68–0.72 of embryo length.
(Description based on 30 specimens.)

Distribution — New Guinea.

Habitat — In forest or scrub at 1650–2400 m altitude.

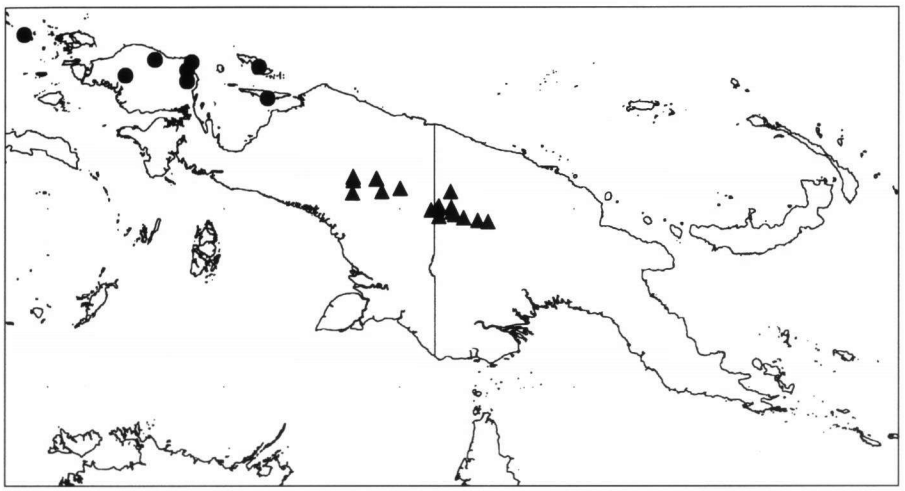
Vernacular name — Bokoom (Hattam).

Note — Markgraf (1977) has suggested the irregularly spaced punctae on the underside of the leaves are possibly due to insect damage but they are remarkably well associated with other morphological characters so may be an inherent feature of the plant. The embryo cotyledons are exceptionally crisped and the base hooked. It is probably most closely related to *A. subalpina*.

### 49. Alyxia purpureoclada Kaneh. & Hatus. — Map 33

*Alyxia purpureoclada* Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 491; Markgr., Blumea 23 (1977) 400, p.p. — Type: *Kanehira & Hatusima 13466* (holo FU, n.v., photo of holotype in L; iso A, BO) from Indonesia, Irian Jaya, Manokwari District, Arfak Mts, Anggi Lakes.
*Alyxia clemensiae* Markgr., Blumea 23 (1977) 396, p.p. (not including type).
*Alyxia floribunda* auct. non Markgr.: Markgr., Blumea 23 (1977) 397, p.p.
*Alyxia ridleyana* auct. non Wernham: Markgr., Blumea 23 (1977) 411, p.p.

Climbers or treelets(? – see note). *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous. *Leaves* in whorls of 3–6; petiole 0–1 cm long, glabrous or pubescent; blade coriaceous or subcoriaceous, elliptic, obovate or oblong, apex emarginate to shortly acuminate or cuspidate, base acute to decurrent onto petiole, margin weakly inrolled or flat, weakly undulate, 2.1–16 by 0.6–8 cm, 2–3.8 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve strong and inset or clear at margin, secondary veins 42–92 pairs, 65–75° from midrib, weakly prominent above, weakly visible or prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous or puberulent only on midrib above, not punctate beneath.



Map 33. Distribution of *Alyxia purpureoclada* Kaneh. & Hatus. (●) and *A. rostrata* (Markgr.) Markgr. (▲).

*Inflorescence* axillary, a compound pleiochasium with clear internodes, with several clear internodes and unbranched side branches, or large lax panicles frequently branched, glabrous or sparsely to densely puberulent, 2–7.5 cm long; peduncle 0.8–2.8 cm long, 1.2–1.6 mm wide; bracts persistent, ovate or deltoid, 1.2–1.5 by 1–1.2 mm; bracteoles present, one immediately beneath calyx; flowers 12–80; pedicels 0.6–1.5 mm long. *Sepals* often fused around the base, ovate, apex rounded to acute, not keeled, 1–1.2 by 0.7–1 mm, 1.2–1.4 times as long as wide, ciliate or not ciliate, glabrous or sparsely puberulent outside, glabrous inside. *Corolla* yellow or tube dark yellow and lobes white; bud head 1 mm long, 0.33 of bud length, ovate, apex obtuse or acute; tube slightly inflated, throat with thickening, 2.1 by 0.9 mm, 1.75 times as long as sepals, 1.6 times as long as lobes, glabrous outside, pubescent in a band below the stamens inside or sparsely pubescent around stamens and more densely in a band beneath them; lobes elliptic, apex rounded or obtuse, base auriculate, c. 1.3 by 0.9 mm, 1.4 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at c. 1.2 mm from corolla base, 0.52 of tube length; anther apex 0–0.3 mm from corolla mouth, anthers 0.8 by 0.3–0.4 mm, 2–2.7 times as long as wide; filaments 0.3 mm long. *Ovary* 0.5–0.8 mm high, glabrous, pubescent only on top or in a tuft between the carpels; style 0.6 mm long; pistil head 0.5 mm long. *Fruit* black, yellow-orange or orange, stalks 1.4–5 mm long, with 1–4 articles in a string, 1.5–4.6 mm between articles, glabrous, sparsely puberulent at ends or all over, articles dry smooth or with thin flesh, 5.5–20 by 4.9–11.5 mm, ellipsoid or subglobose, symmetrical, apex rounded, obtuse or apiculate. *Seeds* ruminate, 4.8–20.5 by 4.1–18.4 by 3.4–4.3 mm. Embryo linear, 4.3–7.1 mm long, cotyledons 0.58–0.61 of embryo length. (Description based on 51 specimens.)

Distribution — New Guinea.

Habitat — Reported from forest on clay, stony soil and limestone at 35–2430 m altitude.

Note — Close to *A. floribunda* (see note there). The label on one collection reports that it is a treelet. All other indications are that it is a climber. There is a possibility that it may have been confused with the plant it was climbing on.

### 50. Alyxia racemosa Pit. — Fig. 12, Map 34

*Alyxia racemosa* Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1124; Lý, Feddes Repert. 97 (1986) 431. — Type: *Lecomte & Finet 971* (lecto P, designated here) from Vietnam, Tourane, Lazaret.

Climbers. *Branchlets* terete or weakly angled, sparsely to densely lenticellate, glabrous. *Leaves* opposite or in whorls of 3, coriaceous or subcoriaceous; petiole 0.1–0.6 cm long; blade elliptic or ovate, apex rounded, obtuse, acute or shortly acuminate, acumen obtuse, base obtuse to cuneate, margin weakly inrolled, weakly undulate, 1.2–8.1 by 0.5–3.8 cm, 1.5–2.8 times as long as wide, midrib flattened or slightly sunken above, intramarginal nerve faintly present, secondary veins 10–33 pairs, 65–80° from midrib, weakly prominent to obscure above, weakly visible beneath, tertiary venation weakly prominent or obscure, reticulate and parallel to secondary veins, glabrous beneath, glabrous above. *Inflorescences* axillary or terminal, a compound pleiochasium with clear internodes or an aggregate pleiochasium forming lax panicles, delicate, glabrous or sparsely puberulent in upper parts, 1.5–14 cm long; peduncle 0.5–5.5 cm by 0.5–0.9 mm; bracts persistent, 1.4–3 by 0.8–1.8 mm wide; bracteoles 2 immediately beneath

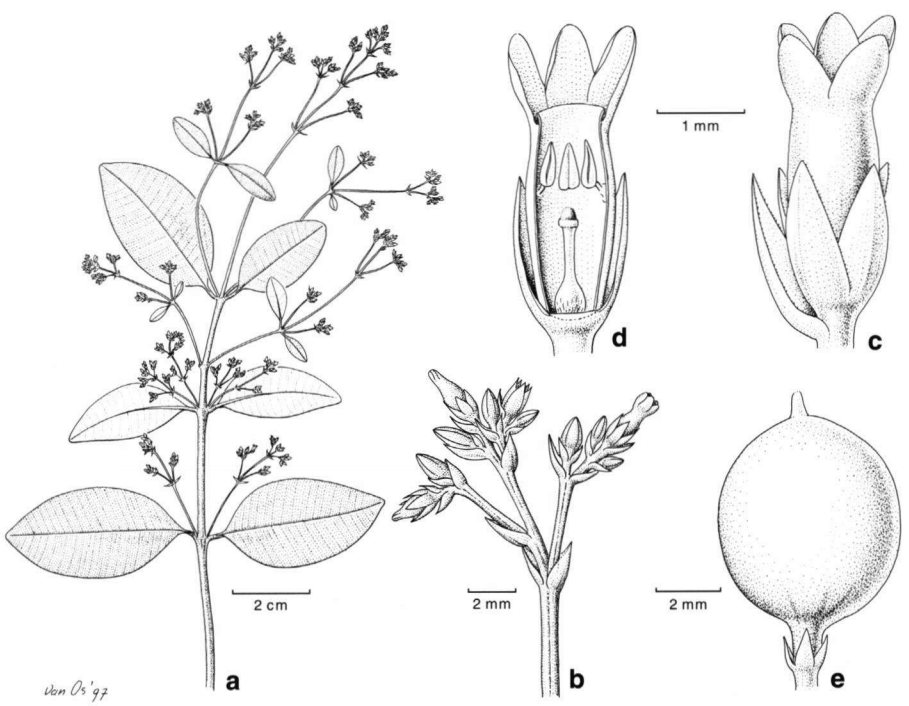
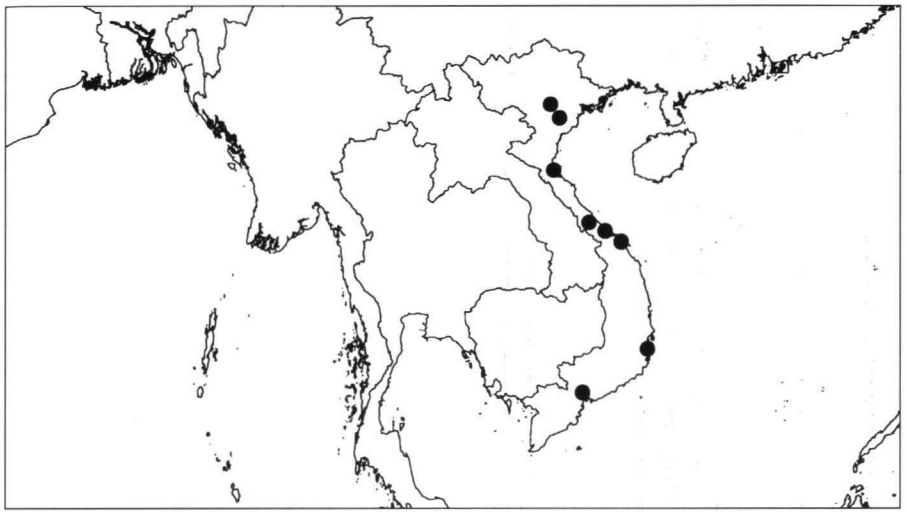



Fig. 12. *Alyxia racemosa* Pit. a. Habit; b. inflorescence; c. open flower; d. flower dissection; e. fruit (*Lecomte & Finet 971*).



Map 34. Distribution of *Alyxia racemosa* Pit.

the calyx or on the pedicel; pedicels 0.4–1 mm long. *Sepals* ovate or lanceolate, apex acute or acuminate, keeled, 1.4–2 by 0.5–1 mm, 1.4–3 times as long as wide, ciliate, glabrous or puberulent on tips only. *Corolla* bud head 0.9–1 mm long, lanceolate, ovate or deltoid, apex obtuse or acute, 0.36–0.42 of bud length; tube slightly inflated, 1.8–2 mm long, 0.7–1.3 mm wide, glabrous outside, glabrous or pubescent in upper half and around stamens inside, 0.9–1.2 times as long as sepals, 1.8–2.1 times as long as lobes; corolla lobes elliptic or oblong, apex rounded, obtuse or acute, not ciliate, 0.7–1.2 by 0.6–0.8 mm, 1–1.7 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 0.9–1.4 mm from corolla base, 0.45–0.6 of tube length; anther apex 0–0.3 mm from corolla mouth, anthers 0.5–0.6 by 0.3 mm, 1.7–2 times as long as wide; filaments 0.3–0.4 mm long. *Ovary* 0.3–0.5 mm high, glabrous or very sparsely pubescent; style 0.5–0.6 mm long; pistil head 0.1–0.4 mm long. *Fruit* with 1 or 2 articles in each string, stalks 1–2 mm long, articles dry smooth, globose or subglobose, 6.1–7 by 5.9–6 mm, glabrous. *Seeds* 4.5–5 by 3.2–4.1 by 2.4–3.6 mm.
(Description based on 26 specimens.)

Distribution — Vietnam.

Habitat — Altitude: reported from 100 m.

Note — This species is quite characteristic due to its delicate, lax inflorescences and the glabrous or only very sparsely pubescent ovary.

### 51. Alyxia reinwardtii Blume — Fig. 13, Map 35

*Alyxia reinwardtii* Blume, Catalogus (1823) 43; Hochr., Candollea 5 (1931) 179; Merr., Contr. Arnold Arbor. 8 (1934) 144; Kerr in Craib, Fl. Siam. 2 (1939) 432; Backer & Bakh.f., Fl. Java 2 (1965) 230; Markgr., Blumea 23 (1977) 386; P.T. Li, J. S. China Agric. Univ. 11 (1990) 27; Widjaya, Sispipan Floribunda 2 (1992) 6; P.T. Li et al., Fl. China 16 (1995) 160. — *Gynopogon reinwardtii* (Blume) Koord., Exkursionsfl. Java 3 (1912) 74; Fl. Tjibodas 3, 3 (1918) 55. — Type: *Blume s.n.* [acc. no. 898.129-217] (lecto L, designated here; iso GH, NY) from Indonesia, Java.

*Alyxia lucida* Wall. in Roxb., Fl. Ind. 2 (1824) 540; Hook.f., Fl. Brit. Ind. 3 (1882) 635; Ridl., J. Straits Br. Roy. Asiat. Soc. 33 (1900) 109; King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 417; Merr. & Rolfe, Philipp. J. Sci., Bot. 3 (1908) 121; Ridl., J. Straits Br. Roy. Asiat. Soc. 59 (1911) 129; Merr., Bibl. Enum. Born. Pl. (1921) 499; Enum. Philipp. Fl. Pl. 3 (1923) 328; Ridl., Fl. Malay Pen. 2 (1923) 332; M.R. Hend., Malay. Wild Fls. (1959) 279; Backer & Bakh.f., Fl. Java 2 (1965) 230. — *Alyxia reinwardtii* Blume var. *lucida* (Wall.) Markgr., Blumea 23 (1977) 389; M.G. Gangop. & Chakr., J. Econ. Tax. Bot. 16, 1 (1992) 32. — Type: *Wallich 1605.1* (lecto K-W; iso A (scrap), BM, K, K-W) from Singapore.

*Alyxia stellata* (J.R. Forst. & G. Forst.) Roem. & Schult. var. *latifolia* Blume, Bijdr. (1826) 1031. — *Alyxia reinwardtii* Blume var. *latifolia* (Blume) Bakh.f., Blumea 6 (1950) 390; Backer & Bakh.f., Fl. Java 2 (1965) 230. — Type: *Blume s.n.* [acc. no. 898.129-237] (holo L) from Indonesia, Jawa Tengah, Nusa Kambangan.

*Alyxia gynopogon* sensu Wall., Cat. (1829) no. 1605, nom. nud.

*Alyxia odorata* Wall. ex G. Don, Gen. Hist. 4 (1837) 97; A.DC., Prodr. 8 (1844) 347; Miq., Fl. Ned. Ind. 2 (1857) 408; Hook.f., Fl. Brit. Ind. 3 (1882) 636; King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 418; Merr., Bibl. Enum. Born. Pl. (1921) 499. — *Pulassarium odoratum* (Wall. ex G. Don) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Wallich 1606* (holo K-W; iso G-DC) from Burma, Tenasserim, between Chappedong and Amherst.

*Alyxia aromatica* Reinw. ex A.DC., Prodr. 8 (1844) 346, nom. inval. (in synonymy). — Based on: *Blume 511a* (L) from Indonesia, Java.

*Alyxia quinata* Miq., Fl. Ned. Ind. 2 (1857) 407; Fl. Ned. Ind. Suppl. 1 (1861) 228. — *Pulassarium quinatum* (Miq.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Teijsmann HB 1000* (lecto U, designated here; iso BO, K (without number), L) from Indonesia, Sumatera Utara, Siboga.

*Alyxia pumila* Hook.f., Fl. Brit. Ind. 3 (1882) 635; King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 420; Ridl., Fl. Malay Pen. 2 (1923) 333; Kerr in Craib, Fl. Siam. 2 (1939) 432. — *Pulassarium pumilum* (Hook.f.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon pumilus* (Hook.f.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — *Alyxia reinwardtii* Blume var. *pumila* (Hook.f.) Markgr., Blumea 23 (1977) 388. — Type: *Lobb s.n.* (lecto K, designated here) from Malaysia, Johor, Mt Ophir.

*Alyxia lucida* Wall. var. *meiantha* Stapf, Trans. Linn. Soc. ser. 2, Bot. 4 (1894) 207; Merr., Bibl. Enum. Born. Pl. (1921) 499. — *Alyxia reinwardtii* Blume var. *meiantha* (Stapf) Markgr., Blumea 23 (1977) 389. — Type: *Haviland 1185* (holo K; iso SAR) from Malaysia, Sarawak, Kira Batu.

*Alyxia pisiformis* [Pierre in L. Planch., Prod. Apoc. (1894) 261, nom. nud.]; Pierre ex Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1126; Kerr in Craib, Fl. Siam. 2 (1939) 432; Lý, Feddes Repert. 97 (1986) 435. — [*Gynopogon pisiformis* Pierre in L. Planch., Prod. Apoc. (1894) 261, nom. nud.]. — [*Pulassarium pisiforme* Pierre in L. Planch., Prod. Apoc. (1894) 261, nom. nud.]. — Type: *Pierre 96* (lecto P, designated here (there are many more specimens labelled *Pierre 96* but from different localities or collected on different dates)) collected in June 1866 from Vietnam, Dong Nai Province, Mt Dinh.

*Alyxia flavescens* [Pierre in L. Planch., Prod. Apoc. (1894) 261, nom. nud.]; Pierre ex Pit. in Lecomte & Humbert, Fl. Gén. Indo-Chine 3 (1933) 1127; Lý, Feddes Repert. 97 (1986) 435. — [*Gynopogon flavescens* Pierre in L. Planch., Prod. Apoc. (1894) 261, nom. nud.]. — [*Pulassarium flavescens* Pierre in L. Planch., Prod. Apoc. (1894) 261, nom. nud.]. — Type: *Pierre 4421* (lecto P, designated here; isolecto A, K, NY) from Vietnam, Bien-hoa, Bao-chiang.

*Alyxia forbesii* King & Gamble, J. Asiat. Soc. Bengal 74, 2 (1908) 420; Ridl., Fl. Malay Pen. 2 (1923) 334; Burkill & M.R. Hend., Gard. Bull. Straits Settlem. 3 (1925) 396; Merr., Contr. Arnold Arbor. 8 (1934) 144; Tsiang, Sunyatsenia 3 (1936) 136; Kerr in Craib, Fl. Siam. 2 (1939) 431; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 69. — Type: *Wallich 1604.1* (lecto K-W, designated here) from Malaysia, Penang.

*Gynopogon spec. A* Koord.-Schum., Syst. Verz. 1 (1913) 173, from Indonesia, Jawa Timur.

*Gynopogon spec. B* Koord.-Schum., Syst. Verz. 1 (1913) 174, from Indonesia, Jawa Barat.

*Gynopogon spec. C* Koord.-Schum., Syst. Verz. 1 (1913) 173, from Indonesia, Jawa Tengah.

*Alyxia oleifolia* var. *tenuifolia* Ridl., Fl. Malay Pen. 2 (1923) 333; Markgr., Blumea 23 (1977) 385, p.p. — Type: *H.C. Robinson s.n.* (lecto K, designated here; iso BM, SING) from Malaysia, Selangor, Gunong Mengkuang.

*Alyxia nitens* Kerr, Kew Bull. 1 (1937) 41; in Craib, Fl. Siam. 2 (1939) 432. — Type: *Kerr 19005* (lecto K, designated here; isolecto ABD, BM, E, K, L, P, TCD) from Thailand, Trang Province, Sikao.

*Alyxia spec.* Kerr in Craib, Fl. Siam. 2 (1939) 434. — Based on *Curtis 2547* (SING) from Malaysia, Kedah, Langkawi Island, Gunong Raya.

*Alyxia cinerea* Bakh.f., Blumea 6 (1950) 390; Backer & Bakh.f., Fl. Java 2 (1965) 230. — *Alyxia reinwardtii* Blume var. *cinerea* (Bakh.f.) Markgr., Blumea 23 (1977) 387. — Type: *Blume s.n.* [acc. no. 898.129-235] (holo L) from Indonesia, Java.

*Alyxia winckelii* Bakh.f., Blumea 6 (1950) 390; Backer & Bakh.f., Fl. Java 2 (1965) 230; Markgr., Blumea 23 (1977) 383. — Type: *Winckel 685* (holo L; iso A, L) from Indonesia, Jawa Barat, Gunung Limus.

*Alyxia jasminea* Tsiang & P.T. Li, Acta Phytotax. Sin. 11 (1973) 362; Fl. Reipubl. Popul. Sin. 63 (1977) 72; Anonymous, Fl. Yunnanica 3 (1983) 521. — Type: *K.M. Feng 4911* (holo KUN; iso IBSC, PE) from China, Yunnan, Ping-Pien.

*Alyxia reinwardtii* Blume var. *insularis* Markgr., Blumea 23 (1977) 387. — Type: *Seimund s.n.* (holo SING; iso BO, UC) from Malaysia, Perak, Pulau Lalang.

*Alyxia reinwardtii* Blume var. *obovatula* Markgr., Blumea 23 (1977) 388. — Type: *Ashton BRUN 71* (holo SING; iso A, BO, BRI, K, L, SING) from Brunei, Berakas.

*Alyxia calcicola* Markgr., Blumea 23 (1977) 405. — Type: *Smitinand & Sleumer 1275* (holo L; iso BKF, BO, C, K, SING) from Thailand, Surat Thani, Khao Pak Chong.

*Alyxia kerrii* D.J. Middleton, Blumea 40 (1995) 111. — Type: *Floto 7402* (holo BKF; iso C, Z) from Thailand, Loei, Phu Kradung.

*Alyxia stellata* auct. non (J.R. Forst. & G. Forst.) Roem. & Schult.: Blume, Bijdr. (1826) 1031; A.DC., Prodr. 8 (1844) 346; Miq., Fl. Ned. Ind. 2 (1857) 407; Fl. Ned. Ind. Suppl. 1 (1861) 228; Hook.f., Fl. Brit. Ind. 3 (1882) 636; Boerl., Handl. Fl. Ned. Ind. 2 (1899) 393.

*Gynopogon stellatus* auct. non J.R. Forst. & G. Forst.: Kurz, J. Asiat. Soc. Bengal 46, 2 (1877) 251; For. Fl. Brit. Burm. 2 (1877) 176.

*Alyxia selangorica* auct. non King & Gamble: Kerr in Craib, Fl. Siam. 2 (1939) 433.

*Alyxia angustifolia* auct. non Ridl.: Markgr., Blumea 23 (1977) 385, p.p.

Ground creepers or climbers. *Branchlets* terete, weakly or strongly angled, densely lenticellate or not, glabrous to sparsely or densely puberulent. *Leaves* opposite or in whorls of 3–5; petiole 0.1–1.8 cm long, glabrous or pubescent; blade coriaceous to papery, narrowly elliptic, elliptic, obovate or oblong, apex obtuse to acuminate, rarely caudate, not mucronate, base obtuse to decurrent onto petiole, margin weakly to strongly inrolled or flat, weakly undulate or not, blade 1.1–17 by 0.3–6.1 cm, 1.5–5.1 times as long as wide, midrib sunken above, intramarginal nerve weakly present or absent, secondary veins 12–57 pairs, 60–90° from midrib, weakly distinguishable or indistinct and weakly prominent to slightly sunken above, obscure to weakly prominent beneath, tertiary venation weakly prominent to obscure above, reticulate and parallel to secondary veins; glabrous, sparsely puberulent only on midrib or puberulent all over beneath, glabrous, puberulent only on midrib or all over above, not punctate beneath. *Inflorescence* axillary or terminal, most frequently a simple unbranched pleiochasium, occasionally with a terminal compound pleiochasium with 1 or 2 nodes, much more rarely more complex with 1 or 2 internodes and branched or unbranched side branches, glabrous to puberulent in upper parts or all over, 1–3.5 cm long; peduncle 0.2–1.9 cm by 0.5–1.4 mm; bracts caducous or persistent, ovate, deltoid, linear, leafy or lanceolate, 1.1–4.5 by 0.5–1.2 mm; bracteoles one on pedicel or two immediately beneath calyx or on pedicel, absent or only on pedicel of terminal flower; flowers 3–12; pedicels 0.5–4.4 mm long. *Sepals* not fleshy, of free sepals, linear, ovate or lanceolate, apex obtuse to acuminate, keeled or not keeled, 1–3.5 by 0.4–1.8 mm, 1.2–3.8 times as

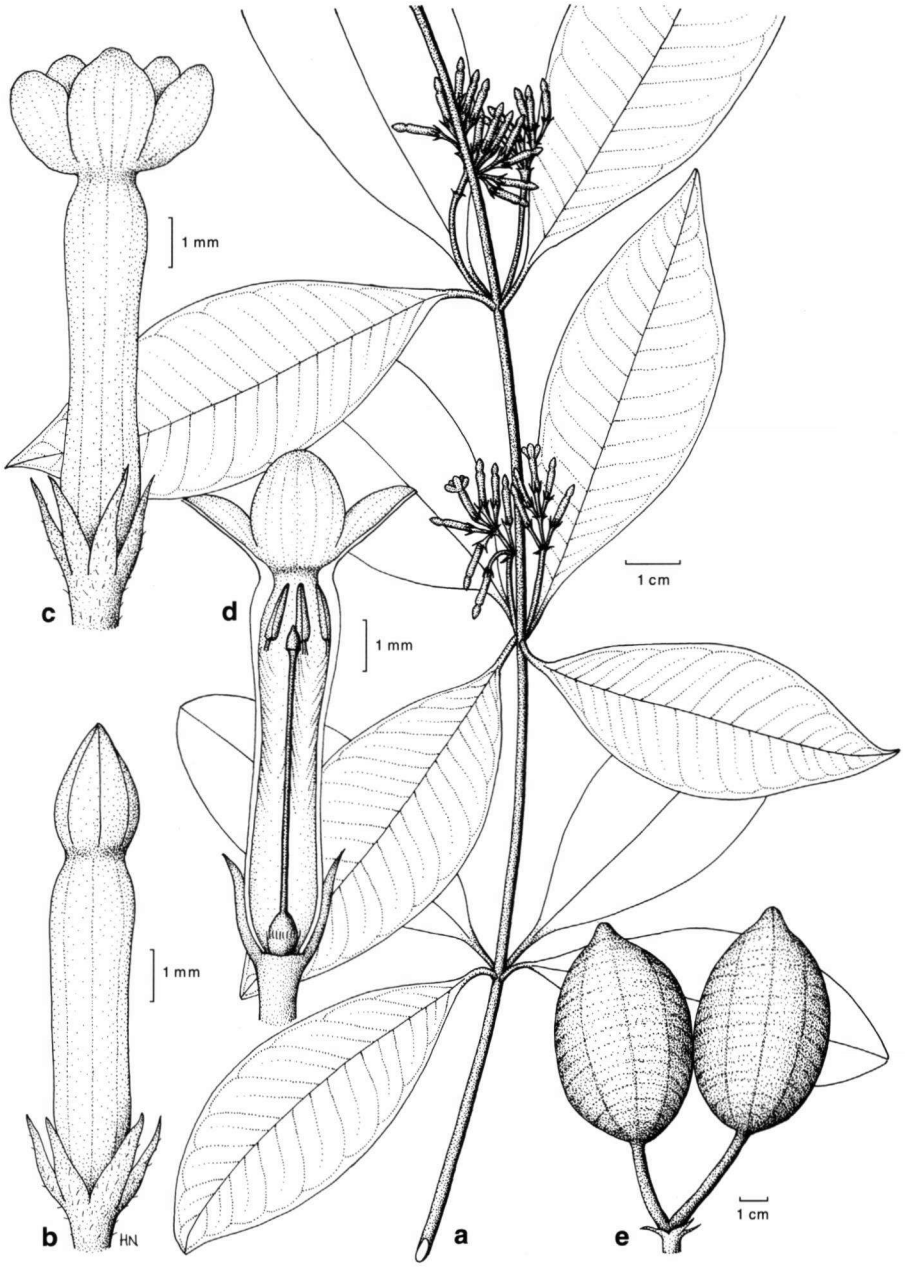
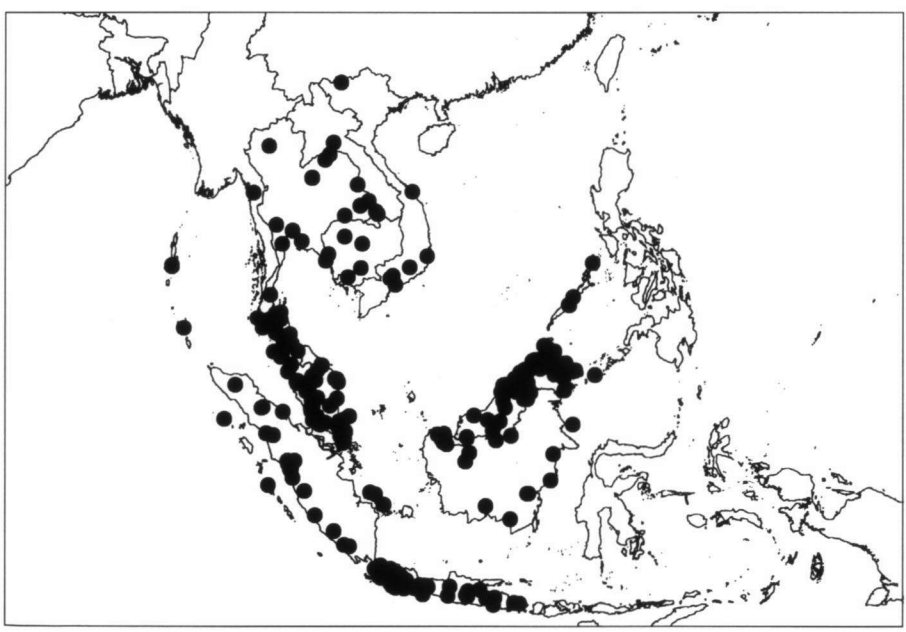



Fig. 13. *Alyxia reinwardtii* Blume. a. Habit; b. flower bud; c. open flower; d. flower dissection; e. fruit (fl. *Kerr 15048*; fr. *Clemens 30530*).

long as wide, ciliate, glabrous or sparsely to densely puberulent all over or puberulent on tips only outside, inside pubescent only at tips, all over or glabrous. *Corolla* white, cream, yellow, pink, white with orange tube, or with a buff coloured tube and white lobes; bud head 1.2–3.7 mm long, 0.18–0.32 (– 0.42) of bud length, globular, ellipsoid, lanceolate, ovate or deltoid, apex rounded, obtuse, acute or acuminate; tube cylindrical, throat with or without thickening or a narrow ring of tissue, 4.8–14 by 1.1–2 mm, 2.5–10 times as long as sepals, 1.3–5.3 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, glabrous or pubescent in upper half and around stamens inside; lobes elliptic, oblong, ovate or orbicular, apex rounded to acute, base auriculate, 1.2–3.8 by 1–3.1 mm, 0.7–3.1 times as long as wide, glabrous or sparsely puberulent outside, glabrous or pubescent at tips of lobes inside, ciliate, not ciliate or ciliate near tips only. *Stamens* inserted at 2.7–9.4 mm from corolla base, 0.67–0.87 of tube length; anther apex 0–1 mm from corolla mouth, anthers 0.6–1.5 by 0.3–0.6 mm, 1.6–3.25 times as long as wide; filaments 0.2–0.8 mm long. *Ovary* 0.4–1.2 mm high, glabrous, pubescent all over or pubescent around base only; style 0.9–8.5 mm long; pistil head 0.4–0.7 mm long. *Fruit* maturing black; stalks 1–14 mm long; with 1 or 2 articles in each string, 1 mm between articles, glabrous or sparsely puberulent at ends, articles with thin flesh, 6–20(–25.3) by 4.8–11.4 mm, ellipsoid or globose, symmetrical, apex rounded, acuminate or apiculate. *Seeds* ruminate, 4.6–11 by 3.9–6.7 by 3–6.2 mm. Embryo cotyledons wider, strongly or weakly undulate, embryo 10.5–11 mm long, cotyledons 0.6–0.68 of embryo length.
(Description based on 1078 specimens.)

Distribution — Southern China, Burma, Thailand, Laos, Cambodia, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Bali, Palawan.



Map 35. Distribution of *Alyxia reinwardtii* Blume.

Habitat — In a wide range of habitats from primary or secondary lowland to montane or peat swamp forest or in scrub or open ridges. On granitic, sandy, clay or ultrabasic soils. At 0–3049 m altitude.

Vernacular names — Nut (Thai), Padasarie (Indonesian), Pulassari (Indonesian).

Typification — 1. The original description of *A. reinwardtii* says this species has the local name poeloes-ari and that Blume had originally identified the material as a species of *Reinwardtia.* The specimen chosen as the lectotype has the name *Reinwardtia aromatica* in Blume's handwriting on it and the word Pallasary, possibly an alternative spelling for the local name.

2. Markgraf suggested that *A. stellata* var. *latifolia* and combinations based on it should be excluded from *Alyxia* and could possibly be an *Ochrosia.* The type specimen (*Blume s.n.* in L) is sterile and has fairly large leaves but in all other respects could very easily be a specimen of *A. reinwardtii.*

3. The lectotype of *A. pisiformis* has been chosen as *Pierre 96* (P) which was collected in June 1866. There are several other collections with the number *Pierre 96* and others with *Pierre 184* and *96* used interchangeably but they are all collected on different dates to the lectotype and must remain syntypes rather than isolectotypes.

4. The type of *A. reinwardtii* var. *obovatula* was erroneously published in Blumea as S which is Stockholm. However, the specimen in SING is clearly annotated as the holotype by Markgraf.

5. For *A. oleifolia* var. *tenuifolia* Ridl. Markgraf suggested on the sheet that a *Robinson s.n.* collection collected from the type locality in SING was the holotype. However, this specimen, not labelled by Ridley as anything other than *A. oleifolia,* which it is, was collected on 2nd Feb. 1913 whereas the K and BM specimens, which are labelled by Ridley as var. *tenuifolia* were collected on 20th January 1913 and are actually specimens of *A. reinwardtii.* Therefore the Kew specimen has been chosen as a lectotype.

Notes — *Alyxia reinwardtii* is extraordinarily variable which has led to it being recognised as a number of species and as a number of varieties. Even using the delimitation of varieties by Markgraf (1977) large numbers of specimens simply do not fit in. Indeed there seems to be a continuous variation in degree of pubescence of various parts, corolla tube length, sepals shape and size, leaf shape and size and fruit size. As Markgraf (1977) defined many of his series of *Alyxia* on the shape and size of plant parts the synonyms of *A. reinwardtii* were previously spread across four series and two subseries. Varieties cannot be recognised because of the continuous nature of the variation. The only entities that can be recognised, but not discretely delimited, are the specimens previously assigned to *A. reinwardtii* var. *meiantha* or *A. forbesii* with long corolla tubes, generally large leaves and often with hairs on the midrib and on the outside top of the corolla tube, and the specimens assigned to *A. pumila* (or at varietal status) and *A. calcicola* which have very small leaves, flowers and fruits.

As this species is so variable it is not easily delimited from its nearest relatives *A. pilosa, A. angustifolia* and *A. ganophylla,* all of which can also be quite variable.

The type specimen of *A. calcicola, Smitinand & Sleumer 1275,* and the specimen *Rabil 312,* are somewhat unusual for *A. reinwardtii* in their more complex inflorescences and small leaves, somewhat reminiscent of a thinner-leaved version of *A. angustifolia.* Unfortunately both specimens only have immature flowers. The status of *A. calcicola* will need to be investigated further when better collections are available

but in the meantime it would appear to only be one end of the possible variation of *A. reinwardtii* and not unlike the type of *A. pumila*. Another specimen, *Ding Hou 718*, comes close to this except that it has a simpler inflorescence but has almost mature flowers very typical for *A. reinwardtii*.

Many specimens from South-East Continental Asia are unusual in having opposite leaves, including the type specimen of *A. jasminea* from Yunnan in SW China. The type of *A. kerrii* has the smallest flowers in this species and a somewhat lax inflorescence, characters on which I originally based the new species. However it is now my belief that this just represents one extreme of *A. reinwardtii* although much better flowering collections are needed from Thailand, Cambodia, Laos and Vietnam. The innumerable syntypes of *A. pisiformis* lack any mature flowers but in many ways resemble *A. kerrii*. The same is also true of *A. pseudosinensis*, a largely unknown species from Vietnam but which has been maintained due to its quite distinctive leaves and fruits. When further collections are made of *Alyxia* in this region a much better understanding of this difficult group will be attained.

### 52. Alyxia ridleyana Wernham — Map 36

*Alyxia ridleyana* Wernham, Trans. Linn. Soc. ser. 2, Bot. 9 (1916) 108; Markgr., Blumea 23 (1977) 411, p.p. — *Discalyxia ridleyana* (Wernham) Markgr., Nova Guinea 14, 2 (1925) 283; Bot. Jahrb. Syst. 61 (1927) 188. — Type: *Boden Kloss s.n.* (holo BM; iso BM) from Indonesia, Irian Jaya, Utakwa River to Mt Carstensz.

*Alyxia fragrans* Merr. & L.M. Perry, J. Arnold Arbor. 24 (1943) 212; Markgr., Blumea 23 (1977) 398, p.p. — Type: *Brass 11577* (holo A) from Indonesia, Irian Jaya, Bele River, 18 km NE of Lake Habbema.

Climbers. *Branchlets* terete to strongly angled, sparsely lenticellate or not, glabrous to densely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 3 or 4; petiole 0.2–1 cm long, glabrous or pubescent; blade subcoriaceous to thickly coriaceous, elliptic, ovate or obovate, apex rounded to shortly acuminate, base rounded to cuneate, margin flat, weakly undulate or not, 2.2–10 by 1.1–5.9 cm, 1.4–4.2 times as long as wide, midrib prominent, slightly sunken or raised and with a central groove above, intramarginal nerve clear at margin to obscure, secondary veins 17–38 pairs, 70–80° from midrib, weakly prominent or indistinct above, obscure to weakly prominent beneath, tertiary venation weakly prominent to obscure above, reticulate and parallel to secondary veins; glabrous, sparsely puberulent only on midrib or puberulent all over beneath, glabrous or puberulent all over above, not punctate beneath. *Inflorescence* axillary or terminal, large lax panicles frequently branched, robust, sparsely to densely puberulent, pale-coloured, 9.5–16 cm long; peduncle 5–7.7 cm by 1.5–2.5 mm; bracts caducous or persistent, deltoid, 2.5–3.7 by 2–3.1 mm; bracteoles present, two on pedicel; flowers 80 to more than 100 in an inflorescence; pedicels 1.1–3 mm long. *Sepals* fleshy or not fleshy, ovate, apex obtuse or acute, keeled or not keeled, 2.1–2.9 by 1.2–2.4 mm, 1–1.8 times as long as wide, ciliate, sparsely or densely puberulent outside, inside glabrous, pubescent only at tips or pubescent over upper half. *Corolla* white; bud head 2–2.4 mm long, 0.4–0.43 of bud length, ellipsoid, lanceolate or ovate, apex obtuse or acute; tube cylindrical or slightly inflated, throat without thickening or with a narrow ring of tissue, 3.6–4.3 by 1.1–1.5 mm, 1.4–1.7 times as long as sepals, 1.7–3.2 times as long as lobes, glabrous or sparsely puberulent around

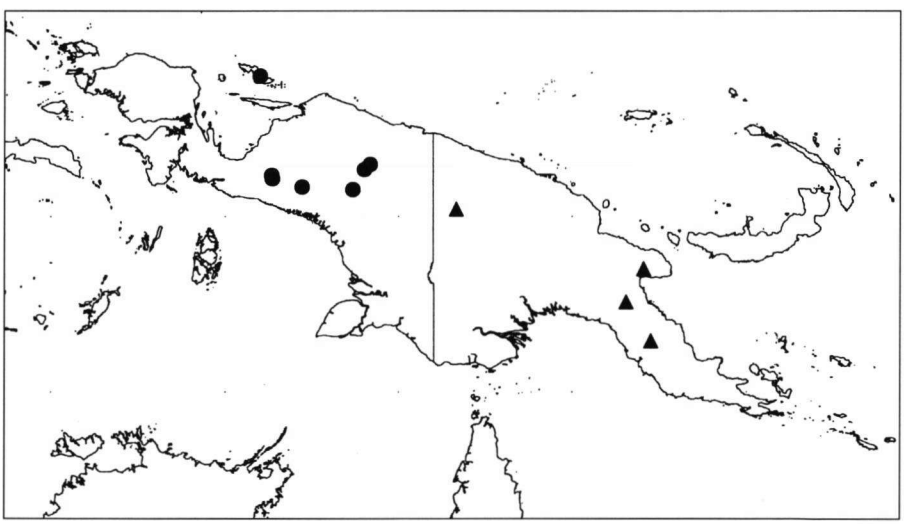
top of tube outside, inside sparsely pubescent around stamens and more densely in a band beneath them or pubescent around and below anthers and in throat with a glabrous gap between; lobes elliptic or ovate, apex rounded, obtuse or acute, base auriculate, 1.2–2.1 by 0.9–1.4 mm, 1.3–1.6 times as long as wide, glabrous or sparsely puberulent outside, glabrous or pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 1.3–2.2 mm from corolla base, 0.39–0.47 of tube length; anther apex 0.9–1.3 mm from corolla mouth, anthers 0.9–1.4 by 0.3–0.4 mm, 2.25–3.5 times as long as wide; filaments 0.5–0.7 mm long. *Ovary* 0.7–1 mm high, densely pubescent all over; style 0.1–0.4 mm long; pistil head 0.6–1 mm long. *Fruit* ochraceous ripening purplish-brown, stalks 1.5–6.2 mm long, with 1 or 2 articles in each string, 0–5 mm between articles, sparsely puberulent all over, articles dry smooth or with thin flesh, 11.5–19 by 8.7–13 mm, ellipsoid, subglobose or cylindrical, symmetrical, apex rounded, obtuse or apiculate. *Seeds* 9.4–11.9 by 6.6–8.7 by 5.4–7.8 mm. Embryo cotyledons wider, strongly or weakly undulate, embryo 9.4 mm long, cotyledons 0.8 of embryo length. (Description based on 34 specimens.)

Distribution — New Guinea.

Habitat — In lowland to mossy forest or on heath at 150–2350 m altitude. Reported from clay and limestone soils.

Vernacular name — Pielieto (Kapaukoe).

Note — This species was interpreted by Markgraf (1977) in a very different sense to the way it is here. Indeed, I have left only the type specimen in this species. In addition the type and some of the specimens Markgraf identified as *A. fragrans* are *A. ridleyana* so the description bears more resemblance to Markgraf's description of *A. fragrans*. It can be distinguished from *A. rostrata* by the thickly coriaceous pubescent leaves, the far fewer secondary veins, the pubescence on the outside of the corolla and the densely pubescent ovary. The isotype in the BM is not clearly marked as being a duplicate of the holotype so its status is not definite.



Map 36. Distribution of *Alyxia ridleyana* Wernham (●) and *A. royeniana* Markgr. (▲).

## 53. Alyxia rostrata (Markgr.) Markgr. — Map 33

*Alyxia rostrata* (Markgr.) Markgr., Blumea 23 (1977) 411, p.p. — *Discalyxia rostrata* Markgr., Nova Guinea 14, 2 (1927) 282; Bot. Jahrb. Syst. 61 (1927) 187. — Type: *Ledermann 12466* (holo B†; lecto L) from Papua New Guinea, East Sepik Province.

*Discalyxia pullei* Markgr., Nova Guinea 14, 2 (1927) 282; Bot. Jahrb. Syst. 61 (1927) 188. — Type: *Pulle 682* (holo L; iso BO) from Indonesia, Irian Jaya, Mt Hellwig, Bijenkorf-Bivak.

*Alyxia ridleyana* auct. non Wernham: Markgr., Blumea 23 (1977) 411, p.p.

Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous or sparsely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 4 or 5; petiole 0.2–0.9 cm long, glabrous; blade coriaceous, narrowly to broadly elliptic, obovate or oblong, apex long acuminate or caudate, not mucronate, base rounded to cuneate, margin flat to strongly undulate, blade 2–16 by 1.5–4.5 cm, 1.3–4 times as long as wide, midrib deeply sunken above, intramarginal nerve weakly present, inset from or clear at margin, secondary veins 48–70 pairs, 75–85° from midrib, weakly prominent above, weakly prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary or terminal, large lax panicles frequently branched, glabrous to puberulent, 4.3–16.5 cm long; peduncle 2.2–6.5 cm by 1–2 mm; bracts caducous or persistent, deltoid; bracteoles two on pedicel or absent; flowers > 100 in whole panicle; pedicels 1–6 mm long. *Sepals* ovate, apex rounded to acute, 1.2–1.7 by 0.7–1.1 mm, 1.5–2 times as long as wide, ciliate or not ciliate, glabrous or sparsely puberulent, glabrous inside. *Corolla* white or with pink tube and white lobes; bud head 1.2–1.8 mm long, 0.32–0.4 of bud length, ellipsoid or lanceolate, apex acute; tube cylindrical or slightly inflated, throat without thickening, 2.7–4 by 0.8–1.1 mm, 1.6–2.5 times as long as sepals, 1.9–3.6 times as long as lobes, glabrous outside, pubescent around and below anthers and in throat with a glabrous gap between inside; lobes oblong or ovate, apex rounded or obtuse, base auriculate, 1–1.4 by 0.8 mm, 1.25–1.75 times as long as wide, glabrous outside, pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 1.3–1.4 mm from corolla base, 0.32–0.38 of tube length; anther apex 1.3–1.9 mm from corolla mouth, anthers 0.8–1 by 0.2–0.35 mm, 2.7–4 times as long as wide; filaments 0.3–0.5 mm long. *Ovary* 0.6–0.7 mm high, pubescent around base only or in tufts between the carpels; style 0.1 mm long; pistil head 0.4–0.6 mm long. *Fruit* orange maturing black, stalks 1.6–3.7 mm long, with 1–7 articles in a string, 1.5–3.6 mm between articles, glabrous, articles dry smooth or with thin flesh, 5.5–9.9 by 4.3–6.5 mm, ellipsoid or cylindrical, symmetrical, apex rounded or obtuse. *Seeds* 5.4–8.2 by 3.9–4.8 by 3.4–4.6 mm. Embryo linear, straight at base or cotyledons weakly undulate, embryo 4.7–7.5 mm long, cotyledons 0.57–0.65 of embryo length. (Description based on 90 specimens.)

Distribution — New Guinea.

Habitat — In closed or open primary or secondary forest or scrub at 1220–2100 m altitude.

Vernacular names — Komunang (Yali), Pik (Jali), Piumugasek (Waskuk), Tu (Wagu).

Note — The inflorescence of this species is a large terminal panicle. It is composed of a terminal cyme with axillary cymes in the axils of normal to extremely reduced leaves. These leaves are often deciduous resulting in the appearance of a robust

'peduncle' with a whorl of cymes at the top. In the description the inflorescence length is taken from where these cymes radiate and the peduncle length is the length from here to the first branching in the inflorescence and does not include the length of this false peduncle. There is often a pair of opposite bracteoles in some specimens which are missing in others as they are in fact bracts with flowers in the axils in these specimens.

*Henty et al. NGF 42715* has shorter more robust infructescences than most specimens of this species but is too poor to really be sure about its identification. It is provisionally assigned to this species but further collecting in the Kiunga district of Western Province of New Guinea may reveal it to be a new species.

### 54. Alyxia royeniana Markgr. — Map 36

*Alyxia royeniana* Markgr., Blumea 23 (1977) 404; P. Royen, Alpine Fl. New Guinea 4 (1983) 2854. — Type: *Van Royen NGF 20398* (holo L; iso A, BRI, CANB, K, LAE) from Papua New Guinea, Central Province, Mt Awormange, East of Woitape.

Erect shrubs, ground creepers or climbers. *Branchlets* weakly angled, sparsely lenticellate, densely and minutely puberulent. *Leaves* in whorls of 3 or 4; petiole 0.1–0.3 cm long, pubescent; blade coriaceous or thickly coriaceous, elliptic or broadly elliptic, apex rounded, obtuse or apiculate, not mucronate, slightly reflexed at apex or flat, base obtuse or acute, margin flat to inrolled, not undulate, green above, pale green or yellowish-green beneath, 0.4–2 by 0.3–1 cm, 1.1–2.3 times as long as wide, midrib slightly to clearly sunken above, intramarginal nerve absent, secondary veins weakly distinguishable or indistinct above, obscure beneath, tertiary venation obscure above; glabrous beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, flowers in a simple unbranched pleiochasium (possibly only 1 remaining in fruit), sparsely puberulent all over or densely puberulent, c. 1 cm long; peduncle c. 0.2 cm by 1 mm; bracts persistent, linear, c. 2.3 by 1 mm; bracteoles present, immediately beneath calyx or on pedicel; flowers c. 4; pedicels 2.1–3 mm long. *Sepals* lanceolate, apex acute, not keeled, 2.5–2.6 by 1.5 mm, 1.7 times as long as wide, ciliate, glabrous or sparsely puberulent outside, pubescent only at tips inside. *Corolla* tube cylindrical, throat with thickening, c. 8 mm long, 3.2 times as long as sepals, 3.2 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes ovate, apex acute, base auriculate, c. 2.5 by 2.1 mm, 1.2 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at c. 5.5 mm from corolla base, 0.69 of tube length; anther apex 0.7 mm from corolla mouth, anthers 1.5 by 0.5 mm, 3 times as long as wide; filaments 0.6 mm long. *Ovary* 1 mm high, pubescent around base only; style 3.1 mm long; pistil head 0.8 mm long. *Fruit* black or yellow turning black, stalks 1.7–3 mm long, with 1 or 2 articles in each string, 0.2 mm between articles, glabrous or sparsely puberulent at ends; articles with thin flesh, 7.8–12.5 by 5.6–9.5 mm, ellipsoid or subglobose, symmetrical, apex rounded or acuminate. *Seeds* elliptic, ruminate, 5 by 3.6 by 2.8 mm. Embryo linear, straight at base.

(Description based on 11 specimens.)

Distribution — New Guinea.

Habitat — In upper montane forest or subalpine scrub at 2134–3230 m altitude.

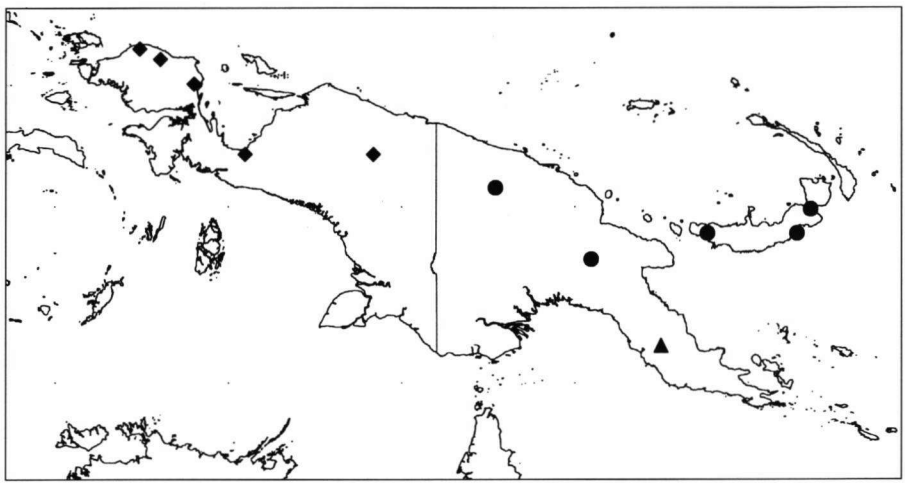
Note — Fruiting specimens of this species seem to have only one fruit in the infructescence suggesting a solitary flower. In each case clear scars can be seen where other flowers have dropped off. The relationship of this species to *A. semipallescens*, a solitary flowered species with smaller flowers, needs to be cleared up with better collections. They appear very similar in general appearance although *A. semipallescens* is only known from the very poor type specimen (see note under that species).

### 55. Alyxia scabrida Markgr. — Map 37

*Alyxia scabrida* Markgr., Bot. Jahrb. Syst. 61 (1927) 184; Blumea 23 (1977) 397, p.p. — Type: *Schlechter 16841* (holo B†; lecto L, designated here; iso A, BM, BRI, C, G, K, MO, S, UC) from Papua New Guinea, Madang Province, Kaulo River.
*Alyxia clemensiae* Markgr., Blumea 23 (1977) 396, p.p. (not including type).

Climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, sparsely or densely puberulent. *Leaves* in whorls of 4; petiole 0.2–0.5 cm long, glabrous or pubescent; blade subcoriaceous or papery, narrowly elliptic or elliptic, apex obtuse or acuminate, base cuneate or decurrent onto petiole, margin flat or weakly to strongly undulate, 3.8–14 by 1–5.1 cm, 2.1–3.9 times as long as wide, midrib slightly sunken or raised and with a central groove above, intramarginal nerve absent, secondary veins 42–55 pairs, 65–80° from midrib, weakly prominent above, weakly visible or prominent beneath, tertiary venation weakly prominent above, reticulate and parallel to secondary veins; glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, a compound pleiochasium with clear internodes, sometimes congregated and forming lax panicles, or once or twice branched and congested at top of peduncle, delicate, densely puberulent, 1.7–9.5 cm long; peduncle 0.8–2.3 cm by 1.1–1.8 mm; bracts caducous or persistent, ovate or deltoid, 1.8–2.5 by 1.4–2 mm; flowers 25–27; pedicels 0–1 mm long. *Sepals* not fleshy, very slightly fused around the base and slightly reflexed, ovate, apex obtuse or acute, 1.5–1.9 by 1–1.6 mm, 1.5 times as long as wide, ciliate, sparsely or densely puberulent, pubescent only at tips or glabrous inside. *Corolla* white or yellow; bud head 1 mm long, 0.38 of bud length, ovate, apex rounded or obtuse; tube cylindrical or slightly inflated, throat with or without thickening, 1.4–2.1 by 0.9–1 mm, 0.7–1.2 times as long as sepals, 1.4–1.9 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, glabrous inside; lobes ovate or orbicular, apex rounded or obtuse, base auriculate, 1–1.2 by 0.9–1.2 mm, 0.9–1.3 times as long as wide, glabrous or sparsely puberulent outside, glabrous inside, not ciliate. *Stamens* inserted at 1.1–1.3 mm from corolla base, 0.5–0.59 of tube length; anther apex 0.2–0.5 mm from corolla mouth, anthers 0.7 by 0.35–0.4 mm, 1.75–2 times as long as wide; filaments 0.3 mm long. *Ovary* 0.5–0.8 mm high, densely pubescent all over; style 0.4–0.7 mm long; pistil head 0.3 mm long. *Fruit* orange (maturing black?), stalks 8–18 mm long, with 1 article in each string, glabrous, articles with thin flesh, 26–60 by 15–29.5 mm, ellipsoid, symmetrical or asymmetrical, apex rounded to acuminate, often hooked. *Seed* ruminate, c. 31 by 19.2 by 17.1 mm. Embryo cotyledons wider, strongly undulate, embryo 29 mm long, cotyledons 0.76 of embryo length. (Description based on 28 specimens.)

Distribution — New Guinea.



Map 37. Distribution of *Alyxia scabrida* Markgr. (●), *A. semipallescens* F. Muell. (▲) and *A. sleumeri* Markgr. (◆).

Habitat — In forest at 30–900 m altitude.

Vernacular name — Sivava (Maenge).

Note — The calyx lobes are slightly fused at the base and slightly reflexed. This species is similar to *A. acuminata* but the specimens generally have larger, more branched inflorescences which are slightly more pubescent and the leaves have clearer, denser secondary veins, and a leaf apex shape which is mostly longer and sharper than in *A. acuminata*. It also has substantially larger fruits, by far the largest in the genus.

### 56. Alyxia schlechteri H. Lév. — Map 38

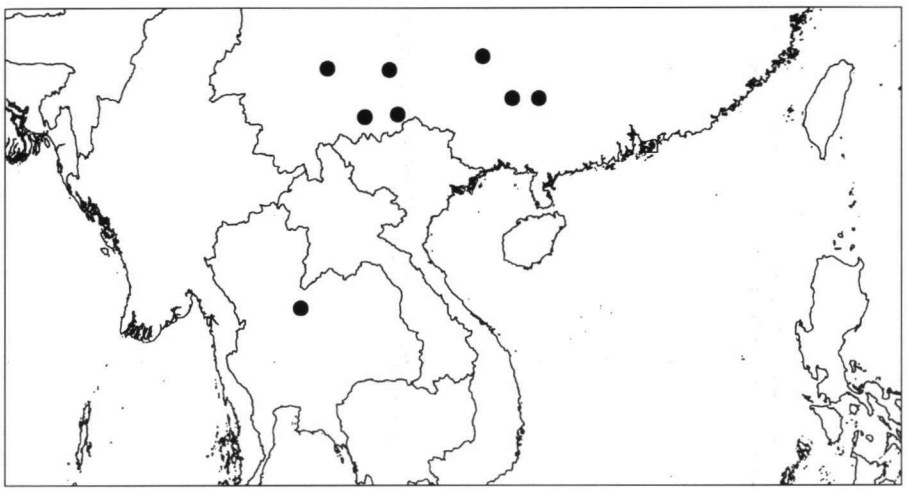
*Alyxia schlechteri* H. Lév., Feddes Repert. 9 (1911) 453; Tsiang, Sunyatsenia 2 (1934) 105; 3 (1936) 136; Tsiang & P. T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 69; Anonymous, Fl. Yunnanica 3 (1983) 519; P. T. Li et al., Fl. China 16 (1995) 161. — Type: *Cavalerie 1871* (holo E; iso A (scrap & photo), K) from China, Guizhou, Lo-fou, south of Tinfan.

*Daphne bodinieri* H. Lév., Feddes Repert. 13 (1914) 285. — *Wikstroemia bodinieri* (H. Lév.) H. Lév., Fl. Kouy-Tcheou (1915) 417. — *Alyxia bodinieri* (H. Lév.) Woodson, J. Arnold Arbor. 15 (1934) 316. — Type: *Laborde & Bodinier 2700* (lecto E; iso A (scrap), P) from China, Guizhou, Rosin-gay to Tchao-se.

*Alyxia forbesii* auct. non King & Gamble: Anonymous, Fl. Yunnanica 3 (1983) 519.

*Alyxia reinwardtii* auct. non Blume: P. T. Li et al., Fl. China 16 (1995) 160.

Climbers. *Branchlets* terete or weakly angled, not to densely lenticellate, glabrous, sparsely or densely puberulent. *Leaves* in whorls of 3, coriaceous; petiole 0.2–0.9 cm long, glabrous; blade narrowly elliptic, apex obtuse, acute or acuminate, base acute or cuneate, margin weakly or strongly inrolled, not undulate, 1–10.5 by 0.4–2.7 cm, 2.1–6.4 times as long as wide, midrib flattened or sunken above, intramarginal nerve present or absent, inset from margin, secondary veins 13 or 14 pairs, 60° from midrib, weakly distinguishable or indistinct above, obscure or weakly visible beneath, tertiary venation obscure, glabrous beneath, glabrous above, not punctate beneath. *Inflorescences* axillary or terminal, a short congested compound pleiochasium, delicate, densely



Map 38. Distribution of *Alyxia schlechteri* H. Lév. (note that particularly large numbers of localities could not be traced in China).

long puberulent, 0.7–1 cm long; peduncle 0–2 cm long; bracts persistent, deltoid; bracteoles 2 immediately beneath calyx; flowers 4–6; pedicels 0–0.5 mm long. *Sepals* ovate, apex acute or acuminate, 2.4–2.6 by 1.1–1.2 mm, 2.2 times as long as wide, ciliate, sparsely or densely puberulent on centre line or puberulent on tips only. *Corolla* bud head 1.5–2.1 mm long, lanceolate, apex acute or acuminate, 0.31–0.35 of bud length; tube cylindrical, 3.4–4.2 by 1.2–1.5 mm, glabrous outside, pubescent only around stamens or in a band below the stamens inside, 1.4–2 times as long as sepals, 2–3 times as long as lobes, throat without thickening; lobes oblong, base auriculate, apex obtuse, not ciliate, 1.4–2 by 0.8 mm, 1.7–2.5 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 2–2.4 mm from corolla base, 0.6–0.67 of tube length; filaments 0.3 mm long; anther apex 0–0.3 mm from corolla mouth, anthers 0.9 by 0.3–0.4 mm, 2.2–3 times as long as wide. *Ovary* 0.5–0.6 mm high, densely pubescent all over or pubescent around base only; style 1.3–1.7 mm long; pistil head 0.2–0.6 mm long. *Fruit* with 1 or 2 articles in each string; stalks 1.5–1.7 mm long; articles 7.7–11.2 by 5.8–7.7 mm, ellipsoid or globose. *Seeds* 7.7–8.2 by 4.4–4.7 by 4 mm.

(Description based on 42 specimens.)

Distribution — China, Thailand.

Habitat — Altitude range: 1200–1600 m.

Note — Closest to *A. thailandica* from which it differs in its narrower leaves and smaller flowers. Also easily confused with *A. sinensis* when in fruit or sterile.

### 57. Alyxia semipallescens F. Muell. — Map 37

*Alyxia semipallescens* F. Muell., Trans. Roy. Soc. Victoria 1 (1889) 28; Markgr., Bot. Jahrb. Syst. 61 (1927) 183; Blumea 23 (1977) 403, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2852, p.p. — Type: *McGregor s.n.* (holo MEL) from Papua New Guinea, Central Province, Mt Musgrave.

Habit unknown (probably low scrambler or climber). *Branchlets* weakly angled, densely puberulent. *Leaves* in whorls of 4; petiole 0.2 cm long; blade elliptic, apex obtuse or acute, not mucronate, base acute, margin weakly inrolled, 1.6–2.4 by 0.8–1.1 cm, 1.2–2.5 times as long as wide. *Sepals* ovate, apex acute, not keeled, 1.2 by 0.8 mm, 1.5 times as long as wide, ciliate, sparsely puberulent on central line, glabrous inside. *Corolla* tube cylindrical, throat with thickening, 4.7 mm long, 3.9 times as long as sepals, 2.5 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; corolla lobes elliptic, apex obtuse, base auriculate, 1.9 by 1 mm wide, 1.9 times as long as wide, glabrous outside, pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 2.7 mm from corolla base, 0.57 of tube length; anther apex 0.6 mm from corolla mouth, anthers 1.2 by 0.5 mm, 2.4 times as long as wide; filaments 0.5 mm long. *Ovary* 0.5 mm high, pubescent around base only. *Fruit* unknown.
(Description based on 1 specimen.)

Distribution — New Guinea.

Note — This is a very poorly known species. The type collection is the only specimen and even then only has one flower which had already been dissected. Therefore, the dimensions given are to be taken as a guide only and the stamen and ovary characters are measurements from the dry flower rather than one reconstituted with water as in the other descriptions. Mueller himself mentions in the description that he has only seen one flower. It is, therefore, difficult to ascertain clearly the affinities of this plant except that it is probably related to *A. royeniana* and *A. subalpina*. Further collections may lead to the re-evaluation of this species. The non-type specimens cited by Markgraf (1977) are actually specimens of *A. subalpina* (due to erroneously synonymising *A. lamii* under this species) and *A. cacuminum*.

### 58. Alyxia siamensis Craib — Fig. 14, Map 39

*Alyxia siamensis* Craib, Kew Bull. 1911 (1911) 412; Pit. in Lecomte & Hubert, Fl. Gén. Indo-Chine 3 (1933) 111; Kerr in Craib, Fl. Siam. 2 (1939) 433; P.T. Li, J. S. China Agric. Univ. 11 (1990) 27; P.T. Li et al., Fl. China 16 (1995) 160. — Type: *Kerr 783* (lecto K, designated here; iso AAU, BM, BO, K, L, P) from Thailand, Chiang Mai, Doi Sutep.

*Alyxia spec.* Kerr in Craib, Fl. Siam. 2 (1939) 434. Based on *Put 2947* (BM, K) from Thailand, Trat, Khao Kuap.

Climbers. *Bark* brown or grey, flaking. *Branchlets* weakly angled, sparsely or densely lenticellate, glabrous or sparsely puberulent. *Leaves* opposite or in whorls of 3; petiole 0.5–1.6 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic, obovate or oblong, apex short to long acuminate, base obtuse to cuneate, margin weakly inrolled or flat, weakly or strongly undulate; blade 5.2–19.6 by 1.7–5.7 cm, 2.4–4.3 times as long as wide, midrib sunken above, intramarginal nerve clear and inset from margin, secondary veins 13–54 pairs, 75° from midrib, weakly prominent or not above, weakly visible and sometimes prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous beneath, glabrous above. *Inflorescences* axillary or terminal, a compound pleiochasium with clear internodes, sometimes congregated forming lax panicles, robust, sparsely puberulent to tomentose all over, 2.5–10 cm long; peduncle 0.8–4.5 cm by 1.3–1.5 mm; bracts caducous or persistent, deltoid, 2.1–3.5 by 0.7–1.2 mm wide; bracteoles present, two on

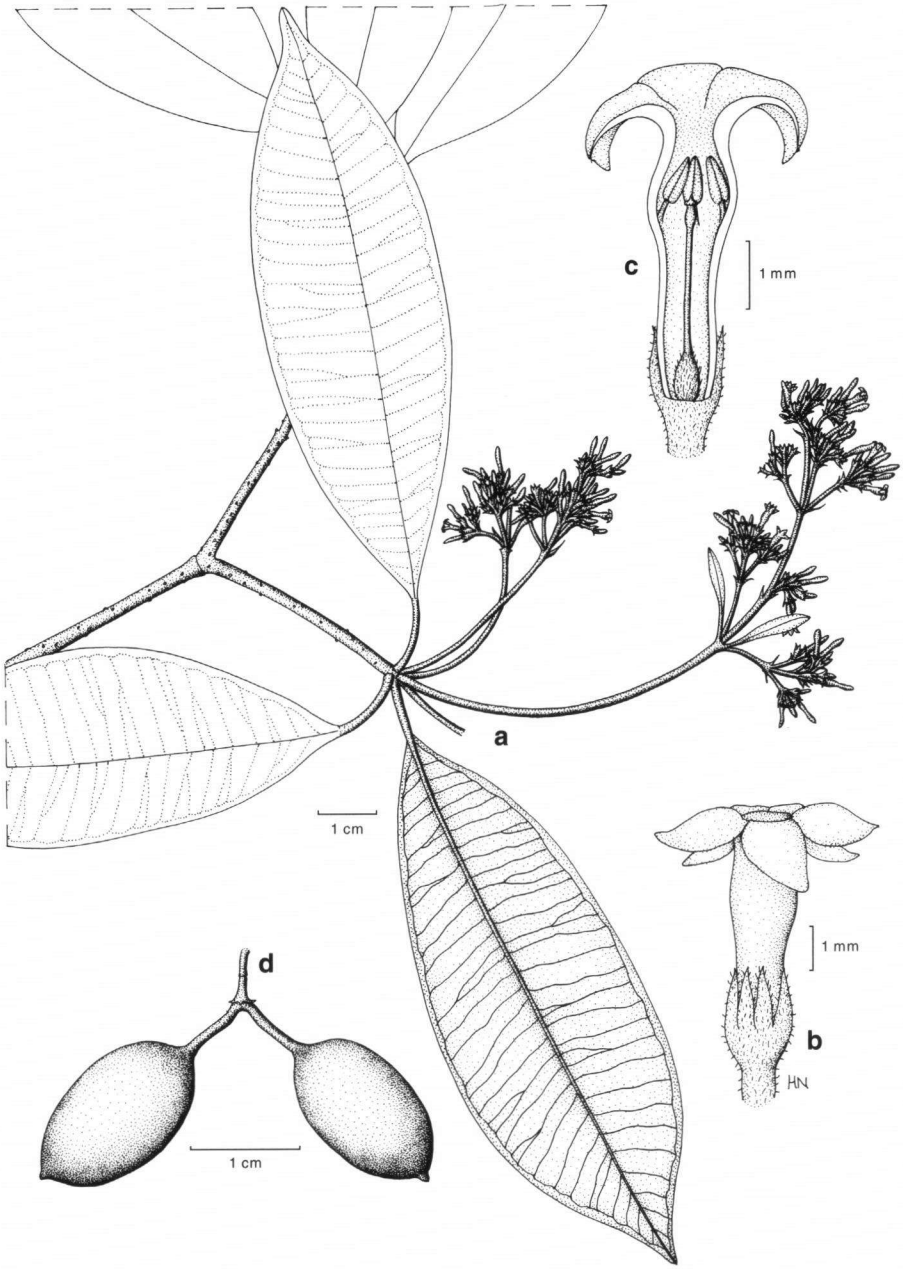
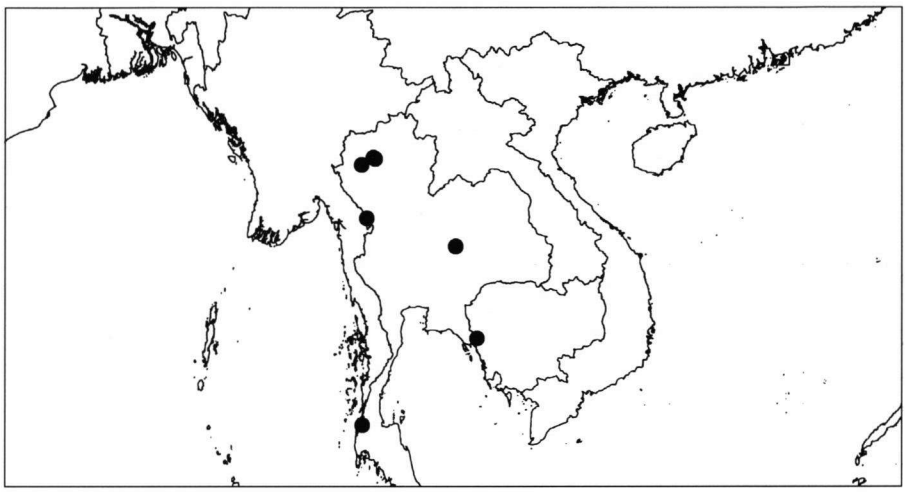



Fig. 14. *Alyxia siamensis* Craib. a. Habit; b. flower; c. flower dissection; d. fruit (fl. *Kerr 3305* & *Geesink et al. 7163*; fr. *Maxwell 87-962*).



Map 39. Distribution of *Alyxia siamensis* Craib.

pedicel; flowers 25–49; pedicels 0.8–2.5 mm long. *Sepals* not fleshy, ovate, apex acute or acuminate, 1.3–2 by 0.7–1 mm, 1.4–2.3 times as long as wide, ciliate, densely puberulent, short all over. *Corolla* white or basal part white and upper 2/3 orangish; bud head 1.8–2.5 mm long, 0.27–0.35 of bud length, ellipsoid, lanceolate or ovate, apex acute or acuminate; tube cylindrical, 3.8–6 by 1–1.5 mm, 2.7–3.8 times as long as sepals, 2.1–3.6 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, glabrous, pubescent in upper half and around stamens or in throat only inside; lobes elliptic or ovate, apex rounded or obtuse, 1.4–2.5 by 1.2–1.8 mm, 1–1.7 times as long as wide, glabrous outside, glabrous or pubescent at base of lobes inside, not ciliate. *Stamens* inserted at 3–4.1 mm from corolla base, 0.7–0.8 of tube length; anthers 1–1.1 by 0.3–0.4 mm, 2.5–3.7 times as long as wide; filaments 0.4–0.6 mm long. *Ovary* 0.6–1 mm high, sparsely or densely pubescent all over; style 2.4–4 mm long. *Fruit* stalks 4.1–12 mm long, with 1 or 2 articles in each string, 1.8 mm between articles, sparsely puberulent at ends, articles fleshy, 13–32 by 7.2–14 mm, ellipsoid, symmetrical, apex obtuse or acute. *Seeds* 10–12.9 by 5–6.6 by 3–6.1 mm.

(Description based on 61 specimens.)

Distribution — Thailand.

Habitat — Evergreen forest at 800–1530 m altitude.

Note — This species is distinctive in Thailand with its large lax inflorescence and large fruits. It is most closely related to *A. balansae*, from which it differs primarily in its larger flowers, and *A. menglungensis*, from which it differs in its pubescent ovary and less pubescent corollas.

### 59. Alyxia sibuyanensis Elmer — Map 40

*Alyxia sibuyanensis* Elmer, Leafl. Philipp. Bot. 4 (1912) 1448; Merr., Enum. Philipp. Fl. Pl. 3 (1923) 328; Markgr., Blumea 23 (1977) 381, p.p. — Type: *Elmer 12137a* (lecto L, designated here; iso A, BISH, BM, BO, E, G, GH, HBG, K, NY, US, W, WRSL, Z) from the Philippines, Romblon Province, Sibuyan Island, Magallanes, Mt Guitinguitin.

?*Alyxia monticola* C.B. Rob., Philipp. J. Sci., Bot. 6 (1911) 356; Merr., Enum. Philipp. Fl. Pl. 3 (1923) 328. — Type: *C.B. Robinson 9359* (untraced) from the Philippines, Luzon, Tayabas, Mt Binuang.

*Alyxia revoluta* Merr., Philipp. J. Sci., Bot. 13 (1918) 52; Enum. Philipp. Fl. Pl. 3 (1923) 328. — Type: *Yates 25515* (lecto US, designated here; iso K, P) from the Philippines, Luzon, Tayabas, Mt Cadig.

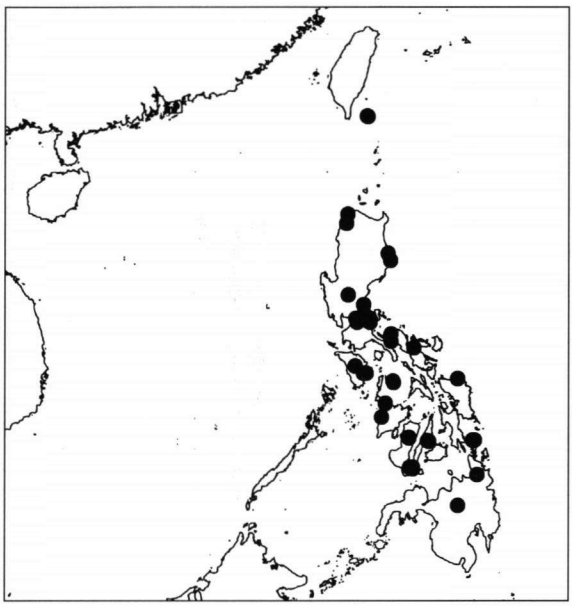
*Alyxia glabra* Merr., Philipp. J. Sci., Bot. 13 (1918) 53; Enum. Philipp. Fl. Pl. 3 (1923) 327. — Type: *Ramos & Edaño 29207* (lecto K, designated here; iso P, US) from the Philippines, Luzon, Tayabas, Infanta-Sinaloan trail.

*Alyxia retusa* Merr., Philipp. J. Sci. 14 (1919) 448; Enum. Philipp. Fl. Pl. 3 (1923) 328; Markgr., Blumea 23 (1977) 381. — Type: *Ramos 33330* (lecto K, designated here; iso A, P, US) from the Philippines, Luzon, Ilocos Norte Province, Mt Palimlim.

*Alyxia insularis* Kaneh. & Sasaki, Trans. Nat. Hist. Soc. Formosa 24 (1934) 402; H.-L. Li, Fl. Taiwan 4 (1978) 203; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 64; P.T. Li et al., Fl. China 16 (1995) 161. — Type: *Kawakami & Sasaki in Kanehira 3496* (holo TI) from Taiwan, Kwasyoto (= Lanyu) Island.

*Alyxia clusiacea* auct. non (Baill.) Pichon: Markgr., Blumea 23 (1977) 380, p.p.

Ground creepers or climbers. *Bark* brown. *Branchlets* terete, square in cross section, weakly or strongly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3–5; petiole 0.4–4.5 cm long, glabrous; blade coriaceous, elliptic, obovate, spathulate or oblong, apex emarginate to acuminate, often rounded and apiculate, base cuneate or decurrent onto petiole, margin strongly inrolled to flat, weakly undulate or not, often glaucous beneath, 2.9–20 by 1.1–8.5 cm, 1.7–7.5 times as long as wide, midrib sunken or raised and with a central groove above, intramarginal nerve weakly present or absent, secondary veins 21–90 pairs, 60–80° from midrib, weakly prominent or indistinct above, obscure to weakly prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins, or obscure; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary or terminal, a simple unbranched pleiochasium or with 1 or 2 internodes and unbranched side branches, glabrous or sparsely to densely puberulent, 1.7–3.3 cm long; peduncle 0.4–1.7 cm by 0.6–2.2 mm; bracts caducous or persistent, deltoid, 1.2–2.5 by 1.2–1.5 mm; bracteoles present, two immediately beneath calyx or on pedicel; flowers 2–9; pedicels 0–5 mm long. *Sepals* ovate, apex rounded to acuminate, keeled or not keeled, 1.3–3.1 by 1.2–2 mm, 0.9–1.8 times as long as wide, ciliate or not, glabrous, sparsely to densely puberulent, sometimes only on centre line, or puberulent on tips only, pubescent only at tips or glabrous inside. *Corolla* white, white and orange or with a buff coloured tube and white lobes; bud head 2.2–3.5 mm long, 0.21–0.3 of bud length, globular, ellipsoid or ovate, apex rounded to acuminate; tube cylindrical, throat with or without thickening, 7.9–12 by 1.5–2.9 mm, 3.6–6.7 times as long as sepals, 2–4.1 times as long as lobes, glabrous outside, continuously pubescent except for base, sometimes sparsely so; lobes ovate, obovate or orbicular, apex rounded to acuminate, base auriculate, 2.5–4.2 by 1.5–3.2 mm, 1–1.7 times as long as wide, glabrous outside, glabrous inside, sometimes ciliate near tips only. *Stamens* inserted at 6.6–9.8 mm from corolla base, 0.75–0.83 of tube length; anther apex 0–1.1 mm from corolla mouth, anthers 1.1–1.7 by 0.5–0.8 mm, 1.7–2.4 times as long as wide; filaments 0.4–1.2 mm long. *Ovary* 0.9–1.3 mm high, glabrous, only pubescent around base or densely pubescent all over; style 6–8.7 mm long; pistil head 0.3–1 mm long, glabrous. *Fruit* yellow or greenish orange, stalks 2–16 mm



Map 40. Distribution of *Alyxia sibuyanensis* Elmer.

long, with 1 or 2 articles in each string, 0–4.1 mm between articles, glabrous or sparsely puberulent at ends, articles fleshy or with thin flesh, 8.6–24.4 by 6.5–16 mm, ellipsoid, symmetrical, apex rounded or apiculate. *Seeds* ruminate, 8–17 by 4.8–7.8 by 5–7.4 mm. Embryo cotyledons weakly undulate, embryo 10.5 mm long, cotyledons 0.6 of embryo length.

(Description based on 156 specimens.)

Distribution — Taiwan (Lanyu Island), Philippines.

Habitat — In primary or secondary lowland to montane or gallery forest, or in thickets or mangroves at 0–1735 m altitude. On clay, rocky, volcanic or ultrabasic soils.

Note — Several names have been synonymised into this species. The only differences are in the leaf apex which ranges from retuse to cuspidate, a character which is variable in many species of *Alyxia* and not sufficient to maintain separate species.

### 60. Alyxia sinensis Champ. ex Benth. — Fig. 15, Map 41

*Alyxia sinensis* Champ. ex Benth., Hooker's Kew J. 4 (1852) 334; Tsiang, Sunyatsenia 2 (1934) 104; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 65; P.T. Li et al., Fl. China 16 (1995) 161. — *Pulassarium sinense* (Champ. ex Benth.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Champion 26* (lecto K, designated here; iso K) from China, Hong Kong.

*Alyxia levinei* Merr., Philipp. J. Sci. 15 (1919) 254; Tsiang, Sunyatsenia 2 (1934) 106; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 68; P.T. Li, J. S. China Agric. Univ. 11 (1990) 28; P.T. Li et al., Fl. China 16 (1995) 161. — Type: *Levine 1975* (lecto PNH, designated here; iso A (plus photo of original destroyed PNH type in A)) from China, Guangdong, Ting Wu Shan.

*Alyxia acutifolia* Tsiang, Sunyatsenia 3 (1936) 135; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 69. — Type: *Ko 51488* (not traced; possibly in IBSC) from China, Guangdong, Sunyi. [The decision on synonymy has been made from the description.]

*Alyxia euonymifolia* Tsiang, Acta Phytotax. Sin. 10 (1965) 28; Anonymous, Fl. Hainanica 3 (1974) 226; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 70. — Type: *How 73613* (holo IBSC, n.v.; iso A) from China, Hainan, Po-ting.

*Alyxia vulgaris* Tsiang, Acta Phytotax. Sin. 10 (1965) 29; Anonymous, Fl. Hainanica 3 (1974) 227; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 72. — Type: *S.S. Sin 23815* (holo IBSC, n.v.) from China, Guangxi, Yao-shan. [The decision on synonymy has been made from examination of some of the paratypes.]

*Alyxia lehtungensis* Tsiang, Acta Phytotax. Sin. 10 (1965) 30; Anonymous, Fl. Hainanica 3 (1974) 227; Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 65. — Type: *S.K. Lau 26905* (holo IBSC, n.v.; iso A) from China, Hainan, Leh-tung.

*Alyxia kweichowensis* Tsiang & P.T. Li, Acta Phytotax. Sin. 11 (1973) 360; Fl. Reipubl. Popul. Sin. 63 (1977) 67. — Type: *Y. Tsiang 7169* (holo IBSC, n.v.; iso NY, S, UC, W, Z) from China, Guizhou, Pingtang.

*Alyxia taiwanensis* S.Y. Lu & Yuen P. Yang, Bot. Bull. Acad. Sin., n.s. 19 (1978) 195; P.T. Li et al., Fl. China 16 (1995) 161. — Type: *Lu 5936* (holo TAIF) from Taiwan, Taichung County, Chinsan. [This type has only been studied from photocopies of the type and specimens identified as this species from Taiwan.]

*Alyxia marginata* auct. non Pit.: Tsiang & P.T. Li, Fl. Reipubl. Popul. Sin. 63 (1977) 67; Anonymous, Fl. Yunnanica 3 (1983) 519; P.T. Li, J. S. China Agric. Univ. 11 (1990) 28; P.T. Li et al., Fl. China 16 (1995) 161.

*Alyxia odorata* auct. non Wall. ex G. Don: P.T. Li et al., Fl. China 16 (1995) 162.

Climbers. *Branchlets* terete or weakly angled, sparsely lenticellate or not, glabrous or sparsely to densely and minutely puberulent. *Leaves* opposite or in whorls of 3; petiole 0.1–3.8 cm long, glabrous or pubescent; blade coriaceous to papery, narrowly to broadly elliptic or obovate, apex emarginate to acuminate, base rounded to cuneate, margin weakly inrolled or flat, strongly undulate or not, 0.7–10.1 by 0.4–3.7 cm, 1–5 times as long as wide, midrib flattened or sunken above, intramarginal nerve weakly present or absent, secondary veins 5–25 pairs, 65–85° from midrib, weakly prominent to sunken above and obscure or weakly prominent beneath, tertiary venation weakly prominent or not above, reticulate and parallel to secondary veins or obscure; glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary or terminal, a short congested compound pleiochasium, delicate, glabrous to densely puberulent, 0.5–1.4 cm long; peduncle 0–2 cm by 0.5–1 mm; bracts caducous or persistent, ovate or deltoid, 1.1–1.5 by 0.8–1.7 mm; bracteoles present, two immediately beneath calyx or on pedicel; flowers 2–10; pedicels 0–1.1 mm long. *Sepals* ovate or lanceolate, apex rounded to acuminate, keeled or not keeled, 1.2–2.9 by 0.5–1.2 mm, 1.2–3.4 times as long as wide, ciliate, glabrous to sparsely puberulent, sometimes only on centre line, or puberulent on tips only, glabrous inside. *Corolla* white, yellow or yellowish-reddish; bud head 0.8–1.5 mm long, 0.24–0.38 of bud length, ovate to lanceolate, apex rounded to acuminate; tube slightly inflated, throat with or without thickening or with a narrow ring of tissue, 2–3 by 0.8–1.5 mm, 0.9–1.7 times as long as sepals, 1.8–3 times as long as lobes, glabrous outside, glabrous or pubescent in upper half inside; lobes elliptic, oblong or ovate, apex rounded to acute, base auriculate, 0.9–1.5 by 0.5–1 mm, 1.2–2.6 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 0.9–2.2 mm from corolla base, 0.39–0.77 of tube length; anther apex 0–0.7 mm from corolla mouth, anthers 0.5–1 by 0.2–0.4 mm, 1.7–3 times as long as wide; filaments 0.2–0.4 mm long. *Ovary* 0.4–0.7 mm high, glabrous, sparsely to densely pubescent all over or pubescent around base only; style 0.5–1 mm long; pistil

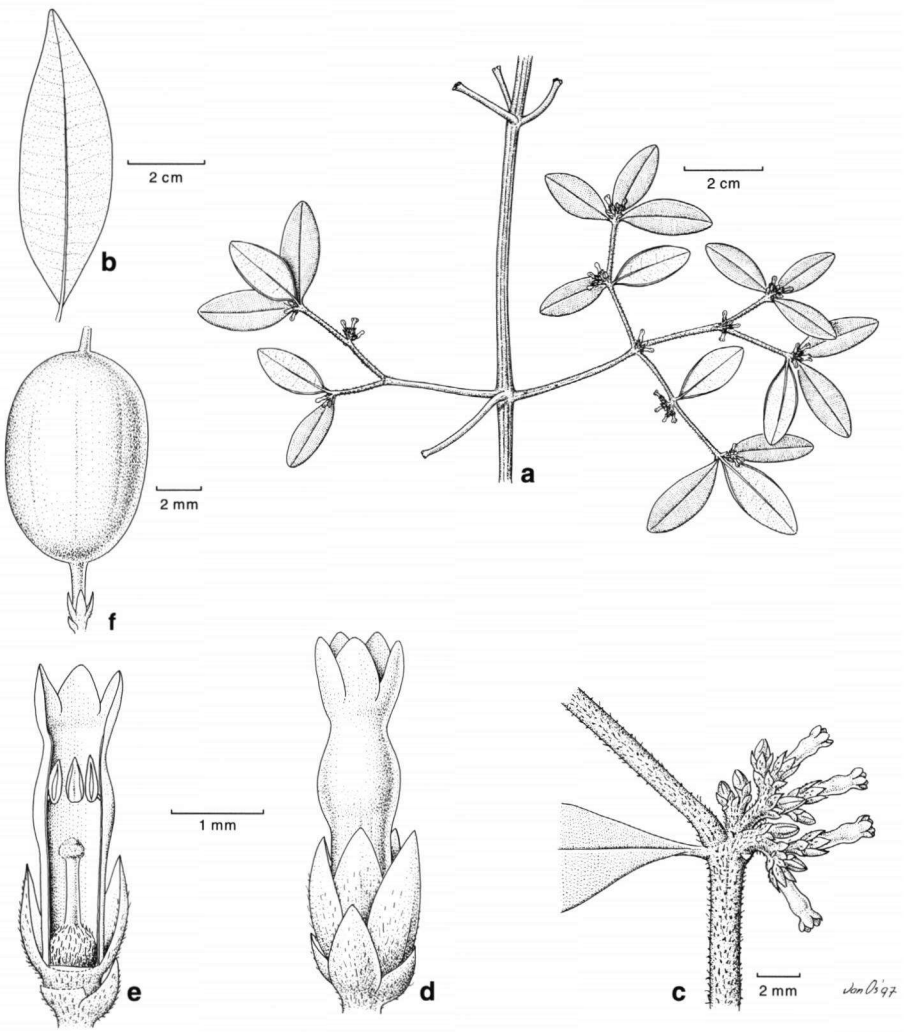


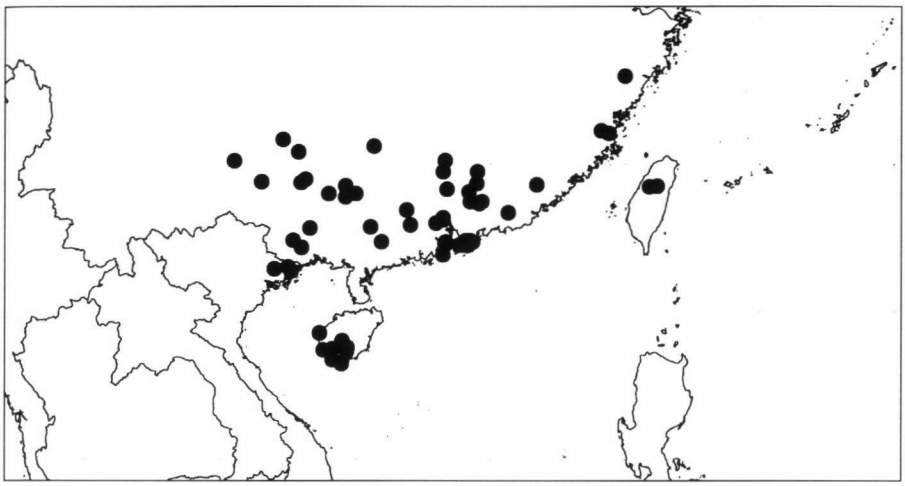

Fig. 15. *Alyxia sinensis* Champ. ex Benth. a. Habit; b. larger, acuminate apex leaf form; c. inflorescence; d. flower; e. flower dissection; f. fruit (a, c–f: *Wight s.n.*; b: *S.K. Lau 20316*).

head 0.2–0.6 mm long. *Fruit* yellow or black, stalks 1.3–3.5 mm long, with 1 or 2 articles in each string, 0.5–1.9 mm between articles, glabrous, articles with thin flesh, 5.4–17.4 by 3.9–10 mm, ellipsoid or globose, symmetrical, apex rounded or obtuse. *Seeds* oblong or ovoid, ruminate, 4.1–13.4 by 3–9.7 by 2.6–5.6 mm. Embryo linear, 8.7 mm long, cotyledons 0.37 of embryo length.
(Description based on 437 specimens.)

Distribution — Southern China, Taiwan, Vietnam.

Habitat — Growing in a wide variety of habitats from cliffs and scrub to open or closed forest from 100–1440 m altitude.

Vernacular name — Mau lak t'ang (Cantonese).



Map 41. Distribution of *Alyxia sinensis* Champ. ex Benth. (note that particularly large numbers of localities could not be traced in China).

Note — There is a complete gradation in the characters between typical *A. sinensis* with small, rounded leaves to typical *A. levinei* with larger, more acuminate leaves, a gradation which also takes in a number of other type specimens. The venation characters are clearer in larger leaves of both sorts. Synonymising these two species (including all the other names) results in an extremely variable species. However, this variation is largely only in leaf size and shape and to some extent in branchlet and inflorescence pubescence. There is a remarkable similarity in flower characters across the variation in leaves with the only noticeable variation being in the length of the internodes, a character quite independent from the leaf shape and size. It has proved extremely difficult to find the collecting localities for many of the specimens of this common and widespread species. Therefore the map does not purport to show the entire distribution of this species. It is extremely difficult to be sure of the distinction between fruiting or sterile specimens of the larger acuminate-leaved *A. sinensis* and those *A. reinwardtii* from Indochina with opposite leaves. All the specimens of this sort from Guangxi, Guangdong and eastwards do have *A. sinensis* flowers but it is not inconceivable that some of the non-flowering specimens may actually prove to be *A. reinwardtii* which has been collected in Vietnam and in Yunnan. I have been unable to get hold of the type material of *A. acutifolia* Tsiang and *A. vulgaris* Tsiang but from the descriptions and Tsiang's own comparisons they clearly belong under this species. *Alyxia hainanensis* is similar to the larger leaved specimens of *A. sinensis* and further collecting is needed to determine fruiting specimens of the two species with certainty.

### 61. Alyxia sleumeri Markgr. — Map 37

*Alyxia sleumeri* Markgr., Blumea 23 (1977) 409 (but not including all paratypes). — Type: *Van Royen & Sleumer 7904* (holo L; iso A, BO, BRI, CANB, K, LAE, PNH, SING) from Indonesia, Irian Jaya, Nettoti Range, Mt Nettoti, southern slope.

*Alyxia pugio* auct. non Markgr.: Kaneh. & Hatus., Bot. Mag. Tokyo 55 (1941) 491.

*Alyxia sogerensis* auct. non Wernham ex S. Moore: Markgr., Blumea 23 (1977) 407, p.p.

Erect shrubs or climbers. *Branchlets* weakly or strongly angled, sparsely lenticellate, glabrous. *Leaves* in whorls of 3; petiole 0.2–0.6 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic, often very narrowly so, apex long acuminate or caudate, base obtuse to decurrent onto petiole, margin weakly inrolled or flat, strongly undulate, 3.7–10 by 0.5–2.9 cm, 2.1–10.2 times as long as wide, midrib sunken above, intramarginal nerve absent, secondary veins 33–79 pairs, 70° from midrib, weakly prominent above but not very distinguishable from parallel tertiary venation, obscure to weakly prominent beneath; glabrous beneath, glabrous above, often punctate beneath. *Inflorescence* axillary, with several clear internodes and unbranched side branches, delicate, glabrous or sparsely puberulent all over, 1.7–3 cm long; peduncle 0.3–1.6 cm by 0.5–0.7 mm; bracts caducous or persistent, deltoid, linear or lanceolate, 1–4 by 0.4–0.7 mm; bracteoles absent or one on pedicel; flowers 4–7; pedicels 2.8–4 mm long. *Sepals* ovate, apex acute or acuminate, not keeled, 0.8–1 by 0.5 mm, 1.6–2 times as long as wide, ciliate, glabrous or sparsely puberulent. *Corolla* yellow or white with orange tube; bud head 2–2.1 mm long, 0.43 of bud length, lanceolate, apex acuminate; tube slightly inflated, throat with thickening, 2.7–3 by 1.1–1.2 mm, 3–3.4 times as long as sepals, 1.3–1.8 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them; lobes elliptic, apex acuminate, base auriculate, 1.5–2.3 by 0.7–0.8 mm, 1.9–2.8 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 1.9 mm from corolla base, 0.54 of tube length; anther apex 0.5 mm from corolla mouth, anthers 1 by 0.3 mm, 3.3 times as long as wide; filaments 0.6 mm long. *Ovary* 0.7 mm high, pubescent in tuft between carpels; style 0.9 mm long; pistil head 0.4 mm long. *Fruit* stalks 2.5 mm long, with 1 article in each string, glabrous, articles dry and smooth, 12.5–14 by 7.2–8.6 mm, ellipsoid, symmetrical, apex rounded. *Seeds* ovoid, ruminate, 10.5–12.6 by 6.1 by 3.5–5.4 mm.

(Description based on 20 specimens.)

Distribution — New Guinea.

Habitat — In forest at 400–1800 m altitude.

Note — This species has been described as an erect shrub on one specimen but this seems unlikely given its systematic position and the appearance of the specimens. Bracteoles are present on some pedicels but not others. In the cases where there is a single bracteole the pedicel tends to be quite long so it is quite possible that the bracteole is actually a sterile bract. The secondary venation is not distinguishable from the parallel tertiary giving the impression of a very densely veined leaf like a *Calophyllum* leaf.

### 62. Alyxia sogerensis Wernham ex S. Moore — Map 42

*Alyxia sogerensis* Wernham ex S. Moore, J. Bot. 61 (1923) suppl. 31; Markgr., Bot. Jahrb. Syst. 61 (1927) 182; Blumea 23 (1977) 407, p.p. — Type: *H. O. Forbes 591* (lecto BM, designated here; iso L, MEL, P; photo in LAE) from Papua New Guinea, Sogeri.

*Alyxia pugio* auct. non Markgr.: Merr. & L.M. Perry, J. Arnold Arbor. 24 (1943) 211.

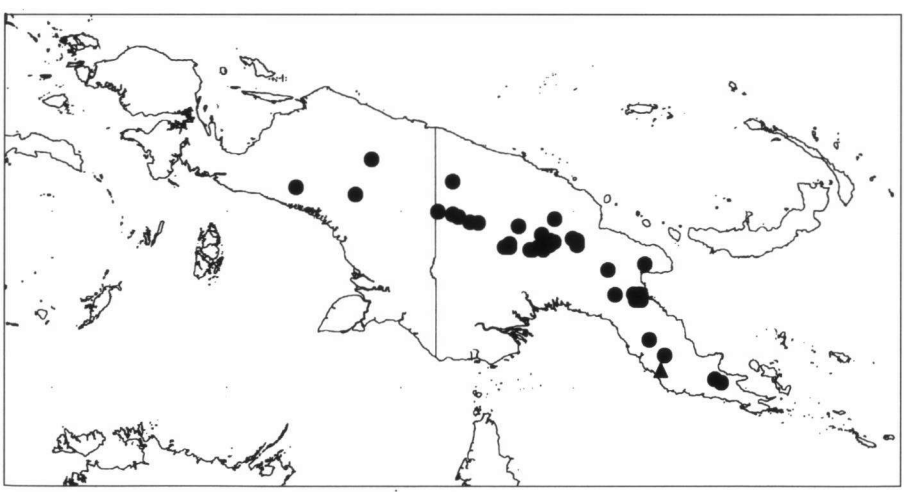
Climbers. *Branchlets* weakly angled, sparsely lenticellate, glabrous. *Leaves* opposite or in whorls of 3; petiole 0.3–0.4 cm long, glabrous; blade subcoriaceous or papery, elliptic or broadly elliptic, apex caudate, not mucronate, base obtuse to cuneate, margin weakly inrolled or flat, strongly undulate, blade 4.7–10.2 by 1.7–3.8 cm, 2.3–3.7

times as long as wide; midrib sunken above, intramarginal nerve clear at margin, secondary veins 50–58 pairs, 80° from midrib, weakly prominent or indistinct above, obscure or weakly visible beneath, tertiary venation weakly prominent or obscure above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* only terminal (see note), with several clear internodes and unbranched side branches, delicate, sparsely puberulent all over, c. 2 cm long; peduncle c. 1 cm by 0.7–0.8 mm ; bracts caducous or persistent; bracteoles 1 or 2 on pedicel; pedicels 4–5 mm long. *Sepals* ovate, apex obtuse or acute, not keeled, 2.1 by 1 mm, 2.1 times as long as wide, ciliate, glabrous or sparsely puberulent, glabrous inside. *Corolla* bud head 1.6 mm long, 0.38 of bud length, lanceolate, apex acuminate; tube c. 2.6 mm long, glabrous outside; lobe glabrous outside, not ciliate (mature flowers not known). *Stamens* inserted at 1.4 mm from corolla base, 0.35 of tube length; anther apex 1.4 mm from corolla mouth, anthers 1.1 mm long, 0.3 mm wide, 3.7 times as long as wide; filaments 0.3 mm long. *Ovary* 0.8 mm high, densely pubescent all over or pubescent in tufts between the carpels; style 0.1 mm long; pistil head 0.6 mm long. *Fruit* yellowish-green, stalks 1.5 mm long, with 1 article in each string, glabrous, articles dry smooth, 11–11.5 by 8.8–9.2 mm, ellipsoid or globose, symmetrical, apex rounded. *Seeds* elliptic, ruminate, 7.8 by 5.6 by 5.4 mm.
(Description based on 1 collection made into 4 specimens.)

Distribution — New Guinea.

Notes — The type specimen is rather poor and the remaining material very scanty. It appears that the inflorescence is only ever terminal, much as in *A. laurina*, but further collections may lead to a re-evaluation of this species, particularly in relation to *A. multistriata* and *A. sleumeri* (in which case *A. sogerensis* takes priority).

This species is unusual in having the stamens inserted very low down in the corolla tube also leading to an extremely short style. Unfortunately, due to the poor material, this finding is the result of the dissection of only one mature flower bud on the type specimen.



Map 42. Distribution *Alyxia sogerensis* Wernham ex S. Moore (▲) and *A. subalpina* Markgr. (●).

## 63. Alyxia spicata R.Br. — Map 43

*Alyxia spicata* R.Br., Prodr. (1810) 470; Roem. & Schult., Syst. Veg. 4 (1819) 439; Spreng., Syst. Veg. 1 (1824) 835; G. Don, Gen. Hist. (1837) 96; A.DC., Prodr. 8 (1844) 346; F. Muell, Fragm. 6 (1868) 117; Benth., Fl. Aust. 4 (1869) 308; Bailey, Syn. Queensl. Fl. (1883) 306; Engl., Bot. Jahrb. Syst. 7 (1886) 470; Bailey, Catal. Pl. Queensl. (1890) 29; Queensl. Fl. 3 (1900) 980; Markgr., Bot. Jahrb. Syst. 61 (1927) 185; Domin, Biblioth. Bot. 89 (1928) 524; Markgr., Blumea 23 (1977) 391; Wheeler, Fl. Kimberley (1992) 702; P.I. Forst., Austral. Syst. Bot. 5 (1992) 569; Fl. Aust. 28 (1996) 131. — *Pulassarium spicatum* (R.Br.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon spicatus* (R.Br.) Britten in Banks & Sol., Ill. Austral. Pl. Cook's Voy. (1901) 60. — Type: *R. Brown Iter Australiense 2857* (lecto BM, designated by Forster (1992); isolecto E, P) from Australia, Northern Territory, Carpentaria, Vanderlin Island.

*Alyxia obtusifolia* R.Br., Prodr. (1810) 470; Roem. & Schult., Syst. Veg. 4 (1819) 439; Spreng., Syst. Veg. 1 (1824) 835; 4, 2 (1827) 109; G. Don, Gen. Hist. (1837) 96; A.DC., Prodr. 8 (1844) 346; Benth., Fl. Aust. 4 (1869) 308; Bailey, Syn. Queensl. Fl. (1883) 306; Catal. Pl. Queensl. (1890) 29; Queensl. Fl. 3 (1900) 980. — *Pulassarium obtusifolium* (R.Br.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *R. Brown Iter Australiense 2856* (lecto BM, designated by Forster (1992); isolecto BM, CANB (without number), MO, NY (without number), UC) from Australia, Queensland, Port Curtis District, Keppel Bay.

*Alyxia tetragona* R.Br., Prodr. (1810) 470; Roem. & Schult., Syst. Veg. 4 (1819) 439; Spreng., Syst. Veg. 1 (1824) 835; G. Don, Gen. Hist. (1837) 96; A.DC., Prodr. 8 (1844) 346. — Type: *Banks & Solander s. n.* (lecto BM, designated by Forster (1992); iso BM) from Australia, Queensland, Cook District, Endeavour River.

*Fagraea tetragona* Span., Linnaea 15 (1841) 326. — *Alyxia spanogheana* Miq., Fl. Ned. Ind. 2 (1857) 409; Markgr., Blumea 23 (1977) 401. — *Pulassarium spanogheanum* (Miq.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Spanoghe s. n.* (no specimens found). Lectotype: Spanoghe illustration in Leiden (941.6-217), designated by Markgraf (1977).

*Alyxia thyrsiflora* Benth., Fl. Aust. 4 (1869) 309. — *Alyxia thyrsifolia* P.I. Forst., Austral. Syst. Bot. 5 (1992) 570 sphalm. — *Pulassarium thyrsiflorum* (Benth.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — Type: *Dallachy & Fitzalan s. n.* (lecto K, designated by Forster (1992); isolecto MEL) from Australia, Queensland, Port Denison.

*Alyxia acuminata* auct. non Markgr.: Markgr., Blumea 23 (1977) 390, p.p.

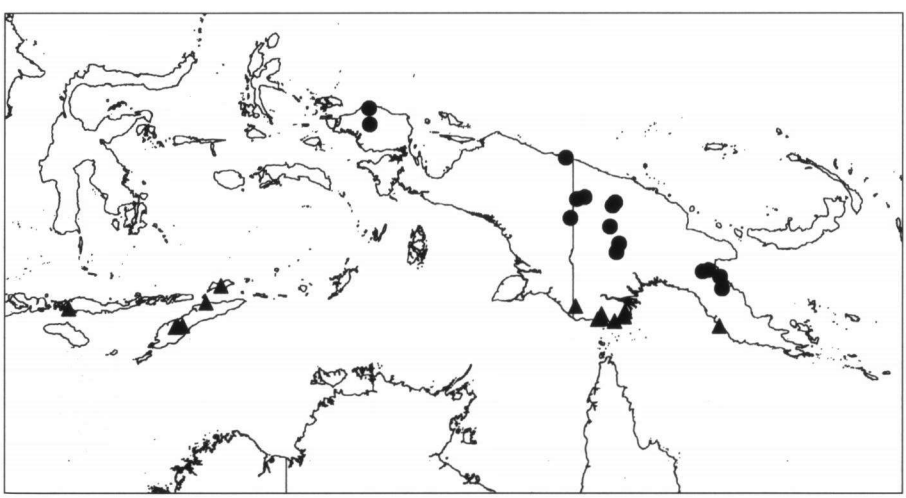
Erect shrubs or, mostly, climbers. *Bark* brown or grey. *Branchlets* weakly or strongly angled, sparsely lenticellate or not, glabrous or sparsely and minutely puberulent. *Leaves* in whorls of 3 or 4; petiole 0.2–1 cm long, glabrous or pubescent; blade subcoriaceous or papery, narrowly elliptic, elliptic or obovate, apex emarginate, rounded, obtuse, acute or shortly acuminate, not mucronate, base obtuse to cuneate, margin weakly inrolled or flat, 2.4–9.2 by 0.9–3.6 cm, 1.5–5.3 times as long as wide, midrib prominent, flattened or raised and with a central groove above, intramarginal nerve clear at margin or obscure, secondary veins 17–40 pairs, 70–75° from midrib, strongly or weakly prominent above, obscure, weakly visible or prominent beneath, tertiary venation weakly prominent or flattened above, reticulate or parallel to secondary veins, glabrous, sparsely puberulent only on midrib or puberulent all over beneath, glabrous or puberulent only on midrib above. *Inflorescence* axillary, with several clear internodes and unbranched side branches (but see note), delicate or robust, densely puberulent, especially further up the inflorescence, 1.2–3.2 cm long; peduncle 0.3–1.4 cm by 0.9–1.1 mm, weakly flattened, bracts caducous rarely persistent, deltoid or lanceolate, 1.9–2.6 by 1.3–2.6 mm wide, bracteoles one or two immediately beneath calyx, generally deciduous; flowers 12–15; pedicels 0.1–0.5 mm long. *Sepals* not fleshy, ovate or lanceolate, fused for up to half length at base, apex obtuse or acute, slightly reflexed, 1–2.2 by 0.6–1.2 mm, 1.4–3 times as long as wide, ciliate, sparsely or densely puberu-

lent outside, pubescent over upper half inside. *Corolla* white, yellow, white with an orange tube or greenish with a brown tube, fragrant; bud head 1.4–2.5 mm long, 0.44–0.51 of bud length, ellipsoid or lanceolate, apex obtuse, acute or acuminate; tube cylindrical or slightly inflated, throat with or without thickening, 2–2.7 by 0.8–1.25 mm, 1–2.4 times as long as sepals, 1–1.4 times as long as lobes, glabrous or sparsely puberulent around top of tube outside, pubescent in upper half and around stamens inside, sparsely pubescent around stamens and more densely in a band beneath them or very sparsely pubescent in upper half of tube; lobes elliptic or oblong, apex obtuse, acute or acuminate, 1.6–2.4 by 0.5–1.2 mm, 2–4.6 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 1.3–2.1 mm from corolla base, 0.52–0.7 of tube length; anther apex 0–0.6 mm from corolla mouth, anthers 0.6–0.9 by 0.2–0.4 mm, 1.5–3 times as long as wide; filaments 0.2–0.6 mm long. *Ovary* 0.4–0.7 mm high, densely pubescent all over or pubescent only on top; style 0.8–1.4 mm long; pistil head 0.2–0.6 mm long. *Fruit* yellow, black or yellow-orange; stalks 1–2.6 mm long; with 1 article in each string, glabrous, with thin flesh, 9.2–10.5 by 6.9–9.5 mm, globose or subglobose, symmetrical, apex rounded. *Seeds* ovoid, ruminate, 8.1–9 by 6–7.2 by 5.4–6.7 mm. Embryo cotyledons wider, strongly undulate, embryo 5.8 mm long, cotyledons 0.69 of embryo length.
(Description based on 747 specimens including Australian specimens.)

Distribution — Lesser Sunda Islands, New Guinea, Australia.

Habitat — Found in a wide variety of habitats from cliffs, dunes and coastal vine thickets to savannah and scrubland to various types of forest: monsoon, evergreen or mixed, at 0–1200 m altitude. The most frequently recorded soil type is sand or sandstone but it has also been recorded from basalt.

Note — One specimen from Port Moresby (*Loher s.n.*, M) has a few hairs at the top of the outside of the corolla tube, a character which is generally more reminiscent



Map 43. Distribution of *Alyxia spicata* R.Br. (▲) (Australian distribution not included) and *A. tetraquetra* Markgr. (●).

of the related *A. acuminata*. The leaves of the Malesian specimens of this species tend to be more frequently acuminate than those of the Australian specimens, somewhat reminiscent of *A. grandis* P.I. Forst. from which it differs in the less prominently veined leaves and the smaller, more globular fruits. Some specimens in Australia, previously referred to *A. thyrsiflora*, have shorter and wider corolla lobes and sometimes a branched inflorescence. There are, however, intermediates linking these specimens to the rest of *A. spicata*. None of this variation has so far been seen in Malesia so plants of this sort are not included in the description above.

### 64. Alyxia subalpina Markgr. — Map 42

*Alyxia subalpina* Markgr., Bot. Jahrb. Syst. 61 (1927) 183; Blumea 23 (1977) 402; P. Royen, Alpine Fl. New Guinea 4 (1983) 2850. — Type: *Ledermann 12760* (holo B†; lecto L, designated here; iso A (scrap)) from Papua New Guinea, East Sepik Province.

*Alyxia lamii* Markgr., Nova Guinea 14, 2 (1927) 280; Bot. Jahrb. Syst. 61 (1927) 183; Merr. & L.M. Perry, J. Arnold Arbor. 24 (1943) 212. — Type: *Lam 1757* (lecto L, designated here; iso BO) from Indonesia, Irian Jaya, Mt Doorman.

*Alyxia clemensiae* Markgr., Blumea 23 (1977) 396, p.p. (not including type).

*Alyxia defoliata* subsp. *orientalis* Markgr., Blumea 23 (1977) 399, p.p. (not including type).

*Alyxia maluensis* auct. non Markgr.: Markgr., Blumea 23 (1977) 395, p.p.

*Alyxia purpureoclada* auct. non Kaneh. & Hatus.: Markgr., Blumea 23 (1977) 400, p.p.

*Alyxia cacuminum* auct. non Markgr.: Markgr., Blumea 23 (1977) 403, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2851, p.p.

*Alyxia semipallescens* auct. non F. Muell.: Markgr., Blumea 23 (1977) 403, p.p.; P. Royen, Alpine Fl. New Guinea 4 (1983) 2852, p.p.

Climbers. *Branchlets* terete, weakly or strongly angled, sparsely lenticellate or not, glabrous to sparsely or densely and minutely puberulent, sometimes glabrescent. *Leaves* in whorls of 3 or 4; petiole 0.1–1 cm long, glabrous or pubescent; blade subcoriaceous to thickly coriaceous, narrowly to broadly elliptic or obovate, apex rounded to acuminate, not mucronate, base rounded to cuneate, margin weakly inrolled or flat, weakly undulate or not, blade 0.8–8 by 0.4–4 cm, 1–3.9 times as long as wide, midrib prominent, flattened, slightly sunken or raised and with a central groove above, intramarginal nerve weakly present or obscure, secondary veins 11–36 pairs, 70–80° from midrib, weakly prominent to indistinct above, obscure or weakly visible beneath, tertiary venation weakly prominent to obscure above, parallel to secondary veins; glabrous or sparsely puberulent only on midrib beneath, sparsely puberulent, glabrous or puberulent only on midrib above, not punctate beneath. *Inflorescence* axillary, a simple unbranched pleiochasium, with clear internodes and unbranched side branches, delicate or robust, sparsely to densely puberulent, 0.8–3.5 cm long; peduncle 0.3–1.5 cm by 0.7–1.8 mm; bracts caducous or persistent, ovate, deltoid, linear, leafy or lanceolate, 1.7–5 by 1–1.8 mm; bracteoles mostly absent, rarely one on pedicel; flowers 3–10; pedicels 0.7–4 mm long. *Sepals* ovate, apex rounded to acute, keeled or not keeled, 1.1–2.5 by 0.9–1.6 mm, 1.2–2 times as long as wide, ciliate, glabrous or sparsely to densely pu-berulent outside, pubescent only at tips or glabrous inside. *Corolla* tube white to orange to purplish-brown and lobes white, cream or yellowish; bud head 1.3–2.7 mm long, 0.26–0.37 of bud length, ellipsoid, lanceolate, ovate or deltoid, apex rounded to acute; tube cylindrical to slightly or strongly inflated, throat with

thickening, 3.4–6.2 by 1.2–2.1 mm, 1.9–5.1 times as long as sepals, 1.6–2.9 times as long as lobes, sparsely to densely pubescent around top of tube outside, very rarely glabrous, inside pubescent in upper half and around stamens or sparsely pubescent around stamens and more densely in a band beneath them; lobes orbicular, apex rounded or obtuse, base auriculate, 1.5–2.7 by 1.4–2.3 mm, 0.9–1.6 times as long as wide, sparsely to densely puberulent outside, very rarely glabrous and inside glabrous, pubescent at base of lobes or papillate, ciliate, not ciliate or ciliate near tips only. *Stamens* inserted at 2.2–3.7 mm from corolla base, 0.57–0.67 of tube length; anther apex 0.1–0.7 mm from corolla mouth, anthers 0.9–1.3 by 0.3–0.6 mm, 2–3 times as long as wide; filaments 0.6–0.8 mm long. *Ovary* 0.6–1.1 mm high, pubescent all over, sometimes more densely around base; style 1–2.4 mm long; pistil head 0.6–1 mm long. *Fruit* yellow or orange turning black or dark purple, stalks 2–3.5 mm long, with 1 article in each string, glabrous or sparsely puberulent at ends, articles dry smooth or with thin flesh, 12.8–21.5 by 10–14.8 mm, ellipsoid to globose, symmetrical, apex rounded, obtuse or apiculate. *Seeds* elliptic, ruminate, 10–13.2 by 8–9.6 by 6.6–8.5 mm. Embryo cotyledons wider, strongly undulate, embryo 9 mm long, cotyledons 0.74 of embryo length.
(Description based on 187 specimens.)

Distribution — New Guinea.

Habitat — In forest to subalpine scrub at (650–)1400–3260 m altitude. Reported from limestone. The single specimen from 650 m was collected from heath forest where many other normally higher altitude plants were also reported.

Vernacular names — Fluan (Kalam), Kindiba (Hagen: Wankl), Kwabu (Ibiwara), Tsui (Minj).

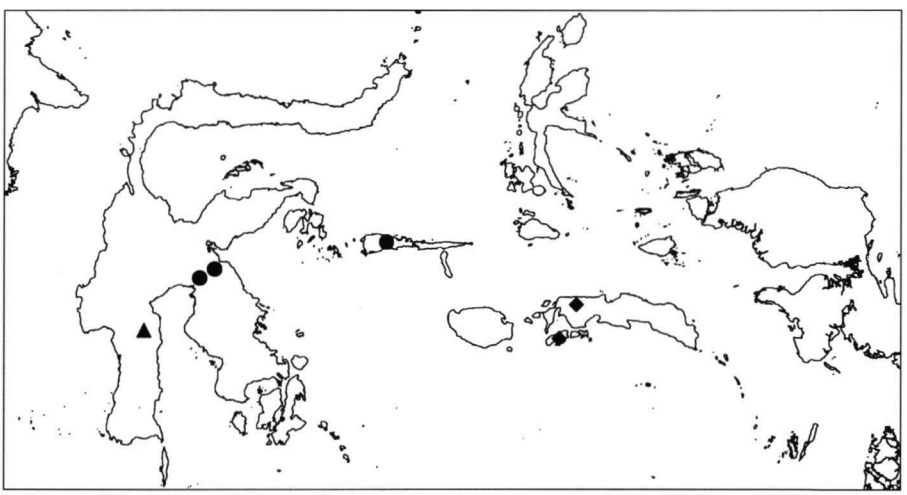
Typification — Markgraf says the type of *A. lamii, Lam 1757*, is in Utrecht. I have been unable to trace it so have made the L specimen a lectotype.

Note — *Alyxia subalpina* is close to *A. acuminata* from which it differs primarily in its generally shorter, more robust and less branched inflorescences and its generally more densely pubescent branchlets and inflorescences. There are, however, some specimens of both species which have characters of the other and, although the two species can be separated, further research into the relationship between these two species would be interesting. It generally occurs at higher altitudes than *A. acuminata* although there is a large overlap. There is a collection from the Western Province of Papua New Guinea, *Henty et al. NGF 42715*, which has longer leaf acumens than most collections of this species and very obscure leaf venation for leaves of their size. It is also mostly glabrous. Unfortunately it only has one very immature fruit on it. It has tentatively been placed in *A. subalpina* but further collecting in this area may find that it is a new species or a specimen of *A. acuminata* at a particularly high altitude (2100 m). There is also one specimen, *Van Royen 11355*, from East Sepik Province which has glabrous flowers. When more material of *A. semipallescens* becomes available it would also be interesting to examine the difference between these two species as that species, from the poor material available, appears to have solitary flowers and an ovary pubescent only around the base. Apart from that it has glabrous flowers on the outside rather like *Van Royen 11355* which, incidentally, was also collected at rather high altitude (2840 m) like the material of *A. semipallescens*.

## 65. Alyxia sulana Markgr. — Map 44

*Alyxia sulana* Markgr., Blumea 23 (1977) 401. — Type: *Atjeh exp. van Hulstijn 59* (holo L; iso BO) from Indonesia, Maluku, Sula Islands, Taliabu, Tanjong Berpua.

Climbers. *Branchlets* terete, sparsely lenticellate or not, glabrous. *Leaves* in whorls of 5; petiole 0.3–0.7 cm long, glabrous; blade subcoriaceous, obovate, apex shortly acuminate to rounded, not mucronate, base cuneate, margin flat, weakly or strongly undulate, 4.5–13.1 by 1.8–4.7 cm, 2.1–3.6 times as long as wide, midrib sunken above, intramarginal nerve clear at margin, secondary veins 30–40 pairs, 70–80° from midrib, weakly prominent above, clear beneath, tertiary venation obscure above; leaf glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a simple unbranched pleiochasium, delicate, glabrous, 1–1.7 cm long; peduncle 0.1–0.9 cm by 0.9 mm; bracts persistent, deltoid, 0.9 by 0.7 mm; bracteoles absent or only on pedicel of terminal flower; flowers c. 4; pedicels 3.5–4.5 mm long. *Sepals* not fleshy, of free sepals, ovate, apex acute, not keeled, 1 by 0.8 mm wide, 1.25 times as long as wide, ciliate, glabrous outside, glabrous inside. *Corolla* tube slightly inflated, throat with thickening, 3.1 by 1.2 mm, 3.1 times as long as sepals, 2 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes elliptic, apex rounded, base auriculate, 1.7 by 0.9 mm, 1.9 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 1.8 mm from corolla base, 0.53 of tube length; anther apex 0.4 mm from corolla mouth, anthers 0.9 by 0.3 mm, 3 times as long as wide; filaments 0.5 mm long. *Ovary* 0.7 mm high, pubescent in tufts between the carpels; style 1.4 mm long; pistil head 0.4 mm long. *Fruit* black, stalks 4–6.7 mm long, with 1 article in each string, sparsely puberulent at ends, articles with thin flesh, 13.2–20.5 by 9.5–15 mm, ellipsoid or cylindrical, symmetrical, apex rounded or apiculate. *Seeds* 14–14.6 by 7–9.6 by 6–8 mm. Embryo linear, straight at base, 7.6 mm long, cotyledons 0.63 of embryo length.
(Description based on 3 collections made into 12 specimens.)



Map 44. Distribution of *Alyxia sulana* Markgr. (●), *A. uniflora* D.J. Middleton (▲) and *A. vera* D.J. Middleton (◆).

Distribution — Sulawesi.

Habitat — In forest on ultrabasic or deep hard red clayey soil at 150–420 m altitude.

Note — The affinities of this species are obscure although it may be related to *A. vera* from Ambon.

### 66. Alyxia tetraquetra Markgr. — Map 43

*Alyxia tetraquetra* Markgr., Bot. Jahrb. Syst. 61 (1927) 185; Blumea 23 (1977) 396. — *Gynopogon tetraqueter* K. Schum. ex Markgr., Bot. Jahrb. Syst. 61 (1927) 185, nom. inval. — Type: *Hollrung 747* (holo B†; lecto HBG, designated here; iso BO, K, MEL, P) from Papua New Guinea, West Sepik Province, August.

*Alyxia sibuyanensis* auct. non Elmer: Markgr., Blumea 23 (1977) 381, p.p.

*Alyxia maluensis* auct. non Markgr.: Markgr., Blumea 23 (1977) 395, p.p.

Climbers. *Branchlets* weakly or strongly angled, densely lenticellate or not, glabrous. *Leaves* in whorls of 3–5; petiole 0.8–1.2 cm long, glabrous; blade coriaceous or thickly coriaceous, broadly elliptic or spathulate, apex emarginate to very shortly acuminate or apiculate, not mucronate, base acute to decurrent onto petiole, margin weakly inrolled or flat, weakly undulate, 4.5–18 by 2.6–8.2 cm, 1.6–3 times as long as wide, midrib raised and with a central groove above, intramarginal nerve clear at margin or obscure, secondary veins 32–51 pairs, 55–80° from midrib, distinct, weakly prominent to indistinct above, obscure or weakly visible beneath, tertiary venation weakly prominent to obscure above, reticulate and parallel to secondary veins; glabrous beneath, glabrous above, not punctate beneath. *Inflorescence* axillary, a short congested compound pleiochasium, very robust, sparsely puberulent in upper parts, 2–3.5 cm long; peduncle 0.9–1.2 cm by 1.9–3.4 mm; bracts caducous or persistent, deltoid, 1.3–2.4 by 1.3–2.4 mm; bracteoles two immediately beneath calyx; flowers 13–25; pedicels 0.5–1 mm long. *Sepals* not fleshy, of free sepals, ovate, apex rounded to obtuse, not keeled, 2 by 1.5 mm, 1.3 times as long as wide, ciliate, sparsely puberulent, glabrous inside. *Corolla* white; bud head 1.7 mm long, 0.4 of bud length, globular or deltoid, apex rounded or acute; tube cylindrical, throat with thickening, c. 3.4 by 1.2 mm, 1.7 times as long as sepals, 3.1 times as long as lobes, densely pubescent around top of tube outside, sparsely pubescent around stamens and more densely in a band beneath them; lobes orbicular, apex rounded, base auriculate, c. 1.1 by 1 mm, 1.1 times as long as wide, sparsely or densely puberulent outside, glabrous inside, ciliate. *Stamens* inserted at 2.3 mm from corolla base, 0.62 of tube length; anther apex 0.2 mm from corolla mouth, anthers 1 by 0.4 mm, 2.5 times as long as wide. *Ovary* 0.8 mm high, densely pubescent all over; style 0.9 mm long; pistil head 0.5 mm long. *Fruit* orange (black when mature?), stalks 2.3 mm long, with 1 or 2 articles in each string, 0 mm between articles, articles with thin flesh, 17–19 by 12.3–13.5 mm, ellipsoid, symmetrical, apex rounded.

(Description based on 68 specimens.)

Distribution — New Guinea.

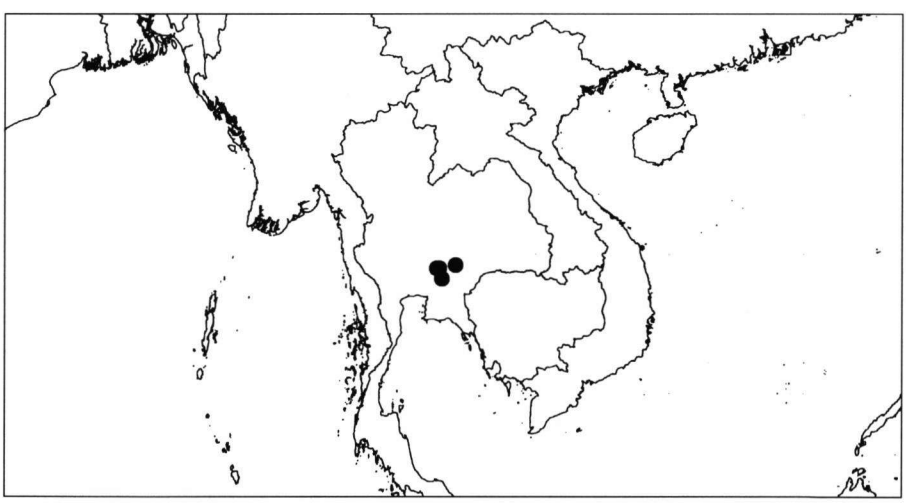
Habitat — In primary or secondary forest or ridge forest or river banks on sandstone, sandy soils or ultrabasic soils.

Note — The inflorescence is particularly robust. This species is related to *A. acuminata* from which it differs in the very robust inflorescences, the generally smaller flowers and the larger, apically more rounded leaves.

## 67. Alyxia thailandica D.J. Middleton — Map 45

*Alyxia thailandica* D.J. Middleton, Blumea 40 (1995) 109. — Type: *Maxwell 74-804* (holo AAU; iso L) collected on 12th August 1974 from Thailand, Nakhon Nayok Province, Khao Yai National Park, Khao Kieo.

Climbers. *Bark* brown or grey. *Branchlets* terete or weakly angled, sparsely lenticellate, glabrous or sparsely long puberulent. *Leaves* in whorls of 3 or 4, coriaceous to papery; petiole 0.3–0.7 cm long, glabrous or pubescent; blade narrowly elliptic, elliptic or obovate, apex obtuse to short sharp acuminate, base acute or cuneate, margin weakly inrolled or flat, weakly undulate, 2.2–8.5 by 0.6–2.6 cm, 1.8–4.1 times as long as wide, midrib sunken above, secondary veins 15–22 pairs, 70–75° from midrib, weakly distinguishable or indistinct and not prominent above, obscure, weakly visible or prominent beneath, tertiary venation obscure above, glabrous or sparsely puberulent only on midrib beneath, glabrous or puberulent on midrib only above. *Inflorescences* axillary or terminal, of short congested cymes, densely covered in long straight hairs, 0.9–1.9 cm long; peduncle 0.1–0.2 cm by 1–1.8 mm; bracts caducous or persistent, deltoid or linear, 2.4–3.5 by 1.8–1.9; bracteoles on the pedicels; flowers 6–18; pedicels 0–1.5 mm long. *Sepals* ovate to lanceolate, apex acute to acuminate, 2–3 by 1.1–1.4 mm, 1.5–2.4 times as long as wide, ciliate, densely covered in long straight hairs. *Corolla* white, cream, yellowish or white with an orange tube; bud head 2–3.2 mm long, lanceolate with an acuminate apex, 0.31–0.39 of bud length; tube cylindrical or slightly inflated, 4.2–6.5 by 1.3–2 mm, 1.8–2.5 times as long as sepals, 1.1–2.3 times as long as lobes, glabrous outside, pubescent in upper half and around stamens or just below stamens inside, throat without obvious thickening; lobes narrowly elliptic or oblong, apex obtuse or acuminate, not ciliate, 2.5–4.3 by 1.5–1.9 mm, 1.9–2.5 times as long as wide, glabrous outside, glabrous inside. *Stamens* inserted at 3–3.4 mm from corolla base, 0.69–0.78 of tube length; anther apex 0.1 mm from corolla mouth; anthers



Map 45. Distribution of *Alyxia thailandica* D.J. Middleton.

1–1.1 by 0.3–0.4 mm, 2.5–3.3 times as long as wide; filaments 0.4 mm long. *Ovary* 0.7–0.8 mm high, sparsely to densely pubescent all over or pubescent around base only; style 2.3–2.7 mm long; pistil head 0.4–0.5 mm long. *Fruit* with 1 article in each string; articles 9–11 by 6.5–7 mm, ellipsoid, sparsely puberulent at ends. *Seeds* 8.3 by 5–5.1 by 4.8–5 mm.

(Description based on 26 specimens.)

Distribution — Thailand.

Habitat — Altitude range: 360–1400 m.

Note — This species has a very localised distribution in Khao Yai National Park in Thailand and is quite distinct within Thailand but has similarities to *A. nathoi* from Vietnam (see note there). An illustration was published with the original description.

**68. Alyxia uniflora** D.J. Middleton, *spec. nov.* — Fig. 16, Map 44

Frutex scandens. Folia ternata coriacea elliptica. Inflorescentiae uniflorae dense pubescentes. Corolla tubo circiter 3.8 mm longo lobis circiter 1.5 mm longis. Ovarium basi pubescens apice glabrum. Mericarpia 1-articulata articulis ellipticis circa 4.5 × 7.3 mm. — Typus: *Kjellberg 3995* (holo S; iso BO) collected in June 1929 from Indonesia, Sulawesi Selatan, Enkerang District, Latimojong Mts, Bukit Poka Pindjang.

Climbers. *Branchlets* weakly angled, not lenticellate, densely puberulent. *Leaves* in whorls of 3; petiole 0.1–0.2 cm long, pubescent; blade coriaceous, elliptic to ovate, apex obtuse to acute, not mucronate, base obtuse, margin flat, not undulate, dark green and shining above, pale green beneath, 0.6–1.7 by 0.3–0.8 cm, 1.6–2.3 times as long as wide, midrib somewhat sunken above, intramarginal nerve absent, secondary veins 8–12 pairs, weakly distinguishable or indistinct above, obscure beneath, tertiary venation obscure; glabrous beneath, not punctate beneath, puberulent only on midrib above. *Inflorescence* of solitary axillary flowers, delicate, 0.9–1.1 cm long; bracts in a ring around the middle of the pedicel; pedicels 4.5–6 mm long, densely puberulent. *Sepals* ovate, apex acute, not keeled, c. 1.3 by 0.9 mm, 1.4 times as long as wide, ciliate, glabrous, glabrous inside. *Corolla* tube slightly inflated, throat with thickening, c. 3.8 mm long, 2.9 times as long as sepals, 2.5 times as long as lobes, glabrous outside, very sparsely pubescent in upper half of tube; lobes elliptic, apex obtuse, base auriculate, c. 1.5 by 1.5 mm, 1 times as long as wide, glabrous outside, pubescent or sparsely pubescent at the tips and base of lobes inside, ciliate near tips only. *Stamens* inserted at c. 2 mm from corolla base, 0.53 of tube length; anther apex 0.6 mm from corolla mouth, anthers 1.1 by 0.5 mm, 2.2 times as long as wide; filaments 0.3 mm long. *Ovary* 0.8 mm high, pubescent around base only; style 0.7 mm long; pistil head 0.4 mm long. *Fruit* stalks 2 mm long, with 1 article in each string, sparsely puberulent at ends; articles with thin flesh, 9.4 by 6.5 mm, ellipsoid, symmetrical, apex rounded. *Seeds* not seen.

(Description based on 1 collection made into 2 specimens.)

Distribution — Sulawesi.

Habitat — In rain forest at 2000–2800 m altitude.

Note — This species would appear to be related to *A. palawanensis* from Palawan, Borneo and Sulawesi from which it differs in the smaller leaves, solitary flowers and the ovary which is pubescent only around the base. It also shows some affinities with

those rare cases of *A. mujongensis* with only one flower in the inflorescence but differs in the smaller flowers, the pubescence on the ovary and the pubescence on the inside of the corolla lobes.

*Specimen studied*:

INDONESIA: Sulawesi Selatan: Enkerang District, Latimojong Mts, Bukit Poka Pindjang, *Kjellberg 3995* (type BO, S).

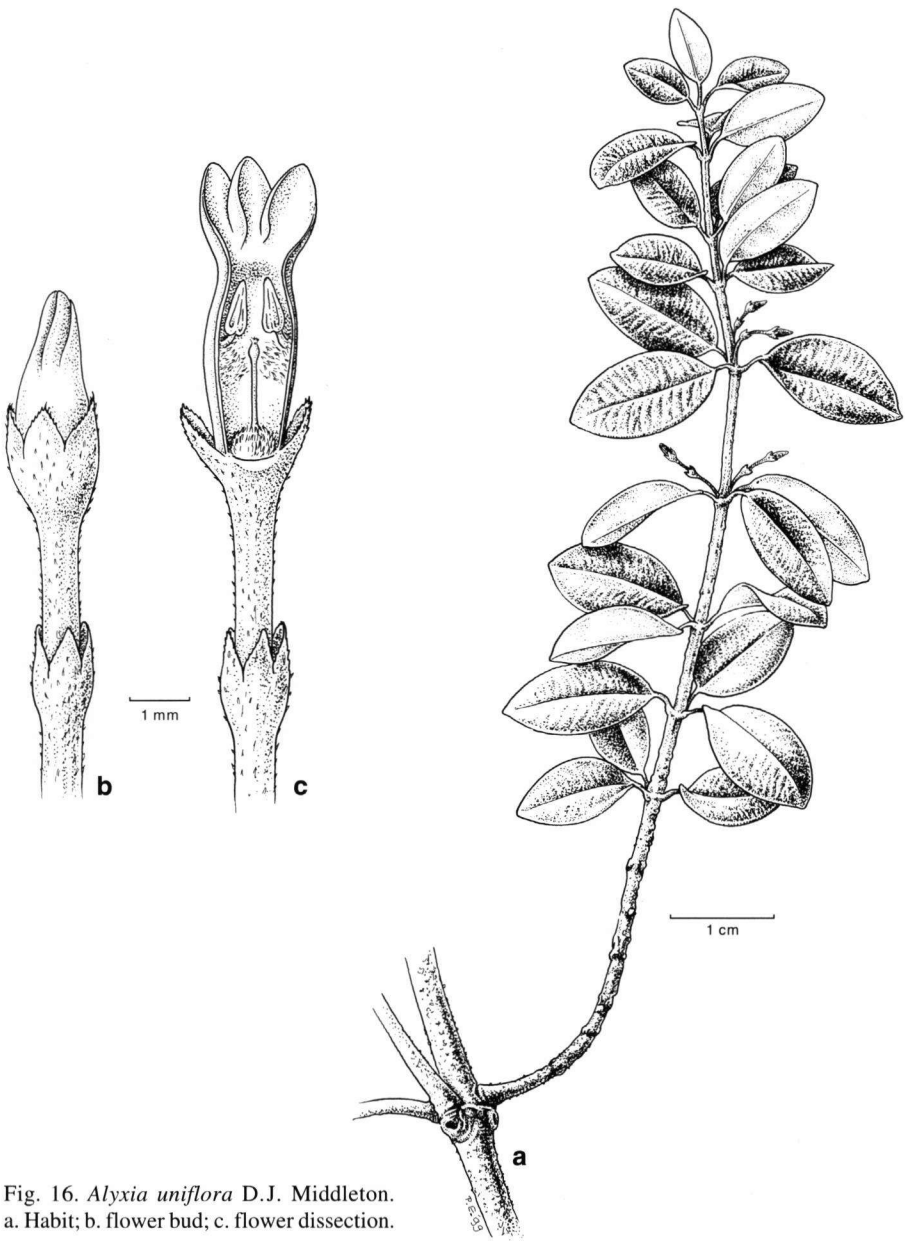



Fig. 16. *Alyxia uniflora* D.J. Middleton.
a. Habit; b. flower bud; c. flower dissection.

## 69. Alyxia vera D.J. Middleton, *spec. nov.* — Fig. 17, Map 44

Frutex scandens. Folia 3–4-verticillata coriacea vel subcoriacea elliptica apice acuminato saepe acuminato necnon retuso. Inflorescentiae circiter 4-flores glabrae. Corolla tubo circiter 3 mm longo lobis circiter 1.6 mm longis. Ovarium glabrum. Mericarpia 1-articulata articulis globosis 8.6–9.3 × 7.3–8.2 mm. — Typus: *C.B. Robinson 74* (holo L; iso BO, K, P, US) collected in 1913 from Indonesia, Ambon.

*Pulassarium verum* Rumph., Herb. Amboin. 5 (1747) 32, t. 20, nom. inval.
*Alyxia stellata* auct. non (J.R. Forst. & G. Forst.) Roem. & Schult.: Roxb., Fl. Ind. 2 (1824) 539; Spreng., Syst. Veg. 4, 2 (1827) 109; Roxb., Fl. Ind. ed. 2, 1 (1832) 699; Fl. Ind. (1874) 235.
*Alyxia laurina* auct. non Gaudich.: Merr., Inter. Rumph. Amb. (1917) 430.

Climbers. *Branchlets* weakly angled, not lenticellate, glabrous. *Leaves* in whorls of 3 or 4; petiole 0.1–0.3 cm long, glabrous; blade coriaceous or subcoriaceous, elliptic, apex acuminate, sometimes notched at the apex, base cuneate or decurrent onto petiole, margin flat, weakly undulate or not, 1–7 by 0.4–2.6 cm, 2–4.3 times as long as wide; midrib flattened or sunken above, intramarginal nerve absent, secondary veins 26–32 pairs, weakly prominent or indistinct above, obscure or weakly visible beneath, tertiary venation obscure above; glabrous beneath, glabrous above. *Inflorescence* axillary, a simple unbranched pleiochasium, delicate, glabrous, 0.7–1.5 cm long; peduncle 0.2–0.8 cm by 0.6–0.7 mm; bracts persistent, deltoid, 0.8–0.9 by 0.5 mm; bracteoles

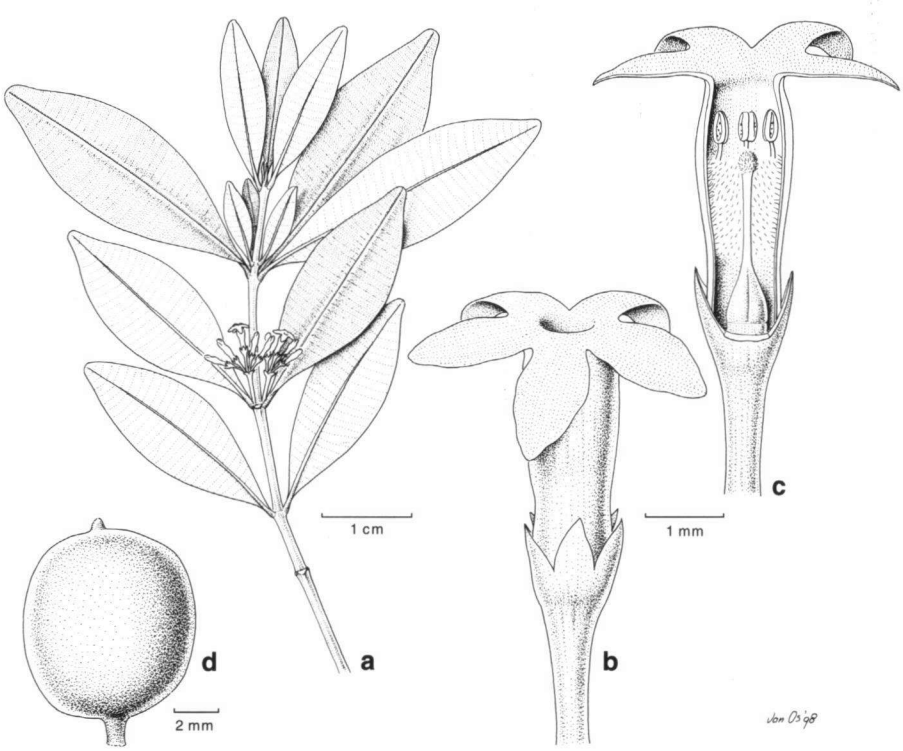



Fig. 17. *Alyxia vera* D.J. Middleton. a. Habit; b. flower; c. flower dissection; d. fruit (fl. *Unknown s.n.* (G); fr. *C.B. Robinson 74*).

absent; flowers 4; pedicels 2–3 mm long. *Sepals* ovate, apex obtuse to acute, 0.8–0.9 by 0.6–0.7 mm, 1.1–1.5 times as long as wide, ciliate or not, glabrous. *Corolla* bud head 1.4 mm long, 0.33 of bud length, ellipsoid, apex acute; tube slightly inflated, throat without thickening, 3 by 1.1 mm, 3.8 times as long as sepals, 1.9 times as long as lobes, glabrous outside, sparsely pubescent around stamens and more densely in a band beneath them inside; lobes ovate, apex obtuse, base auriculate, 1.6 by 1.2 mm, 1.3 times as long as wide, glabrous outside, glabrous inside, not ciliate. *Stamens* inserted at 2.3 mm from corolla base, 0.77 of tube length; anther apex 0.1 mm from corolla mouth, anthers 0.8 by 0.3 mm, 2.7 times as long as wide; filaments 0.4 mm long. *Ovary* 0.7 mm high, glabrous; style 1 mm long; pistil head 0.4 mm long. *Fruit* with 1 article in each string, glabrous, articles with thin flesh, 8.6–9.3 by 7.3–8.2 mm, globose, symmetrical, apex rounded. *Seeds* elliptic, ruminate, 8 by 6.8 by 6 mm. (Description based on 3 collections made into 7 specimens.)

Distribution — Moluccas.

Note — Despite the fact that this species is newly described here it has long been known as it is probably the *Pulassarium verum* of Rhumphius' Herbarium Amboinense (5: 32, t. 20). Roxburgh (1824, 1832) described a plant grown at the Calcutta Botanic Garden collected in Ambon, quite possibly also this species, but which he called *A. stellata,* a species from the Islands of the Pacific. No material of this cultivated plant was found in the loan received from Calcutta and no material which could be this plant was found in K or K-W. The *A. stellata* of Sprengel (1827) is probably also this plant but his use of the name *A. stellata* in Sprengel (1824) is correctly applied to the Pacific species. Merrill (1917) suggested it was *A. laurina*, a species with a very restricted distribution from on, or near, the island of Waigeo in Irian Jaya. It is possibly related to *A. halmaheirae*. The name derives from the specific epithet given to it by Rumphius (1747). It is only known from two collections, one flowering and one fruiting. A fruiting specimen has been chosen as the holotype as there are no duplicates of the flowering specimen from Geneva which is small and has little collection information including an unknown collector.

*Specimens studied*:

INDONESIA: Maluku: Ambon: s.l., *C. B. Robinson 74* (type BO, K, L, P, US); *Unknown s.n.* (G). Seram: Salahoetoe, *Eyma 3090* (BO).

## INSUFFICIENTLY KNOWN

*Alyxia heterophylla* Markgr., Bot. Jahrb. Syst. 61 (1927) 182.

The type specimen is lost and Markgraf himself was unable to place it in his work of 1977.

*Alyxia kurzii* Burkill, Kew Bull. (1935) 317.

New name for *Gynopogon breviflorus* (see there).

*Alyxia nervulosa* F. Muell., Fragm. 7 (1871) 131.

As noted by Green (1994) this name, attributed to a sterile specimen from Lord Howe Island, was not definitely accepted by Von Mueller at the time of publication and not subsequently mentioned by him and must, therefore, be considered to be not

validly published. In addition the description states that the leaves are opposite yet all the species of *Alyxia* known from Lord Howe Island have leaves which are at least 3-verticillate so there is every probability that this is not an *Alyxia* in any event.

*Alyxia schlechteri* H. Lév. var. *salicifolia* P.T. Li, Guihaia 4 (1984) 194.

I have been unable to get hold of type material of this taxon but from the description and locality it is more likely to be a synonym of *A. sinensis* than *A. schlechteri* as was suggested by Li et al. (1995)

*Brabejum pinnatum* Blanco, Fl. Filip. ed. 2 (1845) 40.

This name was placed by Fernández-Villar under *A. odorata* and by Merrill under *Alyxia sp.* although in the absence of a type or an adequate description its status is not certain.

*Gynopogon breviflorus* Kurz, For. Fl. Brit. Burm. 2 (1877) 177.

No material has been identified which is the type of this species and description is insufficient to identify it. There is a specimen from Burma, Yoongeleen, *Brandis 438*, which may be the type but it is impossible to know for sure and the specimen is sterile and could be *A. fascicularis* or *A. reinwardtii*.

*Gynopogon spec. D* Koord.-Schum., Syst. Verz. 1 (1913) 174.

I have been unable to find either of the specimens listed for this species. It is probably *A. reinwardtii* Blume.

*Pulassarium breviflorum* (Kurz) Kuntze, Revis. Gen. Pl. 2 (1891) 417.

New combination based on *Gynopogon breviflorus* (see there).

EXCLUDED TAXA (including those from outwith Asia and Malesia)

*Alyxia* sect. *Pteralyxia* (K. Schum.) Pichon, Mém. Mus. Nat. Hist. Nat., n.s. 27 (1948) 167. = **Pteralyxia** K. Schum.

*Alyxia actinophylla* A. Cunn., Bot. Mag. 61 (1834) t. 3313. — Type: *Cunningham 205*, W Australia, Montague Sound. = **Alstonia actinophylla** (A. Cunn.) K. Schum.

*Alyxia calophylla* Wall., Cat. (1829) 1607, nom. nud. = **Alstonia rostrata** C.E.C. Fisch.

*Alyxia ceylanica* Wight, Ic. Pl. (1848) t. 1293; Hook.f., Fl. Brit. Ind. 3 (1882) 636. — Type: *Walker in Herb. Wight s.n.*, Sri Lanka. — *Alyxia zeylanica* Walp., Ann. Bot. Syst. 3 (1852) 33, orth. var. — *Pulassarium ceylanicum* (Wight) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon zeylanicus* (Walp.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. = **Petchia ceylanica** (Wight) Livera.

*Alyxia coriacea* Wall. in Roxb., Fl. Ind. 2 (1824) 541. — *Pulassarium coriaceum* (Wall.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon coriaceus* (Wall.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — Type: *Wallich 1610* and *9065*, Malaysia, Penang. = **Melodinus coriaceus** Oliv. (note the name in *Melodinus* is heterotypic).

*Alyxia cuspidata* Wall. ex A.DC., Prodr. 8 (1844) 351, nom. inval. = **Melodinus orientalis** Blume.

*Alyxia erythrocarpa* Vatke, Bremen Abh. 9 (1885) 124. — *Gynopogon erythrocarpus* (Vatke) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4, 2 (1895) 151. — Type: *Hildebrandt 3232*, Madagascar, Antsiranana, Nosy Koma. = **Petchia erythrocarpa** (Vatke) Leeuwenb.

*Alyxia glaucescens* Wall. in Roxb., Fl. Ind. 2 (1824) 542, nom. rejic. (see Middleton & Gilbert, 1994).

*Alyxia legouixiae* Guillaumin, Ann. Mus. Col. Marseille sér. 2, 9 (1911) 196.
This name was a typographical error for *Alstonia legouixiae*.

*Alyxia lucida* Baker, J. Linn. Soc. 22 (1887) 503, nom. illeg. = **Petchia erythrocarpa** (Vatke) Leeuwenb.

*Alyxia macrocarpa* Koord., Meded. Lands Plantentuin 19 (1898) 622. — Type: *Koorders 16073*, Indonesia, Sulawesi, from Amoerang to Pakoe-oere. = **Melodinus orientalis** Blume.

*Alyxia madagascariensis* A. DC., Prodr. 8 (1844) 345. — *Pulassarium madagascariense* (A.DC.) Kuntze, Revis. Gen. Pl. 2 (1891) 417. — *Gynopogon madagascariensis* (A.DC.) K. Schum. in Engl. & Prantl, Nat. Planzenfam. 4, 2 (1895) 151. — Type: *Richard in Herb. Boisser*, North of Madagascar. = **Petchia madagascariensis** (A.DC.) Leeuwenb.

*Alyxia polysperma* Scott-Elliot, J. Linn. Soc. 29 (1891) 33. — Type: *Scott Elliot 2374*, Madagascar, Toliara, Fort-Dauphin. = **Petchia madagascariensis** (A.DC.) Leeuwenb.

*Alyxia robusta* Pichon, Mém. Mus. Nat. Hist. Nat. sér. B, Bot. 1 (1950) 163. — Type: *Hillebrand*, Hawaii, Oahu, Nuuanu. = **Pteralyxia laurifolia** (Lodd.) Leeuwenb.

*Alyxia serpentina* S. Moore, J. Linn. Soc. Bot. 45 (1921) 359. — Type: *Compton 2337*, New Caledonia, Taom. = **Rauvolfia semperflorens** (Müll. Arg.) Schltr.

*Alyxia torulosa* Boerl., Bull. Inst. Bot. Buitenzorg 5 (1900) 12. — Type: *Van Romburgh 54*, Indonesia, Kalimantan, Muara Teweh. = **Chilocarpus torulosus** (Boerl.) Markgr.

*Gynopogon hunterii* Roxb., Hort. Beng. (1810) 19, nom. nud. = **Hunteria zeylanica** (Retz.) Gardner ex Thwaites.

*Gynopogon lanceolatus* (Wall. ex A.DC.) Kurz, For. Fl. Brit. Burm. 2 (1877) 177. — Type: *Gomez in Wallich 1611*, Burma, Tavoy. = **Hunteria zeylanica** (Retz.) Gardner ex Thwaites.

*Gynopogon semperflorens* (Müll. Arg.) K. Schum., Nat. Pflanzenfam. 4, 2 (1895) 151. — *Alyxia semperflorens* (Müll. Arg.) Guillaumin, Bull. Soc. Bot. France 88 (1941) 364. = **Rauvolfia semperflorens** (Müll. Arg.) Schltr.

*Paralstonia platyphylla* Merr. ex E.E. Schneid., Bull. Bur. Forest. Philipp. Islands 14 (1916) 204, nom. nud. = **Ochrosia oppositifolia** (Lam.) K. Schum.

ACKNOWLEDGEMENTS

This work has been conducted with a European Union Training and Mobility of Researchers Marie Curie Research Training Grant for which I am most grateful. I would like to thank Dr. Marco Roos and Prof. Pieter Baas of the Nationaal Herbarium Nederland, Universiteit Leiden branch for giving me the opportunity to work in the institute; the collections and loans management staff of the Nationaal Herbarium Nederland, Universiteit Leiden branch; Dr. Martin Pullan for his considerable help with the databasing and DELTA work; Jan van Os, Piet Eggen and Holly Nixon for the illustrations; and Dr. Toon Leeuwenberg for his comments. I would also like to thank the directors and curators of the herbaria which have lent material or offered hospitality when I have visited.

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