

## STUDIES OF PAPUASIAN PLANTS, V\*

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THE present paper primarily contains a discussion of the Winteraceae of New Guinea and the Solomon Islands, while brief notes on two genera of Magnoliaceae and two genera of Monimiaceae (supplementary to the treatment in Jour. Arnold Arb. **22**: 231–252. 1941) are added. When no place of deposit is cited for specimens, they have been seen only in the herbarium of the Arnold Arboretum; otherwise the place of deposit is indicated by: (A) Arnold Arboretum, (NY) New York Botanical Garden.

## WINTERACEAE

The Winteraceae is now usually accepted as distinct from the Magnoliaceae, with which earlier taxonomists combined it. Morphological and anatomical studies show that the two families are entirely distinct. Prof. I. W. Bailey has for many years been assembling data on the interrelationships of the families of woody Ranales, and papers discussing some of these families are now in preparation. Many botanists who have worked with the winteraceous genera have declined to accept the pioneer work of van Tieghem (in Jour. de Bot. **14**: 275–297, 330–355. 1900), who defined the family as consisting of six genera, excluding *Illicium* L. Hutchinson (in Kew Bull. **1921**: 185–191. 1921), in discussing the Winteraceae, included *Illicium* but otherwise accepted van Tieghem's delimitations. Our preliminary studies convince us that most, if not all, of van Tieghem's genera are well-founded. An amplification of the relationships of these genera is being prepared, and the purpose of the present treatment is to record the novelties which have been discovered in Papuasia by recent collectors. In our region three genera of the Winteraceae occur, *Drimys* and *Bubbia* in New Guinea and *Belliolum* in the Solomon Islands.

## DRIMYS J. R. &amp; G. Forst.

In the only comprehensive work on this group of plants in New Guinea, Diels (in Bot. Jahrb. **54**: 240–245. 1916) used the name *Drimys* in its broader sense, to include species of *Bubbia*. He recognized six species of *Drimys* proper from New Guinea. In the same year, Ridley (in Trans. Linn. Soc. II. Bot. **9**: 11–13. 1916) proposed eight species of *Drimys*, of which all except one fall into the narrower concept of the genus. More recently, Pulle, Diels, and Gibbs have each described additional species, and at the present time 23 names of New Guinean species have been proposed which are referable to *Drimys* in the restricted sense (excluding *Bubbia*). Examination of the descriptions of these species indicates that

\* Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **22**: 497–528. 1941.

most of them are very distinct. The rapid growth of the number of species of *Drimys* recognized from New Guinea is due entirely to recent explorations in the higher mountains, and I am convinced that reductions to synonymy will not be extensive, although of course some changes in the nomenclatural status of various entities will be inevitable as our knowledge of the region increases. The collections now under study make necessary the description of six new species, all obtained by Mr. L. J. Brass.

***Drimys microphylla* sp. nov.**

Frutex dioicus (vel polygamo-dioicus?) epiphyticus multiramis 1–2 m. altus ubique glaber, ramulis gracilibus apicem versus leviter angulatis demum subteretibus et cinereis; foliorum parvorum petiolis gracilibus 1–2 mm. longis, laminis subcoriaceis in sicco fuscis elliptico-obovatis, (5–)6–10 mm. longis, (2–)3–5 mm. latis, basi gradatim angustatis, apice rotundatis, margine leviter recurvatis, costa supra subplana vel leviter impressa subtus elevata, nervis lateralibus ut videtur utrinsecus 3 vel 4 obscuris immersis; floribus ♂ axillaribus apicem ramulorum versus solitariis, pedicellis gracilibus sub anthesi 4–6 mm. longis; sepalis 2 calyptratis membranaceis obscure pellucido-glandulosis circiter 2 mm. longis mox caducis; petalis 4–6 submembranaceis lineari-oblongis vel anguste obovatis, 4–5 mm. longis, 0.8–1.2 mm. latis, apice obtusis vel subacutis; staminibus 14–18 toro parvo subconico congestis et plerumque 3-seriatis, 1–2 mm. longis (exterioribus quam interioribus conspicue brevioribus), filamentis basi et apice leviter contractis, apicem versus obscure glandulosis, loculis oblique terminalibus circiter 0.35 mm. longis longitudinaliter dehiscentibus; carpellis sterilibus plerumque solitariis raro 2 interdum nullis, quam staminibus brevioribus, ellipsoideis, compressis; fructu maturitate uniloculari subcarnoso ellipsoideo, circiter 6 mm. longo et 3 mm. lato, basi obtuso, apice obscure uncinato, carina stigmatum obscura, pericarpio copiose glanduloso, seminibus plerumque 3 pendulis obovoideis nigris levibus nitidis, circiter 4 mm. longis et 1.5 mm. latis, apice rotundatis, basi angustatis, leviter angulatis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, alt. 1800 m., *Brass 12006* (TYPE), Jan. 1939 (much-branched shrub 1–2 m. high, very abundant as an epiphyte on high trees in mossy-forest; flowers white).

This species is suggestive only of *D. vaccinioides* Ridley, than which it has slightly larger leaves and flowers and more numerous petals (4–6 rather than 2) and stamens (14–18 rather than about 8). There are some discrepancies between the description of *D. vaccinioides* (in *Trans. Linn. Soc. II. Bot.* 9: 13. 1916) and the illustration (l. c. *pl.* 1, *f.* 1–6). Thus, while the text describes the leaves as 5 mm. long and with 2 pairs of nerves, the plate shows them up to 7 mm. long and with about 4 pairs of nerves; the flowers are said to be 2 mm. broad, but the plate shows petals 3 mm. long. The stamens are apparently 1- or 2-seriate and the torus is more flattened than that of *D. microphylla*; *f.* 5 indicates that 2 carpels are sometimes present in the flowers of *D. vaccinioides*.

I have seen only staminate flowers of *D. microphylla*, although many were dissected; it is possible that pistillate flowers will prove to have fewer stamens. Most of Brass' specimens were taken from a staminate plant, but there are a few branchlets with fruits, apparently taken from a differ-

ent plant. The greatly reduced number of seeds, their strictly apical attachment, and their proportionately large size are noteworthy characters in *D. microphylla*; the fruits of *D. vaccinioides* have not yet been described.

***Drimys buxifolia*** Ridley in Trans. Linn. Soc. II. Bot. 9: 13. 1916.

BRITISH NEW GUINEA: Central Division, southwestern slope of Mt. Albert Edward, alt. 3680 m., *Brass* 4239 (A, NY), 4322 (A, NY) (trees 2–5 m. high, very common in forests and often massed on fringes; branches erect and slender; branchlets reddish; leaves shining, aromatic; flowers white; fruit red); Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4602 (A, NY) (erect-branched pale-foliaged tree to 3 m. high, fairly common on forest-borders; flowers white).

In referring the specimens from the Central Division of British New Guinea to *D. buxifolia*, I am depending upon Ridley's original description; the type was collected by the Wollaston Expedition on the slopes of Mt. Carstensz in Netherlands New Guinea. This description delineates a plant essentially similar to those I have cited in vegetative and floral features (assuming that Ridley's "pedunculis 1 mm. longis" is a misprint for "1 cm."). While the original description mentions the petals as 4 and describes them as only 3 mm. long, our plants have the petals usually 2 (rarely 3 or 4 in no. 4602) and 4.5–8 mm. long. As expansion of the petals is rapid after the opening of the calyx, measurements of them, unless made at maturity, are not very dependable. As regards the stamens, Ridley describes them as 20; no. 4602 has them 18–27, and nos. 4239 and 4322 have them 13–18. The carpels are said by Ridley to be 3; no. 4602 has them 1, 2, or 3, and the other *Brass* specimens have them 3–7.

Variation in number of floral parts has been considered grounds for the erection of species in *Drimys*, but I believe such numbers to be constant only within rather broad limits. Examination of the carpels of *Brass* 4602 shows that, although they appear to be fully formed, they are quite sterile and devoid of ovules; the carpels of nos. 4239 and 4322 are apparently fertile and no. 4322 has mature fruits with about 9 seeds each. It thus appears that the species in this section of *Drimys* are polygamo-dioecious. The staminate flowers of *D. buxifolia* appear to have 18–27 stamens, 1–3 carpels, and 2–4 petals, while the hermaphrodite flowers have 13–18 stamens, 3–7 carpels, and uniformly 2 petals. The species is characterized by its compact habit, its small coriaceous oblanceolate or obovate leaf-blades (usually 12–18 mm. long and 5–12 mm. broad) with 3–5 pairs of obscure short lateral nerves, and its small solitary flowers. Thus *D. buxifolia* is somewhat intermediate between such diminutive species as *D. vaccinioides* and *D. microphylla* on the one hand and *D. pittosporoides* Diels and its several allies on the other.

Two other species from the interior of Netherlands New Guinea of this relationship are *D. Versteegii* Diels and *D. reducta* Diels, separated from *D. buxifolia* on slight foliage differences and variations in number of floral parts. In order to ascertain their true status, the types of these three species should be compared, together with more recently collected material.

Dr. C. T. White has found that *Brass* 4239 and 4322 precisely match the specimens from the Musgrave Range of British New Guinea which

F. v. Mueller (in Trans. Roy. Soc. Vict. 1(2):1. 1889) referred to *D. hatamensis* Becc. However, Beccari's species is not of this relationship, having very much larger leaves and pistillate flowers without stamens. *Drimys buxifolia*, if my determination is correct, will probably be found as a very common species at high elevations throughout the central portion of New Guinea.

***Drimys oligandra* sp. nov.**

Frutex dioicus (vel polygamo-dioicus?) parvus epiphyticus ubique glaber, ramulis gracilibus subteretibus juventute rubiginosis; foliis oppositis vel suboppositis interdum ternatim verticillatis, petiolis gracilibus leviter complanatis 1–2 mm. longis, laminis chartaceis obscure pellucido-punctatis lanceolato-oblongis, 2.5–5 cm. longis, 5–13 mm. latis, basi gradatim angustatis, apice obtuse acuminatis, costa utrinque leviter elevata, nervis lateralibus utrinsecus 3 vel 4 debilibus anastomosantibus utrinque paullo prominulis, rete venularum immerso; floribus ♂ solis visis in axillis foliorum 1–3 dispositis, pedicellis gracilibus sub anthesi 17–21 mm. longis; sepalis 2 membranaceis parce glandulosis suborbicularibus, 1.5–2 mm. longis et latis, apice obtusis; petalis plerumque nullis raro 1 (oblongo-obovato, circiter 2.5 mm. longo et 1 mm. lato, apice rotundato); toro parvo, staminibus 4–6 uniseriatis sub anthesi 1.5–2 mm. longis, filamentis carnosissimis leviter complanatis, loculis circiter 0.6 mm. longis oblique verticalibus; carpellis 1 vel 2 sterilibus obovoideis sub anthesi circiter 0.8 mm. longis, carina stigmatum subapicali.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1300 m., Brass 12975 (TYPE), Feb. 1939 (small shrub, epiphytic in high rain-forest; branchlets and petioles red; flowers white).

*Drimys oligandra* is a very distinct species, apparently without close relatives, characterized by its narrow subacuminate leaves which are sometimes opposite and sometimes subternate. Its staminate flowers are very small, with proportionately long pedicels; petals are usually entirely lacking (in several buds dissected), but in one flower a single petal was found. The stamens are very few for the genus; while such a small number as 4–6 may be expected in the hermaphrodite flowers of certain species, I know of no other case in which they are so few in staminate flowers.

***Drimys rubiginosa* sp. nov.**

Frutex dioicus 1–1.5 m. altus ubique glaber, ramulis gracilibus leviter angulatis juventute rubiginosis demum cinereis; petiolis rugulosis 4–6 mm. longis, laminis subcoriaceis oblongo-obovatis, (2–) 3–5.5 cm. longis, (1–) 1.5–2.5 cm. latis, basi angustatis, apice obtusis, margine anguste recurvatis, costa supra subplana subtus prominente, nervis lateralibus utrinsecus 4–6 anastomosantibus utrinque leviter elevatis et interdum supra insculptis, rete venularum supra immerso subtus prominulo; floribus ♀ solis visis, 2–4 in axillis foliorum aggregatis, pedicellis gracilibus subcarnosis 5–10 mm. longis; sepalis 2 submembranaceis orbiculari-ovatis, 2.5–3 mm. longis et latis, apice obtusis; petalis 2 submembranaceis obovato-oblongis, 4–4.5 mm. longis, 1.8–2 mm. latis, obscure trinerviis, apice rotundatis; toro parvo, staminibus nullis; carpellis 2–4 obovoideo-ellipsoideis sub anthesi circiter 2 mm. longis et 1.3 mm. latis, apice obtusis vel subacutis, carina stigmatum ventrali circiter 1.5 mm. longa, ovulis circiter 16 irregulariter biseriatis;

fructibus ad 4 mm. longis, seminibus subclavatis circiter 1 mm. longis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12629 (TYPE), Feb. 1939 (shrub 1–1.5 m. high, in mossy-forest, common on an exposed summit; branchlets, petioles, leaf-margins, and pedicels red).

*Drimys rubiginosa* is characterized by having its small pistillate flowers completely lacking stamens. In foliage it suggests *D. pittosporoides* Diels, differing in its thinner leaf-blades with more obvious venation. The flowers described for *D. pittosporoides* are presumably hermaphrodite; they have 20–25 stamens and 5 or 6 carpels.

It seems likely that the staminate plant of *D. rubiginosa* is represented by *Brass* 9104 (Netherlands New Guinea: Lake Habbema, alt. 3225 m.; prostrate and ascending shrub to 30 cm. high, in heavy ground moss of forest). The leaves of this specimen are essentially similar to those of the type in texture, shape, and size, but have the veinlet-reticulation slightly closer. The two petals are similar to those of the type, the stamens are 12–14, and the sterile carpels are 1 or 2. Without seeing more ample staminate and pistillate material from the two cited localities, I cannot feel certain that the two specimens are conspecific.

***Drimys Brassii* sp. nov.**

Frutex vel arbor ad 4 m. alta compacta polygamo-dioica ubique glabra, ramulis teretibus rugulosis nigrescentibus demum cinereis; foliis alternatis vel suboppositis apicem ramulorum versus congestis, petiolis rugulosis complanatis inconspicuis 0.5–4 mm. longis, laminis coriaceis elliptico-vel obovato-oblongis, (1.5–)2–3.5 cm. longis, (4–)6–13 mm. latis, basi obtusis vel attenuatis, apice obtusis vel rotundatis, margine anguste vel interdum valde recurvatis, costa supra subplana subtus leviter elevata, nervis lateralibus utrinsecus 4–6 brevibus adscendentibus inconspicue anastomosantibus saepe obscuris, supra planis vel leviter impressis, subtus paullo prominulis, rete venularum immerso; floribus ♂ apicem ramulorum versus axillaribus, pedicellis rectis sub anthesi 7–10 mm. longis; sepalis 2 submembranaceis suborbicularibus, 4–5 mm. longis et latis, apice obtusis; petalis 2 submembranaceis anguste obovato-oblongis, 5.5–7 mm. longis, circiter 2.5 mm. latis, apice rotundatis; toro convexo, staminibus 12–27 sub anthesi 1.3–3.5 mm. longis (exterioribus minimis) 2–4-seriatis, filamentis carnosis subteretibus, loculis 0.7–0.8 mm. longis oblique verticalibus; carpellis sterilibus 2 vel 3 (raro 1) obovoideis 1.5–2 mm. longis, apice uncinatis, carina stigmatum ventrali conspicua; floribus hermaphroditis non visis; pedicellis sub fructu crassis 6–15 mm. longis, carpellis 1–3 maturitate rugulosis ellipsoideis, 6–9 mm. longis, 4–5 mm. latis, basi et apice rotundatis, carina stigmatum fere ad basim elongata, pericarpio ut videtur carnosio, seminibus 15–24 nigrescentibus nitidis obovoideis vel semiobovoideis subfalcatis, 2–3 mm. longis, 1.3–2 mm. latis, basi angustatis, apice rotundatis.

NETHERLANDS NEW GUINEA: Lake Habbema, alt. 3225–3300 m., *Brass* 9068 (TYPE), Aug. 1938 (very abundant in shrubberies and thickets as a shrub or tree 0.5–3 m. high; foliage brown; fruit purple-black), *Brass* 9536 (common as a low shrub [15–20 cm.] on sterile limestone slopes); 6 km. northeast of Lake Habbema, alt. 3000 m., *Brass* 10671 (shrub 30–80 cm. high, plentiful in shrubberies of an open peaty area in forest); 2 km. east of Wilhelmina-top, alt. 3800 m., *Brass & Myer-Drees* 10126 (tree or shrub attaining 4 m., abundant in low forest clumps about timber-line), *Brass & Myer-Drees* 10303 (large shrub in subalpine forest; branchlets reddish; fruit black).

*Drimys Brassii* is characterized by its stiff compact polygamo-dioecious habit, its small coriaceous leaf-blades which are irregularly crowded toward apices of branchlets, its two narrowly obovate-oblong petals, its 2-4-seriate stamens (in staminate flowers) which are usually about 20 in number, and its 1-3 carpels (apparently in both staminate and hermaphrodite flowers, although the latter were not seen). The only described species to which it can be closely related are *D. Lamii* Diels and *D. pittosporoides* Diels. In foliage it seems closest to *D. Lamii*, but that species is described as having about 5 "tepala," presumably petals. While stability in the number of petals is not too dependable in *Drimys*, those species which commonly have 2 petals are more stable in this respect than the species with numerous petals. It is very doubtful that *D. Brassii*, in many flowers of which only 2 petals have been found, will prove ever to have 5 petals. The new species differs from *D. pittosporoides* in its smaller and proportionately narrower leaf-blades; that species is said to have 5 or 6 carpels, while the staminate flowers of our species have only 1-3 carpels and the hermaphrodite flowers (judging from the fruits) a similar number.

The species of this relationship are difficult to understand without access to the types and a larger series of specimens. The proposed new species is based primarily upon the three collections from the vicinity of Lake Habbema, which are quite identical in foliage. *Brass* 9068 and 9536 include both staminate and fruiting material, apparently gathered from different individuals, while no. 10671 is in fruit only. The two cited specimens from Mt. Wilhelmina almost certainly belong here. *Brass & Myer-Drees* 10126 was taken from a staminate plant, while no. 10303 is in fruit. Both staminate flowers and fruits are similar to those from Lake Habbema, but the plants have slightly larger leaves and more obvious lateral nerves. My description covers these two specimens.

Two other specimens from Mt. Wilhelmina which probably belong here are *Brass & Myer-Drees* 10111 and 10309; the former is said to represent one of the chief species at timber-line. They differ from the specimens above-described in minor details of foliage, and both are inclined to have larger (usually 1-carpellate) fruits with as many as 50 seeds per carpel.

***Drimys macrantha* sp. nov.**

Arbor erecta 2-3 m. alta dioica (vel polygamo-dioica?) ubique glabra, ramulis crassis nigrescentibus apicem versus 3-6 mm. diametro subteretibus rugulosis; foliis apicem ramulorum versus irregulariter dispositis, petiolis rugulosis supra leviter canaliculatis 3-7 mm. longis, laminis coriaceis obovatis, 5-9 cm. longis, 2-4 cm. latis, basi attenuatis et in petiolum decurrentibus, apice acutis vel breviter cuspidatis, margine anguste recurvatis, costa supra leviter subtus manifeste prominente, nervis lateralibus utrinsecus 9-12 cum aliis debilioribus interspersis erecto-patentibus supra prominulis etiam leviter insculptis subtus acute prominulis, rete venularum conspicuo copiose anastomosante utrinque valde prominulo; floribus ♂ apicem ramulorum versus in fasciculis laxis paucifloris dispositis, pedicellis sub anthesi 25-35 mm. longis saepe complanatis; sepalis 2 submembranaceis valde concavis suborbicularibus, 8-10 mm. longis et latis, apice rotundatis; petalis 5-7 inaequalibus submembranaceis obovatis, 10-14 mm.

longis, 4–6 mm. latis, basi conspicue angustatis, apice rotundatis, pinna-tinerviis; staminibus 55–65 toro conspicuo convexo 4- vel 5-seriatis, sub anthesi 2–4 mm. longis, filamentis carnosis subteretibus, loculis 0.8–1 mm. longis oblique subverticalibus; carpellis sterilibus plerumque 3 ellipsoideo-obovoideis circiter 2.5 mm. longis, carina stigmatum conspicua ventrali et apicali; floribus ♀ vel hermaphroditis non visis; pedicellis sub fructu crassis complanatis, carpellis 2 vel 3 rugosis obovoideo-ellipsoideis, 7–9 mm. longis, 4–5 mm. latis, basi breviter stipitatis, apice rotundatis, carina stigmatum ad basim ventrali, pericarpio carnosio, seminibus 15–20 castaneis nitidis falcato-ellipsoideis circiter 3 mm. longis et 2 mm. latis valde complanatis, basi subacutis, apice rotundatis.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4519 (A, TYPE, NY), July 16, 1933 (small stiff-branched tree 2–3 m. high, common on forest-borders; leaves stiff, with recurved apex and margins, glaucous when young; flowers white).

*Drimys macrantha* is closely related only to *D. grandiflora* Ridley, from which it differs in its petiolate leaves which, although paler beneath, are not "white," its more numerous secondaries and more obvious veinlet-reticulation, its shorter pedicels, and its even larger flowers. It is also suggestive of *D. reticulata* Diels and *D. cyclopum* Diels, differing from both in its broader leaf-blades, much larger flowers, more numerous stamens, etc. The new species resembles *D. hatamensis* Becc. in foliage, but that species also has smaller flowers and 2 (sometimes 3 or 4) petals.

***Drimys arfakensis*** Gibbs, Phyt. Fl. Arfak Mts. 135. 1917.

NETHERLANDS NEW GUINEA: Arfak Mts., in mossy-forest along the track to Angi from Momi, alt. 1800 m., *Kanehira & Hatusima* 13408 (shrub 1 m. high; flowers white).

The cited specimen shows some points of departure from the original description, but nevertheless it seems to represent a form of Gibbs' species; it bears staminate flowers, whereas the type has only pistillate. Our specimen differs from the type in having its leaf-blades smaller and with immersed veinlets and its petals 7–9 (rather than 12–14), shorter, and proportionately broader. The stamens are 19–22, the sterile carpels 4 or 5.

***Drimys reticulata*** Diels in Bot. Jahrb. 54: 242. 1916.

NETHERLANDS NEW GUINEA: 15–18 km. southwest of Bernhard Camp, Idenburg River, alt. 1800–2150 m., *Brass* 11857 (very slender tree 3–4 m. high, a characteristic species of early second growths in mossy-forest), *Brass* 12149 (slender tree 3 m. high, plentiful in open places in mossy-forest; leaves glaucous beneath; flowers white), *Brass* 12494 (slender tree 2–4 m. high, one of the principal species in young seral growths in mossy-forest; leaves very glaucous beneath).

The cited specimens agree well with the description of *D. reticulata*, otherwise reported only from the type, collected in the adjacent Sepik region of Northeastern New Guinea. Although Brass' field notes indicate that the leaves are glaucous beneath when fresh, when dried they appear to be concolorous, as stated in Diels' description. The original specimen is in fruit, and therefore I add a description of the inflorescences based on the Brass collections. Of the cited numbers, 12494 is staminate, 12149 is pistillate, while the specimens of 11857, apparently taken from two trees, represent both sexes. If my identification is correct, the species is characterized by its strictly dioecious habit, small flowers, 4–6 petals, and re-

duced number of ovules. A comparison with the type is desirable before the following description can be definitely accepted as pertaining to *D. reticulata*.

Slender dioecious tree; flowers in small axillary fascicles of 2–4 (occasionally solitary) near ends of branchlets, the pedicels slender, 8–15 mm. long at anthesis; ♂ flowers: sepals 2, membranaceous, obscurely pellucid-glandular, broadly ovate, 2.5–3 mm. long and broad, subacute at apex; petals 4–6, submembranaceous, obscurely glandular, narrowly obovate-oblong, 4–5 mm. long, 1.5–1.8 mm. broad, obtuse at apex; torus small, the stamens 15–20, at anthesis 1–1.8 mm. long, 2- or 3-seriate, the filaments subterete, the locules about 0.4 mm. long, obliquely subvertical; carpels 2 or 3, sterile, ovoid-ellipsoid, about 1 mm. long, subacute at apex, the stigmatic ridge ventral, extending to base; ♀ flowers similar to the ♂ but without stamens, the carpels 3–6, ellipsoid, about 1.5 mm. long at anthesis, the stigmatic ridge ventral-apical, extending about halfway to base, the pericarp carnose, the ovules 2–4.

***Drimys obovata* sp. nov.**

Arbor gracilis 5–8 m. alta polygamo-dioica (vel dioica?) ubique glabra, ramulis subteretibus rugulosis apicem versus 2–4 mm. crassis brunneis vel cinereis; foliis apicem ramulorum versus irregulariter dispositis, petiolis rugulosis crassis 3–10 mm. longis, laminis coriaceis anguste obovatis, 8–17 cm. longis, 2–6 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice conspicue et plerumque acute cuspidatis vel breviter acuminatis, margine anguste sed valde recurvatis, costa valida supra elevata subtus prominente, nervis lateralibus utrinsecus 10–18 subrectis anastomosantibus utrinque valde prominulis, rete venularum utrinque leviter prominulo vel supra obsoleto; floribus ♂ ramulorum apice vel apicem versus congestis in fasciculis 6–12-floris dispositis, pedicellis gracilibus saepe complanatis sub anthesi 1–3.5 cm. longis; sepalis 2 submembranaceis late ovatis vel suborbicularibus, 5–6 mm. longis et latis, apice obtusis; petalis 2 submembranaceis anguste obovato-oblongis, 7–11 mm. longis, 1.5–2 mm. latis, apice obtusis; toro convexo, staminibus 35–55 circiter 4-seriatis sub anthesi 2–6 mm. longis (exterioribus minimis), filamentis carnosis subteretibus, loculis subverticalibus 0.8–1.2 mm. longis basi leviter divergentibus; carpellis sterilibus 2–4 ellipsoideis 2–3.5 mm. longis, carina stigmatum ventrali longa; floribus hermaphroditis non visis; pedicellis sub fructu ad 3.5 cm. longis, carpellis 4–6 (vel abortu paucioribus) obovoideis, maturitate 5–7 mm. longis et 4–5 mm. latis, basi breviter stipitatis, apice rotundatis, pericarpio carnosio, stigmatibus elongatis, seminibus 10–16 nigrescentibus nitidis obovoideis complanatis, circiter 2.5 mm. longis et 1.5 mm. latis, basi angustatis, apice rotundatis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, alt. 2200–2350 m., *Brass 11295* (TYPE), Nov. 1938 (undergrowth tree 5–8 m. high, common on ridges in fagaceous forest), *Brass 11312* (slender tree 5–6 m. high, common on banks of forest streams); 9 km. northeast of Lake Habbema, alt. 2750–2800 m., *Brass 10567* (slender tree 6 m. high, on open bank of a stream in mossy-forest; leaves concave; pedicels flat, red), *Brass 10570* (tree 5 m. high, on open bank of a stream in forest; flowers white).

The cited specimens all bear staminate flowers except no. 11312, from which the fruits are described. *Drimys obovata* is characterized by its large



coriaceous narrowly obovate leaves with inconspicuous venation, its large flowers, and the large number of stamens in its staminate flowers. Its only close relatives seem to be *D. coriacea* Pulle and *D. dictyophlebia* Diels. From the first of these, the new species is distinguished by its more slender branchlets, proportionately narrower and more obviously pointed leaf-blades, often immersed and less obvious veinlets, and its 2 (rather than 3 or 4) petals. From *D. dictyophlebia*, *D. obovata* differs in having the costa of its leaf-blades raised rather than impressed above, its nerves less obvious on both surfaces, and its flowers larger and with more numerous stamens. From the description, I believe that *D. dictyophlebia* is represented in the present collection by the following fruiting specimen: Netherlands New Guinea: 4 km. southwest of Bernhard Camp, Idenburg River, alt. 900 m., *Brass* 13704 (tree 3–5 m. high, common in undergrowth of semi-open places in *Agathis* forest; leaves aromatic, subbullate; petioles red).

***Drimys hatamensis*** Becc. Malesia 1: 185. 1877.

NETHERLANDS NEW GUINEA: Arfak Mts., Angi, in forest by Iray, Lake Giji, alt. 1900 m., *Kanehira & Hatusima* 13785, 13935 (trees 2–3 m. high; petals white).

The cited specimens, which, like the type, come from the Arfak Mountains, agree with Beccari's description in all essential details and I have little hesitation in referring them to his species. Beccari described only the pistillate flowers, in which the petals are said to be two. *Kanehira & Hatusima* 13935 bears staminate flowers, in which the petals appear to be 2, 3, or 4 (in several buds examined). Both sepals and petals are conspicuously pellucid-glandular; the petals, which are readily caducous, are about 8 mm. long and 2.5 mm. broad at anthesis. The stamens are 28–32 and 2–4 mm. long; the carpels are sterile and 1 or 2 in number. Beccari states that the pistillate flowers have no stamens and 4 carpels. Number 13785, bearing immature fruits, has the carpels 2–5.

Diels (in Bot. Jahrb. 54: 242. 1916) referred three collections from the Sepik region of Northeastern New Guinea to *D. hatamensis*, and my present collections contain several specimens from British and Netherlands New Guinea which are very close to Beccari's species. These are the following:

NETHERLANDS NEW GUINEA: Lake Habbema, alt. 3225 m., *Brass* 9362, 9491 (trees to 3 m. high, frequent in forest undergrowth); 9 km. northeast of Lake Habbema, alt. 2800 m., *Brass* 10246 (tree 5 m. high). BRITISH NEW GUINEA: Central Division, Mt. Obree, alt. about 2400 m., *Lane-Poole* 347; Mt. Tafa, alt. 2300 m., *Brass* 4046 (A, NY), 4124 (A, NY) (common large shrubs in mossy-forest); Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4506 (A, NY) (spreading shrub in forest-borders; flowers white).

Of these specimens, only *Brass* 4506 and *Lane-Poole* 347 bear staminate flowers, the others being in fruit. The staminate flowers are essentially similar to those of the Kanehira and Hatusima collection, but the petals are slightly smaller and scarcely glandular, and the stamens are 24–30. Differences among the cited specimens in foliage are intangible, those from the Arfak Mountains having the veinlet-reticulation slightly less obvious. On the whole, I believe that Beccari's concept may well be taken to include the specimens from the central portion of New Guinea, but this conclusion

should be verified by future study. The species represented by the Brass and Lane-Poole specimens is apparently quite common in the Central Division. Lane-Poole (Rep. For. Res. Papua 86. 1925) referred his plant to *D. cyclosum* Diels, a species with leaf-blades proportionately much narrower. Dr. C. T. White states that the above-cited Brass specimens from the Central Division are similar to plants which F. v. Mueller (in Trans. Roy. Soc. Vict. **1**(2): 1. 1889) determined as *D. piperita* Hook. f. *Drimys piperita* is a Bornean species with 8–10 petals, and its occurrence in New Guinea is questionable; Diels has not mentioned this species as occurring in New Guinea and none of my specimens suggest it.

#### BUBBIA v. Tiegh.

Originally proposed (in Jour. de Bot. **14**: 293. 1900) for a group of seven species from Lord Howe Island and New Caledonia, *Bubbia* was first used for a New Guinean species by Dandy (in Jour. Bot. **72**: 40. 1934). Burt (in Hook. Ic. Pl. **34**: pl. 3315. 1936) noted that several of the New Guinean species referred to *Drimys* in reality belong in *Bubbia*; he indicated that *Bubbia* is a well-marked genus and made some of the required combinations. While I cannot accept Burt's reduction of *Belliolum* to *Bubbia*, the latter seems excellently separated from *Drimys*, and most workers in this group will not agree with Diel's recombination of the two genera (in Bot. Jahrb. **54**: 240–245. 1916).

It is now obvious that *Bubbia* is highly developed in New Guinea. Diels (l. c.) recognized six species in this group (*Drimys*, *pro parte*), Ridley added one (*Drimys umbellata*), and on the basis of recently collected material I find it necessary to propose eleven more. I am inclined to question Burt's transfer of *Drimys parviflora* Ridley to *Bubbia*; from the description this appears to be a true *Drimys*. As now constituted, *Bubbia* contains 19 species from New Guinea, one from Queensland, two from Lord Howe Island, and eight from New Caledonia. A full appraisal of these species cannot be made with the material at hand, but from the descriptions most, if not all, appear to be well founded.

I am indebted to Prof. I. W. Bailey for calling to my attention Burt's discussion of the genus *Tetralthalamus* (in Kew Bull. **1938**: 458–460. 1938). This genus may now be definitely reduced to *Bubbia*, as noted below under *B. montana*.

#### **Bubbia bullata** (Diels) comb. nov.

*Drimys bullata* Diels in Bot. Jahrb. **54**: 243. 1916.

Although *Drimys bullata*, from Northeastern New Guinea, was described on the basis of a sterile specimen, there seems no reason to doubt its place in the genus *Bubbia*. Diels compares it with *Drimys Ledermannii* [*Bubbia Ledermannii* (Diels) Burt], from which it is said to differ in its bullate leaf-blades with the nerves impressed above and sharply prominent beneath.

#### **Bubbia montana** (Lauterb.) comb. nov.

*Tetralthalamus montana* Lauterb. in K. Schum. & Lauterb. Fl. Deutsch. Schutzg. Südsee Nachtr. 319. 1905, in Bot. Jahrb. **58**: 15. f. 4. 1922; Engl. in E. & P. Nat. Pfl. ed. 2. **21**: 229. f. 100. 1925.

*Tetralthalamus*, originally described as a monotypic genus of Guttiferae

related to *Garcinia*, was discussed in a very informative paper by Burtt (in Kew Bull. **1938**: 458–460. 1938), who placed it in the Winteraceae as a close relative of *Bubbia*. In all its morphological and anatomical details, *Tetralthalamus*, according to Burtt, falls into the Winteraceae, and there can be no doubt that this is the correct position for the plant. The only point in which *Tetralthalamus* is at variance with *Bubbia* is in the coherence of its carpels, and one may doubt whether this is quite as complete as implied in figures *F* and *G* of Lauterbach's illustration, cited above. In figures *C* and *E* of this plate there is evidence that the coherence of the carpels is only superficial. In some other species of *Bubbia* (e. g. *B. pachyantha* A. C. Sm.) a coherence of the carpels in flower has been noted, and this in itself cannot be used as a character to separate *Tetralthalamus* from *Bubbia*. I have no hesitation in going a little farther than Burtt and definitely reducing Lauterbach's genus to *Bubbia*. According to the original description and the illustration of *Tetralthalamus montanus*, the essential details of the species are as follows:

Petiole about 15 mm. long; leaf-blades elliptic-obovate, 15–18 cm. long, 4–6 cm. broad, obtusely cuspidate at apex, with about 11 pairs of primary lateral nerves ascending at an angle of about 50° and prominulous on both surfaces, the veinlets forming a reticulum; inflorescence terminal, apparently sessile and with about 3 primary rays, these twice-branched; pedicels 3–4 mm. long; calyx with 3 small lobes; petals 8, elliptic-oblong, the outer ones about 3.5 mm. long and 2 mm. broad, the inner ones smaller; stamens 12, about 1 mm. long and biseriate, with horizontal apical locules; carpels 4, adnate in flower, the stigmatic ridge short, strictly apical, the ovules 3, pendulous.

The species is thus far known only from *Schlechter 13984*, from the Bismarck Mountains of Northeastern New Guinea at an altitude of 1200 m. Its relationship is with *B. oligocarpa* (Schlecht.) Burtt, than which it has smaller leaves and flowers, more numerous petals, fewer stamens with strictly horizontal (rather than oblique) anther-locules, and 4 adnate rather than 2 free carpels. A more distant relative of *B. montana* is *B. sylvestris* (described below).

***Bubbia calothyrsa*** (Diels) comb. nov.

*Drimys calothyrsa* Diels in Bot. Jahrb. **54**: 244. 1916.

According to the original description, this species, thus far known only from the Sepik region of Northeastern New Guinea, is characterized by its large coriaceous leaf-blades with about 25 pairs of lateral nerves, these spreading at nearly right angles from the costa. The inflorescence is said to be ample and pedunculate, the petals up to 10 mm. long, the stamens 25–30, and the carpels 3–6.

***Bubbia sororia*** (Diels) comb. nov.

*Drimys sororia* Diels in Bot. Jahrb. **54**: 245. 1916.

Like its close relative *B. calothyrsa*, *B. sororia* is known only from the Sepik region and has large leaf-blades with spreading nerves. It differs from its ally in being more slender throughout, with the leaf-blades more obviously nerved beneath, the petals smaller, and the stamens fewer.

***Bubbia pachyantha* sp. nov.**

Arbor pauciramosa ad 5 m. alta ubique glabra, ramulis crassis (apicem versus 3–7 mm. diametro) nigrescentibus rugosis subteretibus; petiolis crassis rugulosis 9–17 mm. longis anguste alatis; laminis crasse coriaceis oblongo-ellipticis, 6.5–10 cm. longis, 2.5–4 cm. latis, basi obtusis et in petiolum conspicue decurrentibus, apice obtusis et interdum inconspicue mucronulatis, margine valde revolutis, costa valida rugosa supra elevata subtus prominente, nervis lateralibus utrinsecus 15–20 inconspicuis valde patentibus utrinque prominulis et cum rete venularum anastomosantibus; inflorescentiis terminalibus vel apicem ramulorum versus axillaribus pauciramulosis paniculatis 3–6 cm. longis, pedunculis crassis rugulosis angulatis ad 3 cm. longis, ramulis paucis angulatis, pedicellis similibus ad 9 mm. longis (floribus interdum subsessilibus); calyce crasse coriaceo subrotato 6–8 mm. diametro, margine irregulariter 5–7-lobato, lobis ovato-deltaideis circiter 1.5–2 mm. longis et 2–4 mm. latis, apice rotundatis vel obtusis, sinibus acutis; petalis 4 crasse coriaceis sub anthesi patentibus obovato-oblongis, 8–11 mm. longis, 6–7 mm. latis, basi obtusis, apice rotundatis; toro crasso columnari leviter quadrangulato circiter 2 mm. alto et 3 mm. diametro; staminibus plerumque 12 crasse coriaceis 2-seriatis obovoideis leviter complanatis, 2–2.5 mm. longis, filamentis apicem versus circiter 2 mm. latis basim versus contractis, loculis apicalibus vel subobliquis discretis circiter 1 mm. longis; carpellis 3 vel 4 sub anthesi adnatis obovoideis circiter 3 mm. longis angulatis, carina stigmatum ventrali et apicali, ovulis circiter 20 ut videtur 2-seriatis; calyce sub fructu persistente, carpellis maturis 3 vel 4 discretis et divergentibus, irregulariter obovoideo-subglobosis, 8–10 mm. diametro, carina stigmatum indistincta praeditis, pericarpio sublignoso; seminibus circiter 20 endocarpio spongioso irregulariter congestis nigris oblongo-ellipsoideis, circiter 3 mm. longis et 1.2 mm. latis, falcatis, basi et apice rotundatis.

BRITISH NEW GUINEA: Central Division, southwestern slope of Mt. Albert Edward, alt. 3550–3600 m., *Brass* 4371 (A, TYPE, NY), June 29, 1933 (sparsely branched tree about 5 m. high, fairly common in forests; leaf-blades very stiff, the margins much recurved toward base, the upper surface dark, dull green, the lower surface gray, the costa yellowish; petals cream-colored, at length red; seeds black).

This remarkably distinct species of *Bubbia* is characterized not only by its comparatively small coriaceous leaf-blades and winged petioles, but also by the leathery texture of all its floral parts and the fact that its 3 or 4 carpels are firmly adnate at anthesis along the ventral sutures; thus the gynaecium has the appearance of a compound ovary with a 3- or 4-parted stellate stigma. As the fruits develop, however, the carpels separate and mature in normal fashion for the genus. The seeds are unusually long and sharply curved. The stamens are usually quite regularly arranged, one being at the base of each petal and a superposed pair alternate with each pair of petals.

***Bubbia monocarpa* sp. nov.**

Arbor ad 2.5 m. alta glabra, ramulis rugulosis subteretibus apicem versus 4–6 mm. crassis; petiolis crassis semiteretibus 11–18 mm. longis; laminis chartaceis anguste elliptico-obovatis, 20–28 cm. longis, 7–9.5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice rotundatis vel obtusis, margine subplanis, subtus glaucis et ut videtur farinoso-ceriferis, costa supra leviter

impressa subtus prominente, nervis lateralibus primariis utrinsecus 15–17 anastomosantibus angulo  $65-75^{\circ}$  a costa abeuntibus utrinque valde prominulis, secundariis debilioribus et rete venularum intricato utrinque leviter prominulis; inflorescentia terminali subsessili, radiis primariis circiter 4 adscendentibus gracilibus sub anthesi ad 8 cm. longis bis ramosis granulato-rugulosis; pedicellis gracilibus 3–5 mm. longis; calyce chartaceo rotato suborbiculari 3–3.5 mm. diametro vix lobato, margine subintegro; petalis 5 subcarnosis obovato-ellipticis, sub anthesi 3.5–5 mm. longis et 2–3 mm. latis, apice rotundatis; toro inconspicuo, staminibus circiter 17 carnosus obovoideis 2-seriatis 1.2–1.5 mm. longis, filamentis complanatis parce luteo-glandulosis apicem versus 0.6–1 mm. latis, loculis horizontalibus apicalibus 0.3–0.4 mm. longis; carpello unico obovoideo sub anthesi 1–1.5 mm. longo, apice rotundato et carina stigmatum elongata sub anthesi circiter 1.5 mm. longa coronato, loculo transverso, ovulis 30–40 pluriseriatis e placentis elongatis pendulis.

NETHERLANDS NEW GUINEA: Dalman, 45 km. inland from Nabire, alt. 400 m., *Kanehira & Hatusima 12105* (TYPE), Mar. 1, 1940 (tree 2.5 m. high, in mossy-forest; flowers violet).

*Bubbia monocarpa* is related to *B. oligocarpa* (Schlecht.) Burtt, from which it differs in its shorter and more slender inflorescence, its essentially circular and unlobed calyx, its 5 (rather than 6 or 7) petals, which are smaller, its essentially horizontal (rather than oblique) anther-locules, and its solitary carpel. From *B. longifolia* (described below), the new species differs in obvious foliage-characters, as well as in its calyx, smaller and fewer petals, and solitary carpel. The species of this alliance are characterized by their strictly apical stigmatic ridge and pendulous ovules.

***Bubbia longifolia* sp. nov.**

Arbor parva gracilis ad 1.5 m. alta glabra, ramulis teretibus granulato-rugulosis apicem versus circiter 6 mm. crassis; petiolis crassis angulatis vel anguste alatis 12–15 mm. longis; laminis chartaceis obovato-oblancheolatis, 35–40 cm. longis, 9–11 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice inconspicue cuspidatis vel subacutis, margine inconspicue recurvatis, supra in sicco fusco-olivaceis subtus glaucis et ut videtur farinoso-ceriferis, costa supra valde impressa subtus prominente, nervis lateralibus primariis utrinsecus 20–22 angulo  $55-60^{\circ}$  a costa abeuntibus valde anastomosantibus utrinque acute elevatis, secundariis similibus sed debilioribus, rete venularum intricato utrinque prominulo vel subtus sub-immerso; inflorescentia terminali vel subterminali subsessili, radiis primariis circiter 3 gracilibus sub anthesi ad 10 sub fructu ad 18 cm. longis 2- vel 3-plo ramosis leviter angulatis; pedicellis gracilibus sub anthesi 3–5 mm. longis demum longioribus; calyce parvo 3-lobato, lobis patentibus chartaceis deltoideo-ovatis, 1–1.5 mm. longis, 2–2.5 mm. latis, apice obtusis vel apiculatis; petalis tenuiter carnosus in alabastro agglutinatis ut videtur circiter 6 oblongo-obovatis, ad 7 mm. longis et 3.5 mm. latis, apice rotundatis; toro inconspicuo, staminibus 14–16 coriaceis plerumque 2-seriatis, circiter 2.5 mm. longis, filamentis complanato-obovoideis apicem versus 0.8–1.2 mm. latis, loculis apicalibus horizontalibus contiguis circiter 0.5 mm. longis; carpellis 3 obovoideis subcomplanatis, sub anthesi 2–3 mm. longis, basim versus angustatis, apice rotundatis et carina lineari cristiformi praeditis, loculo transverso, ovulis 24–32 irregulariter 2-seriatis pendulis; carpellis

maturitate ut videtur solitariis, fructu subgloboso ad 3 cm. diametro, carina stigmatum inconspicua, pericarpio crasse carnosio; seminibus numerosis turbinatis, 7–9 mm. longis, circiter 5 mm. latis, conspicue et irregulariter plicato-rugosis, basi abrupte contractis, apice rotundatis, in pulpa copiosa nidulantibus, testa tenui dura, endospermo oleaginoso-farinaceo.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, alt. 175 m., *Brass* 13868 (TYPE), Apr. 1939 (undergrowth tree 1.5 m. high, in rain-forest of lower mountain-slopes; flower-buds red; fruit pink).

*Bubbia longifolia* occurs at an unusually low altitude for the genus in New Guinea and has the longest leaves thus far known in *Bubbia*. The obovate-lanceolate leaf-blades, which are glaucous and apparently farinose-ceriferous beneath, amply characterize the species. Its closest relative appears to be *B. oligocarpa* (Schlecht.) Burtt, from which it differs in its longer leaves, fewer stamens with strictly horizontal rather than obliquely apical-lateral anther-locules, and 3 rather than 2 carpels. The fruit of the new species is large for the genus and the seeds are noteworthy for their coarsely plicate-rugose surface. Another relative of *B. longifolia* may be *B. polyneura* (Diels) Burtt, which, according to the description, has leaf-blades with about 40 pairs of lateral nerves and an inflorescence with comparatively numerous and strong rays.

***Bubbia sylvestris* sp. nov.**

Frutex vel arbor parva ubique glabra, ramulis subteretibus rugosis crassis (apicem versus 5–8 mm. diametro); petiolis rugulosis supra complanatis 1–2 cm. longis; laminis coriaceis obovato-ellipticis, 14–22 cm. longis, 5–7.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice rotundatis vel obtusis, supra fusco-olivaceis, subtus glaucis vel pallidioribus, margine saepe leviter recurvatis, costa valida supra subplana vel leviter elevata subtus prominente, nervis lateralibus primariis utrinsecus 14–20 cum secundariis angulo 65–75° a costa abeuntibus utrinque acute prominulis et cum rete venularum prominulo copiose anastomosantibus; inflorescentia terminali subsessili, radiis primariis ut videtur 6–8 ad 9 cm. longis 1- vel 2-plo ramosis gracilibus siccitate granulosis et striatis; bracteis bracteolisque minutis caducis, pedicellis ad 15 mm. longis plerumque brevioribus; calyce coriaceo 2- vel 3-lobato, lobis patentibus orbiculari- vel deltoideo-ovatis, 2–3 mm. longis, 3–5 mm. latis, apice rotundatis vel obtusis; petalis 8–10 chartaceis vel coriaceis elliptico- vel obovato-oblongis, leviter inaequalibus, exterioribus 8–10 mm. longis et circiter 6 mm. latis, apice rotundatis; toro columnari-pulvinato, 1–2 mm. alto, 2–2.5 mm. diametro; staminibus 22–35 crasse coriaceis 2- vel 3-seriatis clavato-obovoideis 1.5–2.5 mm. longis, filamentis leviter complanatis apicem versus 0.7–1.5 mm. latis basi contractis, loculis horizontalibus apicalibus 0.5–0.7 mm. longis; carpellis 3–5 coriaceis alabastro cohaerentibus mox liberis obovoideis, sub anthesi 2–3 mm. longis, basi contractis, apice rotundatis, carina stigmatum apicali ad 1.5 mm. longa, ovulis 25–40 pluriseriatis pendulis.

NORTHEASTERN NEW GUINEA: Morobe District, Ulap Trail, *Clemens* 41142 (TYPE), April 6, 1940 (shrub or small tree; flowers pale, greenish); Ogeramngang, alt. about 1800 m., *Clemens* 4463 (shrub 1 m. high, in forest; flowers green); Yunzaing, alt. about 1500 m., *Clemens* 4122 (tree or shrub about 3 m. high, in forest on mossy ridge; leaf-blades pale beneath; flower-buds green).

The three cited specimens are not precisely similar, the type having the

only fully developed inflorescence and having leaves which are conspicuously glaucous beneath. The other two specimens have more congested inflorescences and leaves which are apparently pale green beneath. In other respects the specimens are quite similar and I have little doubt that they represent the same species. A fourth plant which probably belongs here is *Clemens 5008*, also from the Morobe District (Ogeramng, alt. about 1800 m.; small slender tree on forested hill; flowers green or purplish). This specimen, with leaves like those of the type, has very immature buds and apparently has the petals about 15 and the stamens about 40. Another collection which probably represents *B. sylvestris* is *Clemens 41800* (Boana, Morobe District, alt. 750–1350 m.), with leaf-blades up to 26 cm. long and 9.5 cm. broad, glaucous beneath. This specimen is in fruit and has the primary rays of the inflorescence reduced in number, probably through loss. The carpels are borne on conspicuous stipes 5–8 mm. long and are inequilaterally ellipsoid, up to 12 by 8 mm., with a subapical stigmatic ridge about 2 mm. long. The seeds are 15–20 in number, black, obovoid, about 4 by 3 mm.

*Bubbia sylvestris* appears to be closely related only to *B. oligocarpa* (Schlecht.) Burtt, but that species has the leaf-blades larger and with more definitely ascending nerves, the rays of the inflorescence fewer, and the flowers smaller and with fewer parts (petals 6, stamens about 18, carpels 2). From *B. calothyrsa* (Diels) A. C. Sm. and *B. sororia* (Diels) A. C. Sm. the new species differs in its proportionately narrower leaf-blades with less widely spreading lateral nerves, sessile and less ample inflorescence, and floral details such as its broader petals, etc.

***Bubbia Clemensiae* sp. nov.**

Frutex vel arbor parva glabra, ramulis subteretibus rugosis crassis (apicem versus 4–7 mm. diametro); foliis alternatis, petiolis crassis rugulosis supra complanatis 1–1.5 cm. longis, laminis subcoriaceis supra nitidis ellipticis vel obovato-ellipticis, 17–24 cm. longis, 6–10 cm. latis, basi obtusis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine leviter recurvatis, costa valida supra leviter elevata vel complanata subtus prominente, nervis lateralibus primariis utrinsecus 12–20 cum secundariis brevioribus angulo 55–65° a costa abeuntibus utrinque acute elevatis marginem versus anastomosantibus, rete venularum supra leviter prominulo subtus inconspicuo vel subimmerso; inflorescentia terminali crassa pedunculata, pedunculo ad 7 cm. longo, radiis primariis ut videtur 3 vel 4 crassis ad 6 cm. longis nunc unifloris nunc apicem versus flora 2–4 gerentibus, pedicellis crassis 1–6 cm. longis ut pedunculo saepe valde complanatis; calyce coriaceo rotato 6–9 mm. diametro irregulariter 6–9-lobato, lobis brevibus 2–4 mm. latis, apice obtusis vel obscure apiculatis; petalis plerumque 6 crasse coriaceis, alabastro valde imbricatis, demum patentibus, inaequalibus, elliptico-oblongis, sub anthesi 11–17 mm. longis et 5–12 mm. latis, apice rotundatis; toro conspicuo subconico sub anthesi 3–4 mm. longo et circiter 2.5 mm. diametro; staminibus numerosis (100–125) confertis 5- vel 6-seriatis crasse coriaceis clavato-obovoideis, 2.5–3.5 mm. longis, filamentis leviter complanatis apicem versus 1.2–2 mm. latis inferne contractis, loculis horizontalibus apicalibus 0.6–1 mm. longis; carpellis 5–11 crasse coriaceis, alabastro

adpressis et subadnatis, mox liberis, obovoideis, sub anthesi circiter 3 mm. longis et diametro, angulatis, apice convexis, carina stigmatum conspicua apicali, ovulis circiter 15 anguste obovoideis pluriseriatis pendulis.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramngang, alt. 1750–1800 m., *Clemens 5157* (TYPE), Jan. 27, 1937 (small shrub or tree, less than 1 m. high, in hilly forest; petals dark maroon; anthers yellow; carpels green), *Clemens 4596* (same locality).

*Bubbia Clemensiae* is characterized by its large thick flowers with numerous stamens. Its closest relationship is probably with the preceding new species (*B. sylvestris*), from which it differs not only in its larger leaves and coarser inflorescence, but also in having its calyx irregularly 6–9-lobed (rather than regularly 2- or 3-parted), its petals fewer and larger, its stamens many more, and its carpels more numerous and with fewer ovules.

***Bubbia idenburgensis* sp. nov.**

Arbor ad 4 m. alta glabra, ramulis brunneis rugosis subteretibus apicem versus 4–7 mm. crassis; foliis apicem ramulorum versus irregulariter alternatim congestis, petiolis crassis rugulosis supra complanatis 1–2 cm. longis, laminis coriaceis anguste obovato-ellipticis, (8–)11–24 cm. longis, (3–)3.5–7 cm. latis, basi angustatis et in petiolum decurrentibus, apice obtusis vel obtuse cuspidatis, supra siccitate fusco-olivaceis, subtus glaucis, margine anguste recurvatis, costa supra impressa vel subplana subtus prominente, nervis lateralibus primariis utrinsecus 8–15 saepe inconspicuis angulo 55–65° a costa abeuntibus marginem versus anastomosantibus utrinque prominulis vel subplanis, rete venularum plerumque immerso interdum utrinque paullo prominulo; inflorescentia sub fructu terminali subsessili, radiis primariis 3–6 ad 11 cm. longis (centrali quam aliis longiore) 2(3-)plo ramosis rugulosis leviter angulatis, pedicellis gracilibus ad 1 cm. longis; calyce sub fructu subpersistente parvo irregulariter 2- vel 3-lobato, lobis tenuiter carnosus obscure glandulosus late reniformi-ovatis, 1–1.5 mm. longis, 2–3 mm. latis; toro convexo, staminum cicatricibus paucis ut videtur 2-seriatis; carpellis 4–6 vel interdum abortu paucioribus raro 1 obovoideo-turbinatis, ad 8 mm. diametro stipite basali conspicuo 0.5–1.5 mm. longo excluso, carina stigmatum inconspicua lineari 3–4 mm. longa apicali-ventrali praeditis, pericarpio crasso; seminibus 2–10 castaneis falcatis obovoideis, 3–4.5 mm. longis, 2–2.5 mm. latis, utrinque rotundatis, in pulpa spongiosa nidulantibus, testa dura.

NETHERLANDS NEW GUINEA: 4–6 km. southwest of Bernhard Camp, Idenburg River, alt. 900–1250 m., *Brass 13028* (TYPE), Mar. 1939 (tree 3 m. high, in rain-forest undergrowth; fruits red), *Brass 13313* (tree 2–4 m. high, common in mossy-forest undergrowth; leaves very glaucous beneath; fruit unripe).

Although the two cited specimens differ slightly in foliage, they are quite similar in fruiting inflorescences and are certainly conspecific. The leaf-blades of the type are slightly the larger and have the venation more obvious; the lateral veins of no. 13313 are essentially immersed and the costa is deeply impressed above.

*Bubbia idenburgensis* is characterized by its comparatively narrow coriaceous leaf-blades, its few and large seeds, and the position of its stigma on the upper part of the ventral edge of the carpel. Presumably the flowering carpel has the stigma partially ventral and partially apical. The new



species is perhaps most closely related to *B. umbellata* (Ridley) Dandy, but has the lateral nerves of the leaf-blade fewer, the petioles longer, and the inflorescence with fewer but longer rays. From *B. oligocarpa* (Schlecht.) Burtt the new species differs in its proportionately narrower leaf-blades with fewer lateral nerves and less conspicuous venation, its more numerous carpels (probably 4–6 in flower), and its ventral-apical rather than strictly apical stigmatic ridge. The relationship of *B. idenburgensis* to *B. sylvestris* (above described) is less close.

***Bubbia glauca* sp. nov.**

Frutex vel arbor parva ad 2 m. alta glabra, ramulis subteretibus cinereis vel brunneis rugosis apicem versus 3–5 mm. crassis; foliis alternatis vel suboppositis, petiolis gracilibus rugulosis leviter canaliculatis 8–15 mm. longis, laminis chartaceis anguste obovatis, 12–19 cm. longis, (3.5–)4–6 cm. latis, basi gradatim attenuatis et in petiolum decurrentibus, apice subacutis vel breviter cuspidatis, supra fusco-olivaceis, subtus albido-glaucis, margine inconspicue recurvatis, costa supra leviter impressa subtus prominente, nervis lateralibus primariis utrinsecus 12–16 angulo 50–60° a costa abeuntibus marginem versus anastomosantibus utrinque valde prominulis, secundariis inconspicuis et rete venularum utrinque plerumque leviter prominulis; inflorescentia sub fructu terminali subsessili, radiis primariis 3–5 suberectis ad 8 cm. longis (longitudine variis) gracilibus granulato-rugulosis subsimplicibus vel semel ramosis, pedicellis 3–5 mm. longis; calyce sub fructu parvo subcoriaceo 3-lobato, lobis deltoideis circiter 1 mm. longis et 2 mm. latis subacutis; toro parvo, staminum cicatricibus paucis; carpellis (ut videtur sub anthesi 2) maturis solitariis vel binis, levibus vel leviter rugulosis, subglobosis, 10–12 mm. diametro, basi minute stipitatis, carina stigmatum inconspicua 3–5 mm. longa apicali-ventrali praeditis, pericarpio coriaceo circiter 2 mm. crasso; seminibus 8–11 in pulpa spongiosa nidulantibus, placenta incrassata apicali-ventrali gerentibus, castaneis levibus obovatis, circiter 4 mm. longis et 2.5 mm. latis, utrinque rotundatis.

BRITISH NEW GUINEA: Western Division, Palmer River, 2 miles below junction with Black River (upper Fly River region), alt. 100 m., *Brass 7191* (TYPE), July, 1936 (shrub or small tree 2 m. high, uncommon in ridge-forest undergrowth; leaves aromatic, the blades gray beneath).

*Bubbia glauca*, which occurs at an unusually low elevation for the genus in New Guinea, is closely related only to *B. idenburgensis* (above described), with which it has in common an inconspicuous short apical-ventral stigmatic ridge on the fruit. The two species are also similar in leaf-shape, but *B. glauca* is more slender throughout and has the blades thinner in texture and with more obvious venation on both surfaces. The rays of the fruiting inflorescence of *B. glauca* are comparatively simple, each having very few fruits near its apex and being essentially unbranched; the rays of the inflorescence of *B. idenburgensis* are 2- or often 3-times branched and consequently the fruits are much more numerous. From the absence of additional scars on the fruiting torus of *B. glauca*, it seems likely that the flowers will prove to have only two carpels.

***Bubbia Archboldiana* sp. nov.**

Arbor ad 3 m. alta glabra, ramulis teretibus fuscis rugosis crassis (apicem

versus 5–8 mm. diametro); foliis irregulariter alternatis et apicem ramulorum versus congestis, petiolis crassis supra complanatis 4–9 mm. longis, laminis rigide patentibus coriaceis anguste elliptico-obovatis, (8–)12–18 cm. longis, 3–5.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine interdum inconspicue recurvatis, supra fuscis nitidis, subtus pallidioribus, costa lata supra leviter impressa subtus prominente, nervis lateralibus primariis utrinsecus 12–15 cum secundariis paullo debilioribus angulo 60–70° a costa abeuntibus supra valde prominulis subtus subplanis vel inconspicue prominulis, cum rete venularum supra manifesto subtus immerso copiose anastomosantibus; inflorescentia terminali subsessili vel pedunculo crasso ramulis simili ad 2 cm. longo praedita, radiis primariis 6–11 divaricatis 5–8 cm. longis (ramulis et floribus inclusis) 2- vel 3-plo ramosis crassis rugulosis, pedicellis rectis 3–7 mm. longis; calyce parvo irregulariter 2- vel 3-lobato, lobis patentibus obtusis deltoideo-ovatis, 1.2–1.5 mm. longis, 2–3 mm. latis; petalis 4 vel 5 carnosus alabastro imbricatis mox patentibus ellipticis vel obovato-ellipticis, 5–6 mm. longis, 3–4 mm. latis, apice rotundatis; toro convexo; staminibus circiter 17 plerumque 2-seriatis obovoideis 1.8–2 mm. longis, filamentis complanatis apicem versus circiter 1 mm. latis, loculis oblique horizontalibus apicalibus; carpellis 9 vel 10 congestis obovoideis, sub anthesi 2–2.5 mm. longis et 1.2–1.5 mm. latis, basi angustatis, apice subcomplanatis, carina stigmatum apicali et ventrali sed basim non attingente, ovulis 12–16 biseriatis ventralibus.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2100 m., *Brass* 12712 (TYPE), Feb. 1939 (tree 3 m. high, in an open situation in tall mossy-forest; lower leaf-surface glaucous; petals green, the entire inflorescence otherwise red).

*Bubbia Archboldiana* and the following new species (*B. megacarpa*) are remarkably similar in general appearance, but they are distinguished as later noted. Together they form a well-marked group, characterized by their elongate stigmas, which are extended along both the ventral edge and the apex of the carpel. *Bubbia Archboldiana* is perhaps most closely related, among described species, to *B. oligocarpa* (Schlecht.) Burt, differing in its short petioles, proportionately narrower leaf-blades, more copiously branched inflorescence, fewer petals, 9 or 10 (rather than 2) carpels, and the stigmatic character mentioned above. From *B. sylvestris* (above described) the new species differs in its fewer and much smaller petals, fewer stamens, more numerous carpels, and the obvious characters of stigmas and ovule-attachment. The new species may also be compared with *B. sororia* (Diels) A. C. Sm., a species with longer petioles, broader leaf-blades with more spreading lateral nerves, more ample inflorescence, more numerous and larger petals, fewer carpels, etc.

***Bubbia megacarpa* sp. nov.**

Arbor ad 3 m. alta glabra, ramulis pallide brunneis valde rugosis subteretibus apicem versus 4–7 mm. crassis; foliis alternatis, petiolis crassis rugosis supra complanatis vel subalatis 6–12 mm. longis, laminis coriaceis in sicco utrinque fuscis anguste elliptico-obovatis, 11–18 cm. longis, 3–5.5 cm. latis, basi angustatis et in petiolum decurrentibus, apice obtusis vel

rotundatis, margine saepe valde recurvatis, costa supra impressa subtus prominente et rugosa, nervis lateralibus primariis utrinsecus 10–14 cum secundariis debilioribus angulo 55–65° a costa abeuntibus utrinque valde prominulis, cum rete venularum utrinque leviter prominulo copiose anastomosantibus; inflorescentia terminali pedunculo crasso brevi (ramulo defoliato simili) praedita, radiis primariis 3–5 divaricatis 5–7 cm. longis granulato-rugosis angulatis vel complanatis 1- vel 2-plo ramosis, pedicellis rigidis angulatis ad 10 mm. longis (floribus interdum subsessilibus); calyce parvo irregulariter 2- vel 3-lobato, lobis late ovatis, 1.5–2 mm. longis, 2.5–3.5 mm. latis, margine erosis; petalis 4 carnosis obovato-oblongis, 6–7 mm. longis, 4–5 mm. latis, apice rotundatis; toro breviter conico; staminibus 18–20 coriaceis 2- vel 3-seriatis obovoideis 1.5–2 mm. longis, filamentis apicem versus 1–1.3 mm. latis, loculis oblique apicalibus horizontalibus; carpello unico coriaceo inaequilaterali subobovoideo, sub anthesi circiter 2 mm. longo et 2.5 mm. lato et 1.5 mm. crasso, interdum marginis dorsalis apice leviter uncinato, margine apicali-ventrali rotundato, carina stigmatum elongata apicali et fere ad basim ventrali, loculo lineari valde curvato, ovulis circiter 50 vel ultra irregulariter pluriseriatis; pedicellis sub fructu crassis (2.5–4 mm. diametro) ad 15 mm. longis; fructu coriaceo transverse ellipsoideo, ad 4 cm. longo et crasso et 5 cm. lato, utrinque rotundato, basi complanato, apice curvato, carina stigmatum elongata conspicue ornato, pericarpio ruguloso, seminibus numerosis in pulpa copiosa ut videtur mucilaginosa irregulariter nidulantibus nigris obovoideis, circiter 5 mm. longis et 3 mm. latis, basi subacutis, apice rotundatis, testa tenui, endospermo oleaginoso-farinaceo.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, alt. 2800 m., *Brass* 10249 (TYPE), Oct. 1938 (tree about 3 m. high, common in forest undergrowth in wet bottoms; flowers white).

As previously mentioned, this species and the preceding (*B. Archboldiana*) closely resemble each other and are characterized by their elongate stigmas. In *B. megacarpa* the stigmatic ridge is much longer, extending along the entire apex of the carpel and along the ventral edge virtually to the base. In *B. Archboldiana* the stigmatic ridge extends over about two-thirds of the apex and a similar portion of the ventral edge. The ovulation of the two species is quite different, the locule of *B. megacarpa* being sharply curved to parallel the stigmatic ridge and extending from the base to near the dorsal apex, while the ovules are numerous and arranged in several irregular series. In *B. Archboldiana*, on the other hand, the locule is quite straight and does not reach the base, while the ovules are not more than 16, being arranged in two rows. A further difference, of course, pertains to the solitary carpel of *B. megacarpa* as contrasted with the 9 or 10 carpels of *B. Archboldiana*. In other floral details the two plants are quite similar, but the carpellary differences are striking and apparently constant.

Among less obvious differences, *B. megacarpa* has the leaf-blades only inconspicuously paler beneath rather than glaucous, and the veinlets more obvious beneath. *Bubbia megacarpa* has the rays of the inflorescence fewer, more obviously angled, and less copiously branched. The fruit of

*B. megacarpa* is quite unique among those thus far known in *Bubbia*, for its size, shape, and number of seeds.

***Bubbia argentea* sp. nov.**

Arbor parva, ramis crassis erectis, ramulis rugosis subteretibus apicem versus 5–8 mm. crassis; foliis irregulariter alternatis et apicem ramulorum versus saepe mox delapsis, petiolis validis rugulosis supra complanatis 10–18 mm. longis, laminis coriaceis anguste ellipticis, 12–17 cm. longis, 4–6.5 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis, margine inconspicue recurvatis, supra fusco-olivaceis, subtus argenteo-glaucis, costa valida granulato-rugulosa supra subplana subtus prominente, nervis lateralibus primariis utrinsecus 15–20 angulo 70–80° a costa abeuntibus conspicue anastomosantibus utrinque valde elevatis, nervis secundariis similibus sed brevioribus et cum rete venularum intricato utrinque prominulo copiose anastomosantibus; inflorescentia sub fructu juvenili terminali subsessili, radiis primariis 10–13 divergentibus ad 9 cm. longis 2- vel 3-plo ramosis rugulosis angulatis vel complanatis, pedicellis gracilibus 3–8 mm. longis; calyce coriaceo parvo 2- vel 3-lobato, lobis patentibus reniformi-ovatis, circiter 1.5 mm. longis, 2–2.5 mm. latis, apice obtusis; toro semigloboso-convexo, staminum cicatricibus circiter 20 ut videtur 2-seriatis; carpellis ut videtur 4–6 (demum interdum abortu paucioribus) post anthesin obovoideis, basi angustatis, apice rotundatis et carina stigmatum conspicua cristiformi apicali 0.6–1 mm. longa coronatis, ovulis circiter 12 pendulis; carpellis submaturis obovoideo-subglobosis ad 6 mm. diametro stipite basali valido 1–1.5 mm. longo excluso, carina stigmatum brevi inconspicua apicali, pericarpio crasso ruguloso; seminibus plerumque 4–6 nigris falcatis oblongis, circiter 2.5 mm. longis, 1–1.5 mm. latis, utrinque rotundatis, in pulpa spongiosa nidulantibus, pericarpio duro.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4740 (A, NY, TYPE), Aug. 7, 1933 (small tree with thick erect branches, rare in forests; leaves silver-gray beneath; immature fruit resinous; seeds black).

Although the cited collection lacks flowers and bears only immature fruits, it is obviously an undescribed species of the relationship of *B. calothyrsa* (Diels) A. C. Sm. and *B. sororia* (Diels) A. C. Sm., differing from both in its shorter petioles, smaller leaf-blades which are narrowly elliptic rather than oblanceolate, and more numerous and more spreading primary inflorescence-rays.

***Bubbia calophylla* sp. nov.**

Arbor parva (?) glabra, ramulis subteretibus crassis (apicem versus 7–10 mm. diametro); foliis alternatis, petiolis rugulosis 4–5 mm. diametro supra complanatis circiter 3 cm. longis, laminis subcoriaceis late oblongo-ellipticis, 25–30 cm. longis, 10–14 cm. latis, basi obtusis vel gradatim angustatis et in petiolum decurrentibus, apice ut videtur subrotundatis, margine leviter recurvatis, supra nitidis, subtus subglaucis, costa valida rugulosa supra leviter elevata subtus prominente, nervis lateralibus primariis utrinsecus 25–35 cum secundariis subsimilibus et paullo debilioribus angulo 70–85° a costa abeuntibus utrinque acute elevatis et conspicue anastomosantibus, rete venularum intricato utrinque conspicue prominulo; inflorescentia terminali multiflora, pedunculo ut ramulis crasso ad 7 cm. longo, radiis primariis

paucis ad 15 cm. longis 2- vel 3-plo ramosis, pedunculis secundariis crassis striatis complanatis 7-9 cm. longis, pedicellis sub fructu 3-10 mm. longis; calyce sub fructu persistente subcoriaceo 3-lobato, lobis patentibus deltoideo-ovatis, circiter 1.5 mm. longis et 2-3 mm. latis, apice obtusis vel subacutis; toro convexo coriaceo, staminum cicatricibus circiter 3-seriatis; carpellis 5-8 turbinatis parce luteo-glandulosis, basi conspicue stipitatis (stipite 2-3 mm. longo), apice rotundatis, in specimine nostro immaturis ad 6 mm. diametro, carina stigmatum inconspicua apicali brevi (0.6-1 mm. longa), pericarpio coriaceo; seminibus 8-15 castaneis obovoideis, 2-2.5 mm. longis, 1-1.5 mm. latis, valde falcatis, basi et apice rotundatis, in pulpa spongiosa irregulariter nidulantibus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramngang, alt. about 1800 m., Clemens 5061 (TYPE), Jan. 19, 1937.

Although flowers of this plant have not been seen, the material is ample to demonstrate that the species is undescribed. *Bubbia calophylla* is doubtless of the relationship of *D. calothyrsa* (Diels) A. C. Sm., with which it has in common large leaf-blades with broadly spreading lateral nerves. However, *B. calophylla* has longer petioles, leaf-blades broader in proportion and essentially elliptic rather than oblanceolate, with more numerous lateral nerves and in general more conspicuous reticulate venation, longer primary inflorescence-rays and on the whole a more ample inflorescence, and a short, nearly punctiform, apical stigma rather than an elongate stigmatic crest.

#### BELLIOLUM v. Tiegh.

In proposing the genus *Belliolum*, van Tieghem (in Jour. de Bot. 14: 330. 1900) included in it four New Caledonian species, of which only one (*B. Pancheri* (Baill.) v. Tiegh.) was known in flowering condition; this species may be considered the type of the genus. *Belliolum* is distinguished from *Bubbia* by having the anther-locules longitudinal and extrorse-lateral rather than horizontal and apical. In *B. Pancheri* the anther-locules are placed toward the base of the stamens.

Burt (in Hook. Ic. Pl. 34: pl. 3315. 1936), in connection with his new species *Bubbia haplopus* from the Solomons, expressed the opinion that *Belliolum* cannot be maintained as distinct from *Bubbia*, and consequently made several new combinations under the latter name. The basis for this opinion lies in the fact that certain specimens appeared to Burt to be intermediate, as regards the staminal characters, between *Belliolum* and *Bubbia*. He discussed at some length the New Caledonian collection of Schlechter 15348 (referable to *Belliolum crassifolium* (Baill.) v. Tiegh.), good flowering material of which is also available to me. The stamens of this species bear strictly vertical anther-locules, which are extrorse-lateral near the apex of the stamens. In fundamental details these stamens are similar to those of *Belliolum Pancheri*; the fact that the locules are borne near the apex rather than toward the base of the stamens does not necessarily weaken the generic character.

Another species discussed by Burt as intermediate between the two genera is *Bubbia amplexicaulis* (Vieill.) Dandy [*Bubbia auriculata* v.

Tiegh.],<sup>1</sup> in which "the anther-thecae are apical and almost touch at their tips, then they diverge downwards at an angle of 45°; that is to say they are intermediate between transverse and longitudinal." In examining the numerous New Guinean species which are clearly referable to *Bubbia*, I have noted some in which the anther-locules are thus obliquely apical, although usually they are more horizontal than an angle of 45° would indicate. Stamens with this type of anther-locule are quite different from those of *Belliolum* proper, as represented by *B. Pancheri* and *B. crassifolium*. In the latter species the anther-locules, although subapical, are strictly longitudinal and are exceeded by a conspicuous continuation of the connective.

On the basis of material now available, therefore, it seems that *Belliolum* and *Bubbia* may be retained, the former having anther-locules which are always longitudinal and exceeded apically by the connective, while the latter has anther-locules which are horizontal (or subhorizontal), apical, contiguous, and not exceeded by the connective. This conclusion, of course, is provisional and must be tested with a larger series of specimens than is now available. For the time being it seems advisable to retain both genera as established by van Tieghem.

***Belliolum haplopus*** (Burt) comb. nov.

*Bubbia haplopus* Burt in Hook. Ic. Pl. **34**: pl. 3315. 1936.

SOLOMON ISLANDS: B o u g a i n v i l l e : Okomo, Buin, alt. about 400 m., *Waterhouse 90* (NY, type coll.); Koniguru, Buin, alt. 800 m., *Kajewski 1994, 2007* (trees 10–15 m. high, common in rain-forest; leaf-blades silvery beneath; petals white; fruits pink when ripe, up to 16 mm. long and 14 mm. broad; native names: *oigu, ororoyu*); Kupei Gold Field, alt. 950 m., *Kajewski 1658* (tree to 15 m. high, common in rain-forest; fruit pink, up to 25 mm. long and 16 mm. broad). U l a w a : *Brass 2959* (tree 10 m. high, common in lowland rain-forest; bark thin, gray; leaf-blades grayish beneath; flowers and fruits white).

The cited specimens agree well with a duplicate of the type and with Burt's excellent description and plate. With more abundant material, a slight expansion of the original characters should be noted, as follows: petioles up to 3 cm. long; leaf-blades up to 26 cm. long and 10 cm. broad, the primary lateral nerves 8–16 per side. The calyx is rotate and essentially entire at margin rather than bilobed; I have not found more than 10 petals (as noted by Burt) in my flowers, but these are sometimes up to 8 mm. long. There is considerable variation in the length of the pedicels (if the often 1-flowered peduncles are so interpreted); these range from about 1.5 cm. (*Brass 2959*) to 9 cm. (*Kajewski 1658*).

<sup>1</sup> *Bubbia amplexicaulis* is based upon *Drimys amplexicaulis* Vieill. ex Parment. in Bull. Sci. France & Belg. **27**: 308. pl. 10, f. 34. 1896. I cannot agree with Dandy (in Jour. Bot. **72**: 40. 1934) that Vieillard's name is adequately published by Parmentier. The description consists merely of the anatomical details of the leaf and stem, and the illustration shows a cross-section of the petiole; no specimen is cited. It seems that the many new species proposed by Parmentier in his extensive work "Histoire des Magnoliacées" must be considered *nomina subnuda* and ignored from a nomenclatural point of view. Since no specimens are cited, the species cannot be recognized by subsequent workers unless they have access to Parmentier's specimens. For the species under discussion, therefore, I accept the name *Bubbia auriculata* v. Tiegh. (1900).

**Belliolum Burttianum** sp. nov.

Arbor ad 10 m. alta ubique glabra, ramulis subteretibus rugulosis apicem versus 3–5 mm. crassis; foliis apicem ramulorum versus subalternatis, petiolis gracilibus leviter canaliculatis 12–22 mm. longis, laminis chartaceis vel subcoriaceis in sicco fusco-olivaceis anguste obovato-ellipticis, 9–16 cm. longis, 4–6 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis, margine inconspicue recurvatis, subtus inconspicue ceriferis, costa supra impressa subtus prominente, nervis lateralibus primariis utrinsecus 9–11 sub angulo 65–75° a costa abeuntibus anastomosantibus utrinque valde prominulis, secundariis debilioribus et rete venularum intricato utrinque paullo prominulis; inflorescentia ramulis brevibus lateralibus terminali, radiis ut videtur 2–5 nunc unifloris nunc trifloris, pedicellis gracilibus leviter angulatis 2–6 cm. longis; calyce tenuiter coriaceo rotato circulari 4–5 mm. diametro, margine subintegro inconspicue bilobato; petalis circiter 25 subcarnosis 4–6-seriatis, exterioribus elliptico-oblongis ad 12 mm. longis et 7 mm. latis apice rotundatis, interioribus magnitudine gradatim reductis, intimis lanceolato-oblongis circiter 5 mm. longis et 1.5 mm. latis apice obtusis; staminibus circiter 3-seriatis 40–45 subcarnosis 2.5–3 mm. longis loculos verticales laterales 1–1.2 mm. longos paullo supra medium gerentibus, connectivo complanato obtuso 0.4–0.7 mm. ultra loculos producto; carpello unico obovoideo-turbinato sub anthesi circiter 3 mm. longo et 2.5 mm. lato, basi breviter stipitato, apice truncato et carina stigmatum nigra lineari circiter 2 mm. longa coronato, loculo obovoideo, ovulis circiter 35 placentis elongatis horizontalibus paullo supra loculi medium irregulariter dispositis.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, alt. 950 m., *Kajewski 1680* (TYPE), Apr. 10, 1930 (tree to 10 m. high, common in rain-forest; petals white; carpel green).

*Belliolum Burttianum* is of the relationship of *B. haplopus* (Burt) A. C. Sm., from which it differs in its more numerous and larger petals, its stamens with the anther-locules nearer the apex and with the connective much less obviously produced, and its solitary carpel. The 3 or 4 carpels of *B. haplopus* are less regular in shape and have a stigmatic ridge only about 1 mm. long; the ovulation is essentially similar. In foliage the two species are close, but the leaves of *B. Burttianum* are substantially smaller and thinner on the average. *Kajewski's* description of the new species as "common" may not be reliable, as he obtained *B. haplopus* at the same locality and doubtless considered them the same.

It is a pleasure to name the new species for Mr. B. L. Burt, whose studies of this group of plants have greatly aided in clarifying their relationships.

**Belliolum gracile** sp. nov.

Arbor ad 5 m. alta glabra, ramulis subteretibus rugulosis apicem versus 2–3 mm. crassis; foliis subalternatis, petiolis gracilibus leviter canaliculatis 7–18 mm. longis, laminis chartaceis oblanceolatis, (6–)7–12 cm. longis, (2–)2.5–4.5 cm. latis, basi angustatis et in petiolum decurrentibus, apice rotundatis vel obtusis, margine planis vel inconspicue recurvatis, supra fusco-olivaceis, subtus albido-punctato-ceriferis, costa supra leviter impressa subtus valde elevata, nervis lateralibus primariis utrinsecus 7–10 sub angulo

55–65° a costa abeuntibus anastomosantibus et saepe curvatis utrinque prominulis, secundariis debilibus et rete venularum utrinque leviter prominulis; inflorescentia sub fructu terminali vel e ramulis brevibus lateralibus oriente subsimplici, floribus paucis ut videtur saepe solitariis, pedicellis gracilibus sub fructu ad 23 mm. longis; calyce sub fructu chartaceo rotato circulari ad 3 mm. diametro, margine integro, demum caduco; toro conspicuo semigloboso, cicatricibus staminum paucis; carpellis maturis solitariis vel binis coriaceis obovoideis, ad 18 mm. longis et 11 mm. latis, basi ad stipitem 1–2 mm. longum angustatis, apice rotundatis et carina stigmatum inconspicua 1–2 mm. longa coronatis, pericarpio extra ruguloso 1.5–3 mm. crasso; seminibus 10–20 (plerumque 3 vel 4 maturis, aliis abortivis) in pulpa spongiosa nidulantibus, obovoideis, 4–5 mm. longis, circiter 3 mm. latis, basi angustatis, apice rotundatis, placentis horizontalibus circa loculi medium dispositis.

SOLOMON ISLANDS: *G u a d a l c a n a l*: Tutuve Mt., alt. 1700 m., *Kajewski 2630* (slender tree 4–5 m. high, common in poor rain-forest, the trunk to 7 cm. diam.; common name: *ses-a-veré*). *S a n C r i s t o v a l*: Hinuahaoro, alt. 900 m., *Brass 2898* (TYPE), Sept. 22, 1932 (tree 4 m. high, in mountain-forest; leaf-blades gray beneath, the venation more obvious above; immature fruit smooth, green; all parts faintly aromatic), *Brass 3063, 3063A* (spreading shrub or small tree 1.5–3 m. high, in mountain-forest; leaf-blades gray-green beneath; fruit green, at length red, smooth, fleshy).

Although *B. gracile* is known only from fruiting specimens, I venture to describe it as new because of its vegetative differences from *B. haplopus* (Burt) A. C. Sm., doubtless its closest ally. In comparison with that species, *B. gracile* has the branchlets and petioles substantially more slender and the leaf-blades smaller and proportionately narrower, with fewer lateral nerves. From *B. Burtianum* (above described) the new species also differs in its more slender and small-leaved habit; it is expected that floral characters will provide additional distinctive points. Differences in fruit are also discernible between *B. gracile* and *B. haplopus*, the fruit of the latter tending to be subglobose rather than obovoid, with a longer stigmatic ridge (3–5 mm. long) and more numerous seeds (10–15 often maturing and an equal or greater number abortive).

***Belliolum Kajewskii* sp. nov.**

Arbor ad 8 m. alta glabra, ramulis subteretibus fuscis vel purpurascensibus apicem versus 3–5 mm. crassis; foliis alternatis confertis, petiolis gracilibus rugulosis leviter canaliculatis 1–2.5 cm. longis, laminis in sicco fuscis subcoriaceis oblanceolatis, (7–)10–17 cm. longis, 3–5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice obtusis vel paullo emarginatis, margine leviter recurvatis, subtus inconspicue punctato-ceriferis, costa supra impressa subtus prominente, nervis lateralibus primariis utrinsecus 13–17 sub angulo 65–75° patentibus brevibus anastomosantibus utrinque valde prominulis, secundariis numerosis et rete venularum intricato utrinque prominulis; inflorescentia sub fructu terminali vel e ramulis brevibus lateralibus oriente subsimplici, floribus interdum 2 vel 3 fasciculatis interdum apice radiorum paucis, pedicellis sub fructu 1.5–4 cm. longis; calyce sub fructu chartaceo rotato 4–5 mm. diametro, margine subintegro obscure 3-vel 4-lobato; toro semigloboso, cicatricibus staminum ut videtur 2-vel 3-seriatis; carpellis maturis solitariis vel binis oblongo-subglobosis, ad 16



mm. longis et 13 mm. latis, basi rotundatis et abrupte breviter stipitatis, apice truncatis et carina stigmatum lineari 5–6 mm. longa praeditis, pericarpio coriaceo extra ruguloso 2–3 mm. crasso; seminibus 20–40 obovoideis, 3–4 mm. longis, circiter 2 mm. latis, apice rotundatis, placentis horizontalibus paullo supra loculi medium irregulariter dispositis.

SOLOMON ISLANDS: *Bougainville*: Lake Luralu, Koniguru, Buin, alt. 1500 m., *Kajewski 2099* (TYPE), Aug. 17, 1930 (small tree to 8 m. high, common in rain-forest; native name: *nomovour*). *Guadalcanal*: Uulolo, Tutuve Mt., alt. 1200 m., *Kajewski 2574* (small tree 5–6 m. high, common in rain-forest; leaf-blades slightly silvery beneath; fruit red when ripe; native name: *ruvor*).

*Belliolum Kajewskii* is distinguished from the other Solomon Islands species of *Belliolum* discussed above by its narrow oblanceolate leaf-blades with more spreading lateral nerves. Its leaves are somewhat similar in shape to those of *B. gracile* (above described), but they are thicker and darker in color, and the two species are differentiated by obvious characters of the fruit; that of *B. Kajewskii* is proportionately broader, more flattened at apex, and with a longer stigmatic ridge and more numerous seeds. In foliage, the new species suggests certain New Caledonian species of *Belliolum*, such as *B. crassifolium* (Baill.) v. Tiegh., but all of those known to me have more complex inflorescences.

## MAGNOLIACEAE

### TALAUMA Juss.

***Talauma oreadum*** Diels in Bot. Jahrb. **54**: 240. 1916.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1200 m., *Brass 12976* (tree 5 m. high, in rain-forest underbrush, rare; flowers brownish white, fragrant; fruit red, 55 mm. long and 25 mm. in diameter); Arfak Mts., Angi, near Iray, Lake Giji, alt. 1900 m., *Kanehira & Hatusima 13899* (tree 10 m. high, in forest; flowers white); Island of Japen, Seroei, alt. 250–370 m., *Neth. Ind. For. Serv. 30413, 30619*.

The cited specimens agree very well with the original description of *T. oreadum*, otherwise reported only from the Sepik region of Northeastern New Guinea. This is the only true *Talauma* thus far recorded from New Guinea, *T. papuana* Schlecht. having been referred to *Elmerrillia* by Dandy.

### ELMERRILLIA Dandy

***Elmerrillia papuana*** (Schlecht.) Dandy in Kew Bull. **1927**: 261. 1927.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, alt. 300 m., *Brass & Versteegh 13594* (tree 23 m. high, occasional in primary rain-forest on the slope of a ridge; trunk 48 cm. diam.; crown not wide-spreading; bark 11 mm. thick, gray-brown, scaly; sap-wood yellow; heart-wood dark brown; flowers white); Island of Japen, Seroei, alt. 370 m., *Neth. Ind. For. Serv. 30451*.

The species has previously been reported from Northeastern and British New Guinea. I have not sufficient material to evaluate the two varieties proposed by Dandy, but his var. *glaberrima* (in Kew Bull. **1928**: 185. 1928) appears to be represented by *Brass & Versteegh 13594*. *Elmerrillia sericea* C. T. White (in Jour. Arnold Arb. **10**: 212. 1929) is doubtfully distinct from *E. papuana*.

## MONIMIACEAE

## TRIMENIA Seem.

**Trimenia papuana** Ridl. in Trans. Linn. Soc. II. Bot. **9**: 144. 1916.

NETHERLANDS NEW GUINEA: 9–20 km. northeast of Lake Habbema, alt. 2200–2700 m., *Brass* 10862 (tree 8 m. high, frequent in low substage of tall forest; flowers yellow), *Brass* 11292 (tree 3–6 m. high, common in open high undergrowth of ridge-crest forest; branches erect; young flowers white; fruit red), *Brass* 11601 (tree 8 m. high, in substage of midmountain forest, Bele River); Balim River, alt. 1600 m., *Brass* 11764 (erect shrub or small tree 2–3 m. high, plentiful in *Vaccinium* scrub on infertile sandy soil; fruit red); 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12628 (tree 2–3 m. high, in mossy-forest, common in low scrub on an exposed summit; branches upright; flowers white).

The cited specimens are apparently the first since the collection of the type, which was obtained in southern Netherlands New Guinea. Gilg and Schlechter (in Bot. Jahrb. **55**: 199. *f.* 1. 1918) referred several collections from Northeastern New Guinea to this species, but later (in Bot. Jahrb. **58**: 248. 1923) they correctly distinguished their material as a new species, *T. myricoides* Gilg & Schlecht. Several recent collections by Clemens in Northeastern New Guinea are also referable to *T. myricoides*.

## DRYADODAPHNE S. Moore

**Dryadodaphne** S. Moore in Jour. Bot. **61**: 109. 1923; Kosterm. in Rec. Trav. Bot. Néerl. **34**: 605. 1937.

*Isomerocarpha* A. C. Sm. in Jour. Arnold Arb. **22**: 250. 1941.

During her work on the New Guinean species of Lauraceae, Dr. C. K. Allen called my attention to the fact that the genus *Dryadodaphne*, originally described as a member of the family, had been referred by Kostermans to the Monimiaceae. Kostermans believes that Moore's genus is identical with *Levieria* Becc. and that the species involved is possibly *L. montana* Becc. Although I have not seen the type of Moore's genus (*Forbes* 724 from British New Guinea), his description does not indicate that a species of *Levieria* was under consideration. *Levieria* has numerous stamens and lacks staminodes, and the anthers do not dehisce by valves. The presence of such valves, although not stated by Moore, is implied by his reference of the genus to the Lauraceae.

Among the few genera of Monimiaceae with anthers dehiscing by valves (subfamily Atherospermoideae), only the recently described *Isomerocarpha* agrees with *Dryadodaphne* in essential details. Moore states that the flowers of *Dryadodaphne* are unisexual, whereas the numerous flowers of *Isomerocarpha* which I have dissected are always hermaphrodite. According to Kostermans, the type specimen of *Dryadodaphne* "represents a male plant with flowers still in bud." In view of the immaturity of flowers, therefore, I consider it probable that Moore overlooked the juvenile carpels, which are deeply immersed in the urceolate receptacle and somewhat obscured by the numerous staminodes. In other respects, including dimensions of all parts of the plant, Moore's description of *Dryadodaphne celastroides* agrees with the specimens which I have referred to *Isomerocarpha novo-*

*guineensis*, and I have little hesitation in considering the plants conspecific.

While regretting the necessity of replacing the name *Isomerocarpha*, proposed only about a year ago, I nevertheless feel it advisable to accept the name *Dryadodaphne* for this interesting group in the Monimiaceae. A full description and a discussion of the place of the genus is to be found in my treatment of *Isomerocarpha*. The synonymy of the species follows:

***Dryadodaphne novoguineensis*** (Perk.) comb. nov.

*Daphnandra novoguineensis* Perk. in Bot. Jahrb. **52**: 217. f. 5. 1915.

*Dryadodaphne celastroides* S. Moore in Jour. Bot. **61**: 109. 1923.

*Isomerocarpha novoguineensis* A. C. Sm. in Jour. Arnold Arb. **22**: 251. 1941.

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