

## **A Taxonomic Revision of Timonius Subgen. Pseudobobea (Valeton) S. P. Darwin (Rubiaceae)**

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# A taxonomic revision of *Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin (Rubiaceae)

Steven P. Darwin

## Abstract

DARWIN, S. P. (2010). A taxonomic revision of *Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin (Rubiaceae). *Candollea* 65: 217-240. In English, English and French abstracts.

Twenty-one species, distributed from Sulawesi (Indonesia) to Rossel Island (Louisiade Archipelago) through the Moluccas (Indonesia) and Papua New Guinea, are assigned to *Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin, a new taxon based on *Timonius* sect. *Pseudobobea* Valeton (*Rubiaceae*, *Guettardeae*). Nine new species are described: *Timonius akunensis* S. P. Darwin, *Timonius bracteoides* S. P. Darwin, *Timonius carrii* S. P. Darwin, *Timonius clathratus* S. P. Darwin, *Timonius leptocalyx* S. P. Darwin, *Timonius moluccanus* S. P. Darwin, *Timonius reflexus* S. P. Darwin, *Timonius repertus* S. P. Darwin, and *Timonius rosselensis* S. P. Darwin. Species of the new subgenus are distinctive in having usually vertically oriented fruit pyrenes, reflexed calyx lobes, and leaf blades with coriulate venation. Lectotypes are designed for the names *Timonius argenteus* Valeton, *Timonius merokensis* Wernham, *Timonius minahassae* Koord., *Timonius papuanus* Merr., *Timonius schefferi* Valeton, *Timonius schumannii* Koord., and *Timonius versteegii* Valeton. Neotypes are designated for the names *Timonius branderhorstii* Valeton, and *Timonius grandifolius* Valeton. A taxonomic key to all species is provided as well as information on their ecology and distribution.

## Key-words

RUBIACEAE – GUETTARDEAE – *Timonius* – Papua New Guinea – Indonesia – Systematics – Taxonomy

## Résumé

DARWIN, S. P. (2010). Révision taxonomique de *Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin (Rubiaceae). *Candollea* 65: 217-240. En anglais, résumés anglais et français.

Vingt et une espèces, réparties de Sulawesi (Indonésie) à l'Île Rossel (archipel de la Louisiade) en passant par les Moluques (Indonésie) et la Papouasie-Nouvelle Guinée, ont été assignées à *Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin, un nouveau taxon basé sur *Timonius* sect. *Pseudobobea* Valeton (*Rubiaceae*, *Guettardeae*). Neuf nouvelles espèces sont décrites: *Timonius akunensis* S. P. Darwin, *Timonius bracteoides* S. P. Darwin, *Timonius carrii* S. P. Darwin, *Timonius clathratus* S. P. Darwin, *Timonius leptocalyx* S. P. Darwin, *Timonius moluccanus* S. P. Darwin, *Timonius reflexus* S. P. Darwin, *Timonius repertus* S. P. Darwin et *Timonius rosselensis* S. P. Darwin. Les espèces du nouveau sous-genre se distinguent par leurs pyrènes de fruits habituellement verticales, leurs lobes du calice recurvés, et leurs feuilles à nervation corivée. Un lectotype est désigné pour les noms *Timonius argenteus* Valeton, *Timonius merokensis* Wernham, *Timonius minahassae* Koord., *Timonius papuanus* Merr., *Timonius schefferi* Valeton, *Timonius schumannii* Koord. et *Timonius versteegii* Valeton. Un néotype est désigné pour les noms *Timonius branderhorstii* Valeton et *Timonius grandifolius* Valeton. Une clé de détermination et des informations sur l'écologie et la distribution de chaque espèce sont fournies.

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## Introduction

*Timonius* DC., with perhaps as many as 200 species, is the largest of fourteen genera assignable to *Rubiaceae* tribe *Guettardeae* (BREMER & ERIKSSON, 2009), and one of the twenty largest genera of the family (DAVIS & al., 2009). *Timonius* is strictly paleotropical in distribution, extending from Malesia westward to Sri Lanka and the Seychelles, northward to the Philippines, Micronesia, and Taiwan, and southeastward to tropical Australia and the South Pacific as far as the Tuamotu Islands. Centers of species diversity are the Malay Peninsula (WONG, 1988), Borneo (PUFF & WONG, 1993), the Philippines (MERRILL, 1923), and Papuasia (Sulawesi eastward to the Solomon Islands).

Several detailed descriptions of *Timonius* have been published (VALETON, 1909, 1927; DARWIN, 1993, 1994), but the salient generic features may be summarized as follows:

*Dioecious woody plants*, sometimes epiphytes or hemiepiphytes, sometimes myrmecophytes. *Leaves* often with unusual venation (e.g., paxillate, corivate), and with crypt- or pit-like domatia in the abaxial axils of lateral nerves. *Inflorescences* axillary, cymose, often conspicuously bracteate, several- to many-flowered with the flowers secund on the inflorescence arms, or (pistillate plants) reduced to a solitary flower. *Calyces* toothed, lobed, or truncate, and persistent in fruit. *Corollas* infundibular to salverform, the lobes valvate (their edges pressed together and interlocking) and adaxially invested with a thickened callus. *Stamens* (or staminodia) as many as the corolla lobes and inserted on the corolla tube, the filaments short, the anthers included. *Ovary* several- to many-loculed, the styles of pistillate flowers with several usually unequal stigmatic arms, the pistilodium of staminate flowers unbranched or bifid. *Fruits* drupaceous and containing several to many free pyrenes, the ovules solitary and pendulous in each pyrene.

The evolutionary affinities of *Timonius* are only now being elucidated. A phylogeny of selected species of *Guettarda* L., published by ACHILLE & al. (2006) and based on nrDNA ITS sequence data, included five *Timonius* species. While *Guettarda* was shown to be polyphyletic, the monophyly of *Timonius* was strongly supported in a Bayesian analysis. In that study, the *Timonius* clade was sister to a clade comprised of five "*Guettarda*" species (all from New Caledonia) and two species of "*Antirhea*" (from Fiji and New Caledonia); the sister taxon to the "*Antirhea*"-"*Guettarda*"-*Timonius* clade was *Antirhea borbonica* J. F. Gmel. (Mascarene Islands and Madagascar). Interestingly, all of the above taxa are dioecious, and were designated by ACHILLE & al. (2006) the "Paleotropical Dioecious Clade" of *Guettardeae*. A close relationship between *Timonius* and the Hawaiian genus *Bobeia* Gaudich., as was suggested by CHAW & DARWIN (1992), was not supported.

A recent study by ROVA & al. (2009), based on ITS, *rps16*, and *trnL-F* sequence data, suggests that *Hodgkinsonia* F. Muell. (two species in tropical Australia) may be sister to *Timonius* (represented in their study only by *T. nitidus* (DC.) Fern.-Vill.). *Hodgkinsonia* morphology does suggest a close relationship with *Timonius*: dioecy, valvate corolla aestivation, short stamen filaments and dorsifixed anthers, branched stigmas, and drupaceous (though only bilocular) fruits (BREMER, 1992).

A phylogenetic study by MOYNIHAN & WATSON (2001), also based on ITS sequence data, suggested that the neotropical genus *Neolaugeria* Nicolson may share a more recent common ancestor with *Timonius* than with any New World *Guettardeae*. However, support for a *Neolaugeria-Timonius* sister relationship was admittedly weak, and the subsequent analysis by ACHILLE & al. (2006) placed *Neolaugeria* in a basal position relative to a clade that included the entire Paleotropical Dioecious Clade. Affinity between *Timonius* and neotropical *Guettardeae* likewise was suggested by BREMER & ERIKSSON (2009). In their molecular analysis of representative *Rubiaceae*, two species of *Timonius*, along with *Guettarda crispiflora* Vahl (= *Tournefortiopsis crispiflora* (Vahl) Borhidi), were united in a strongly supported clade (Bayesian analysis).

## Infrageneric classification of *Timonius*

The above summary of published phylogenies indicates that a much more wide-ranging molecular analysis of *Guettardeae* genera and species is needed in order to resolve the phylogenetic relationships of *Timonius*. While published studies do not contradict a hypothesis of *Timonius* monophyly, none has investigated more than a handful of *Timonius* species. It is unlikely that future analyses will be able to sample even a majority of the 200 or so species of this genus. Thus, the circumscription of infrageneric taxa based on presumed synapomorphies (e.g., unusual leaf architecture; reduction of flower number in pistillate inflorescences; multiplication of ovary locules and pyrenes; valvate, calyptrate, or other specialized stipule aestivation) may usefully guide future taxon sampling for the purpose of reconstructing phylogeny and developing hypotheses of character evolution and adaptation. The carving out of a few well-characterized species-groups (formally named and ranked, or not) will leave a number of unassignable species which, presumably, have retained relatively more plesiomorphic traits, and may prove to occupy basal positions in the phylogenetic history of the genus.

Thus far, two subgenera of *Timonius* have been described: subgen. *Timonius*, with eight species in Java, the Moluccas, New Guinea, tropical Australia, and the Solomon Islands (DARWIN, 1993); and subgen. *Abbottia* S. P. Darwin, with 29 species distributed from eastern Borneo through Papuasia to the Philippines, tropical Australia, Fiji, and Samoa (DARWIN, 1994). Another (unranked) species group allied with *Timonius*

*flavescens* (Jack) Baker was described from Papuaasia, but likely extends eastward to Sri Lanka and the Seychelles (DARWIN, 1997). The present study treats all *Timonius* species allied with *T. branderhorstii* Valeton and assignable to a subgenus extending from the Louisiade Archipelago (southeastern Papua New Guinea) westward to the Molucca Islands of Indonesia.

### Taxonomic treatment

*Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin, **stat. nov.**

≡ *Timonius* sect. *Pseudobobea* Valeton in Bull. Dépt. Agric. Indes Néerl. 26: 21. 1909.

**Type species** (designated by DARWIN, 1993): *Timonius branderhorstii* Valeton.

**Habit.** – Dioecious, pubescent shrubs or trees to 30 m tall and 45 cm dbh (*T. clathratus* S. P. Darwin, *T. moluccanus* S. P. Darwin) and sometimes with buttressed trunks; or initially epiphytic and perhaps also strangling shrubs (*T. akunensis* S. P. Darwin).

**Stipules.** – Imbricate (but only slightly so in *T. clathratus*, *T. merokensis* Wernham, and *T. schefferi* Valeton), usually densely pubescent adaxially, deciduous or caducous.

**Leaves.** – Opposite, simple, entire; costa and secondary nerves prominent, pinnate, the veinlets irregularly scalariform to corivate (MELVILLE, 1976).

**Staminate inflorescences.** – Cymose, usually 2-armed or subcapitate, 3- to 25- or rarely 40-flowered (*T. grandifolius* Valeton); peduncles somewhat strap-shaped; bracts paired at apex of peduncle, often persistent; a smaller bracteole often subtends each sessile flower; calyx limbs mostly cylindrical-cupular, pubescent inside and out; corollas narrowly infundibular to hypocrateriform, densely sericeous outside, glabrous within; anthers linear and subsagittate at base, borne on the corolla and alternating with the corolla lobes.

**Pistillate inflorescences.** – One- or rarely three-flowered (*T. schefferi*) cymes; peduncles usually somewhat strap-shaped; bracts paired at apex of peduncle beneath sessile ovary (hypanthium), usually persistent; bracteoles absent (all 1-flowered inflorescences) or solitary beneath each sessile flower; calyx limbs usually pubescent inside and out, the lobes erect or more often strongly reflexed in fruit; corollas infundibular to salverform (but seen in only a few species), probably caducous, densely sericeous outside, glabrous within; staminodia subsagittate, borne on the corolla and alternating with the corolla lobes.

**Fruits.** – Drupes with firm mesocarp, ellipsoid to obovoid or depressed-globose, sometimes beaked (*T. leptocalyx* S. P. Darwin); 8-45 × 8-30(-45) mm; yellow, orange, or red when mature, subglabrous to densely velutinous. Pyrenes (4-)12-40(-70), vertical to subvertical, arranged in 4-8 radiating double-files.

**Size and distribution.** – 21 species distributed from Sulawesi (Celebes) eastward through the Moluccas and New Guinea to Rossel Island (Louisiade Archipelago); not known from the Bismarck Archipelago or Solomon Islands (Table 1).

**Table 1.** – Species of *Timonius* subgen. *Pseudobobea* (Valeton) S. P. Darwin grouped by geographical region and by political province or district. [\* = Species known from more than one region].

Species	Geographical regions
<i>Northeastern New Guinea</i>	
<i>T. akunensis</i> S. P. Darwin*	E. Highlands, Morobe
<i>T. argenteus</i> Valeton	Madang, E. Sepik, W. Sepik
<i>T. clathratus</i> S. P. Darwin	Madang, Morobe, Sepik
<i>T. grandifolius</i> Valeton*	Sepik
<i>T. klossii</i> Wernham*	W. Highlands
<i>T. leptocalyx</i> S. P. Darwin	Morobe
<i>T. papuanus</i> Merr.	E. Sepik
<i>T. repertus</i> S. P. Darwin	Morobe
<i>T. sylvestris</i> S. Moore*	Morobe
<i>Southeastern New Guinea</i>	
<i>T. akunensis</i> S. P. Darwin*	Central
<i>T. carrii</i> S. P. Darwin	Central, Northern, Milne Bay
<i>T. merokensis</i> Wernham	Central
<i>T. rosselensis</i> S. P. Darwin	Rossel Island (Louisiade Archipelago)
<i>T. sylvestris</i> S. Moore*	Central, Milne Bay, Woodlark Island, Louisiade Archipelago
<i>South-central New Guinea</i>	
<i>T. branderhorstii</i> Valeton*	Western, Digul
<i>T. grandifolius</i> Valeton*	Western, S. Highlands
<i>T. versteegii</i> Valeton*	Western
<i>Southwestern New Guinea</i>	
<i>T. versteegii</i> Valeton*	Mimika
<i>T. klossii</i> Wernham*	Mimika
<i>Western and West-central New Guinea</i>	
<i>T. bracteatus</i> Merr. & L. M. Perry	Guinea
<i>T. bracteoides</i> S. P. Darwin	Djajapura, Jayawijaya
<i>T. branderhorstii</i> Valeton*	Djajapura
<i>T. grandifolius</i> Valeton*	Djajapura
<i>Far Western New Guinea</i>	
<i>T. grandifolius</i> Valeton*	Nabire
<i>T. klossii</i> Wernham*	Vogelkop
<i>T. reflexus</i> S. P. Darwin	Vogelkop
<i>Sulawesi and Molucca Islands</i>	
<i>T. minahassae</i> Koord.	Sulawesi, Gebe
<i>T. moluccanus</i> S. P. Darwin	Halmahera, Morotai
<i>T. schefferi</i> Valeton	Gebe
<i>T. schumannii</i> Koord.	Sulawesi

*Habitats.* – Found most frequently in primary or wet secondary forest, or dry *Castanopsis* (D. Don) Spach forest (*T. leptocalyx*), or sago swamps (*T. branderhorstii*), or seasonally flooded forests (*T. grandifolius*, *T. papuanus* Merr.), or grasslands (*T. sylvestris* S. Moore); often reported as growing on lateritic and ultrabasic soils from near sea level to 2000 m elevation or higher (*T. akunensis* S. P. Darwin, *T. carrii* S. P. Darwin, *T. repertus* S. P. Darwin).

*Symbiotic relationships.* – Acarodomatia present as pubescent pockets or pits in abaxial axils of secondary and sometimes also tertiary nerves (leaves barbate beneath), or often absent. Ant-inhabited domatia (hollow internodes of branchlets and perhaps also petioles) seen in one collection of *T. papuanus* from the Sepik region of New Guinea.

*Pollination biology.* – Probably pollinated by moths. The flowers are reported as sweet-scented; the corollas are noted as yellow to orange, brown, red, or purple outside, the lobes as white.

The first infrageneric classification of *Timonius* was proposed by VALETON (1909: 21), who recognized three sections. Sect. *Pseudobobea* he characterized as having fruits with vertically oriented pyrenes arranged in 8-12 radiating files and attached at about the same height near the fruit apex. The other two sections, sect. *Helospora* Valetton and sect. *Polyphragmon* Valetton (= subgen. *Timonius*) were likewise characterized on the basis of pyrene number and orientation. Valetton assigned two species, *T. koordersii* Valetton (Sulawesi) and *T. branderhorstii*, to sect. *Pseudobobea*, and DARWIN (1993) chose *T. branderhorstii* as lectotype. However, aside from the vertical pyrenes, the two species are not very similar, and *T. koordersii*, with reticulate leaf venation and short, erect calyx lobes, is excluded from subgen. *Pseudobobea* as here construed. However, three species that Valetton assigned to other sections are here placed in subgen. *Pseudobobea*: *T. schefferi* (from sect. *Polyphragmon*), and *T. versteegii* Valetton and *T. schumannii* Koord. (both from sect. *Helospora*).

The pyrene character identified by Valetton holds for most species of subgen. *Pseudobobea*, but is not universally reliable. Another character that distinguishes species of the subgenus is leaf venation: the tertiary nerves are scalariform or, after diverging from adjacent secondary nerves, they meet and curve outward toward the leaf margin (“corivate venation” of MELVILLE, 1976: fig. 34-35); the pattern of the underlying venation is often mimicked by the appressed pubescence on abaxial leaf surfaces. Also, the calyx lobes of pistillate flowers often become strongly reflexed in fruit, although these remain erect in a few species (*T. akunensis*, *T. carrii*, *T. leptocalyx*, and *T. repertus*, all from eastern New Guinea), or rarely the calyx lobes are reduced to broadly obtuse teeth (*T. schumannii*); neither pistillate flowers nor fruits are as yet known from *T. moluccanus* and *T. rosse-lensis* S. P. Darwin. In species of subgen. *Pseudobobea*, the

pistillate inflorescence bracts are usually broad and often involucrate, whereas these are usually much smaller in other *Timonius* species.

In their usually strongly imbricate stipules, species of subgen. *Pseudobobea* differ from species allied with *T. flavescens* (DARWIN, 1997), in which the stipules are valvate or subvalvate and separate from their apices downward, and from species of subgen. *Timonius* (DARWIN, 1993), in which the stipules are evidently calyptrate and separate from their sides or bases upward. Species of subgen. *Abbottia* (DARWIN, 1994) are marked by having leaf blades with reduced secondary nerves, and veinlets that form a finger-print-like pattern (paxillate venation), among other features not found in subgen. *Pseudobobea*.

Most species of subgen. *Pseudobobea* have limited geographical distributions, and several appear to be narrow endemics (Table 1). Only three species, as here circumscribed, are at all widespread: *T. branderhorstii* (south-central New Guinea, but one disjunct collection from Djajapura), *T. grandifolius* (north-central New Guinea from Nabire to the Sepik region, and also south-central New Guinea), and *T. klossii* (Vogelkop region, southwestern New Guinea, and the Western Highlands). A similar absence of widespread species was found in other *Timonius* species-groups (DARWIN, 1993, 1994, 1997), and may suggest recent speciation (see PAUL & al., 2009). Indeed, only a few species of the genus are widespread, for example *T. flavescens* (New Guinea westward to Borneo, Sumatra, Malay Peninsula, Andaman Islands, Sri Lanka, and the Seychelles), *T. timon* (Spreng.) Merr. (Java eastward through Papuasias to the Solomon Islands and tropical Australia), and *T. polygamus* (G. Forst.) B. L. Rob. (a strand species in the Solomon Islands eastward to Fiji, Samoa, and the Tuamotu Islands).

Much of the morphological variability within subgen. *Pseudobobea* lies in (1) vegetative characters (e.g., persistence of stipules, presence or absence of leaf domatia, the shape of leaf blades and the number of secondary nerves), (2) pubescence, and (3) dimensional differences in various vegetative and reproductive parts. Perhaps the most frequently reliable character for species diagnosis is the shape and orientation (erect to strongly reflexed) of the mature calyx lobes. Such (nonadaptive?) variability, especially in vegetative characters, along with the limited species distributions, may be consistent with the view that subgen. *Pseudobobea* is in the process of diversification through allopatry and ecological differentiation.

Among reproductive structures, the number of pyrenes per fruit and, to a limited degree, their orientation are useful in delimiting species, as are the dimensions of the staminate inflorescence and number of flowers. Only in *T. branderhorstii* was the numerical plan of the flower found useful for species delimitation (corolla lobes and stamens 4 rather than 5). However,

generalizations about floral variability would not be warranted at this time, since, for many species, the deciduous corollas were unavailable for study; for some species, either the staminate (*T. akunensis*, *T. repertus*, *T. schefferi*, *T. schumannii*) or pistillate (*T. moluccanus*, *T. rosselensis*) inflorescences are as yet unknown.

### Key to the species of *Timonius* subgen. *Pseudoboea*

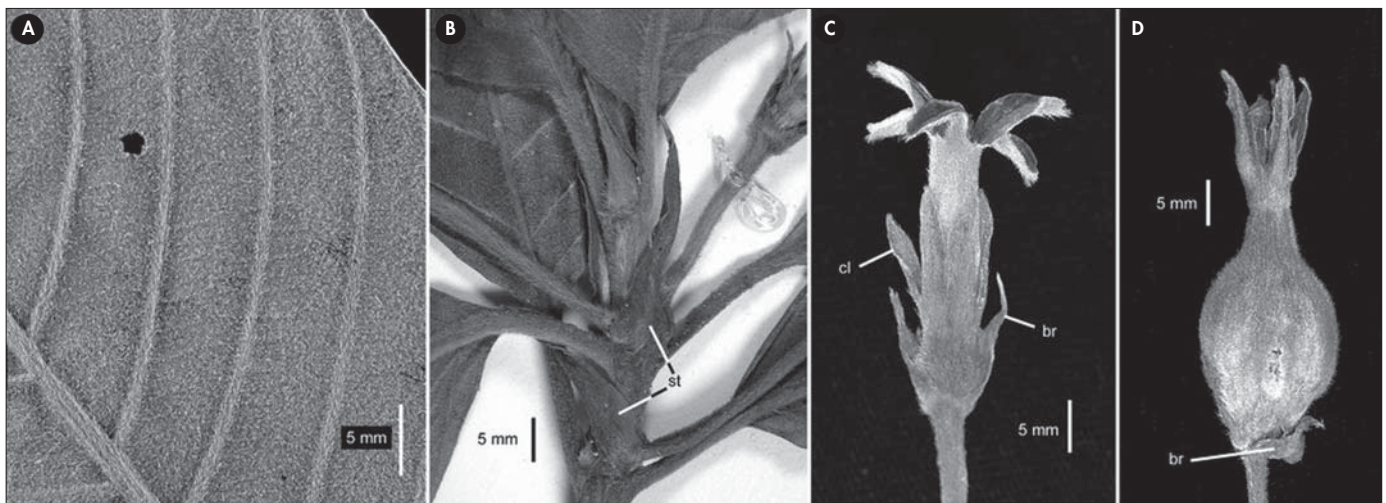
1. Distribution in Sulawesi and Molucca Islands ..... 2
  - 1a. Distribution in New Guinea and nearby islands..... 5
2. Branchlets (subterminal internodes) 5-7 mm broad toward apex; petioles 5-6 mm broad at middle .....
  - ..... **12. *T. minahassae***
- 2a. Branchlets (subterminal internodes) 2-5 mm broad toward apex; petioles 1-4 mm broad at middle ..... 3
3. Stipules ovate, < 14 mm long ..... **13. *T. moluccanus***
  - 3a. Stipules lanceolate, often > 20 mm long ..... 4
4. Secondary nerves 6-10 on each side of costa; pistillate inflorescences 3-flowered; fruits tawny-strigillose to hispidulous ..... **18. *T. schefferi***
  - 4a. Secondary nerves 12-18 on each side of costa; pistillate inflorescences 1-flowered; fruits canescent to sparsely appressed-puberulent ..... **19. *T. schumannii***
5. Leaf blades broadly rounded to truncate and cuspidate-acuminate at apex; Rossel Island only .....
  - ..... **17. *T. rosselensis***
- 5a. Leaf blades usually acute to acuminate, if rounded then only briefly so and never truncate ..... 6
6. Calyx lobes prominent and erect (never strongly reflexed) at apex of mature fruits; eastern New Guinea ..... 7
  - 6a. Calyx lobes usually strongly reflexed and appressed at apex of fruit ..... 10
7. Calyx lobes (pistillate flowers or fruits) subulate, < 2 mm broad ..... **10. *T. leptocalyx***
  - 7a. Calyx lobes (pistillate flowers or fruits) linear to ovate; 2-6 mm broad ..... 8
8. Leaf blades abaxially tawny-velutinous .....
  - ..... **1. *T. akunensis***
- 8a. Leaf blades abaxially appressed-pubescent ..... 9
9. Inflorescences and fruits sericeous with pale (often silvery) hairs..... **6. *T. carrii***
  - 9a. Inflorescences and fruits sericeous with reddish brown hairs ..... **16. *T. repertus***
10. Leaf blades evidently barbate beneath with domatia in axils of secondary nerves ..... 11
  - 10a. Leaf blades evidently without axillary domatia beneath ..... 25
11. Branchlets (subterminal internodes) < 2 mm broad .....
  - ..... **11. *T. merokensis***
- 11a. Branchlets (subterminal internodes) 2-10 mm broad ..... 12
12. Secondary nerves 15 or more on each side of costa... 13
  - 12a. Secondary nerves < 15 on each side of costa ..... 15
13. Leaf blades to 50 × 27 cm; staminate inflorescences with as many as 40 flowers; fruits to 45 mm broad .....
  - ..... **8. *T. grandifolius***
- 13a. Leaf blades to 30 × 14 cm; staminate inflorescences with as many as 20 flowers; fruits to 30 mm broad ..... 14
14. Stipules caducous; leaf blades puberulent at least on nerves beneath; staminate peduncles < 10 mm long; pistillate peduncles ca. 3 mm long ..... **14. *T. papuanus***
  - 14a. Stipules usually persistent to third node below apex of branchlet; leaf blades subglabrous beneath; staminate peduncles >10 mm long; pistillate peduncles 3-10 mm long ..... **20. *T. sylvestris***
15. Calyx lobes (pistillate flowers and fruits) > 10 mm long ..... 16
  - 15a. Calyx lobes (pistillate flowers and fruits) < 10 mm long ..... 19
16. Branchlets (subterminal internodes) 2-3 mm broad; staminate inflorescences 3-flowered; stamens 4; pistillate peduncles > 12 mm long ..... **3. *T. bracteatus***
  - 16a. Branchlets (subterminal internodes) 3-8 mm broad; staminate inflorescences 5- to 25-flowered; stamens 5; pistillate peduncles < 12 mm long ..... 17
17. Branchlets and stipules appressed-puberulent to glabrous; stipules caducous; fruits densely yellow-puberulent; pistillate calyx unequally 8-lobed ..... **14. *T. papuanus***
  - 17a. Branchlets and stipules strigillose; stipules usually persistent 2-3 nodes below apex; fruits red- to brown-velutinous; pistillate calyx 4- to 6-lobed..... 18
18. Stipules usually < 20 mm long; leaf blades appressed-strigillose on nerves beneath; bracts of staminate inflorescences to 5 mm long..... **15. *T. reflexus***
  - 18a. Stipules 20-40 mm long; leaf blades subglabrous beneath; bracts of staminate inflorescences 5-15 mm long ..... **20. *T. sylvestris***

19. Branchlets (subterminal internodes) 5-6 mm broad, appressed-puberulent to glabrous; staminate calyx appressed-puberulent; pistillate peduncles ca. 3 mm long; pistillate calyx unequally 8-lobed ..... **14. *T. papuanus***
- 19a. Branchlets (subterminal internodes) 2-4 mm broad, puberulent to strigillose; staminate calyx densely puberulent-strigillose; pistillate peduncles 5-60 mm long; pistillate calyx 4- to 6-lobed ..... 20
20. Stamens (staminate flowers) glabrous ..... 21
- 20a. Stamens pubescent, at least on back ..... 23
21. Bracts of staminate inflorescences 10-20 mm long; staminate calyx cup to 8 mm tall; bracts of pistillate inflorescences involucrate, foliaceous, to 15 mm long ..... **3. *T. bracteatus***
- 21a. Bracts of staminate inflorescences 2-4 mm long; staminate calyx cup to 3 mm tall; bracts of pistillate inflorescences deciduous, to 8 mm long ..... 22
22. Stipules to 10 mm long; staminate peduncles 4-10 mm long; pistillate inflorescences strigillose ..... **4. *T. bracteoides***
- 22a. Stipules 14-25 mm long; staminate peduncles 10-18 mm long; pistillate inflorescences finely but densely puberulent ..... **7. *T. clathratus***
23. Bracts of staminate inflorescences to 1 mm long; staminate calyx lobes linear, to 1 mm long; fruits densely yellowish to brownish puberulent-velutinous ..... **9. *T. klossii***
- 23a. Bracts of staminate inflorescences to 5 mm long; staminate calyx lobes deltoid to spatulate to ovate, 1-2 mm long; fruits gray- to brown-puberulent with appressed hairs, or subglabrous ..... 24
24. Staminate corollas 4-lobed ..... **2. *T. argenteus***
- 24a. Staminate corollas 5-lobed ..... **5. *T. branderhorstii***
25. Leaf blades to 35 cm long; secondary nerves 15-25 on each side of cost a ..... **21. *T. versteegii***
- 25a. Leaf blades to 26 cm long; secondary nerves 8-12(-18) on each side of costa ..... 26
26. Stipules to 12 mm long; anthers (staminate flowers) ca. 4 mm long; pistillate peduncles ca. 1 mm broad at middle; pistillate calyx lobes 3-5(-7 mm) long; fruits <15 mm broad ..... **5. *T. branderhorstii***
- 26a. Stipules to 40 mm long; anthers (staminate flowers) 6-8 mm long; pistillate peduncles 2-5 mm broad at middle; pistillate calyx lobes 10-15 mm long; fruits >15 mm broad ..... 27
27. Pistillodia (staminate flowers) densely strigillose ..... **15. *T. reflexus***
- 27a. Pistillodia (staminate flowers) glabrous ..... **20. *T. sylvestris***

**1. *Timonius akunensis* S. P. Darwin, spec. nova** (Fig. 1)

**Typus:** PAPUA NEW GUINEA. **Eastern Highlands:** just above Akuna (6°22'S 145°56'E), tree in mid-montane oak forest on slope, 1650 m, 8.VII.1963, flowering and fruiting, *Hartley 11983* (holo-: CANB!; iso-: A!, BRI!, LAE!).

*Species Timonio carrii et T. reperto similis calycis lobis prominentibus et sub fructu erectis, sed foliorum laminis velutinis non appressi-pubescentibus differt. A T. sylvestri et T. clathrato differt calycis lobis erectis non reflexis, et a T. leptocalyce differt calycis lobis plus quam 2 mm latis.*



**Fig. 1.** – *Timonius akunensis* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet apex; **C.** Pistillate flower; **D.** Fruit. [br = bract; cl = calyx lobe; st = stipule].

[A-D: *Hartley 11983, A*]

*Trees*, or initially epiphytic and often strangling *shrubs* to 3 m tall. *Branchlets* 3-5 mm broad toward apex, sericeous-velutinous with reddish brown hairs. *Stipules* imbricate, persistent to second or third node, lanceolate, to  $33 \times 10$  mm, acuminate, sericeous outside, adaxially glabrous except densely sericeous toward center and base. *Petioles* 5-20 mm long, ca. 2 mm broad at middle, sericeous. *Leaf blades* elliptic to oblong-elliptic to obovate,  $9-20 \times 4-10$  cm, sharply acute to acuminate at apex, acute to briefly attenuate or rarely obtuse at base, stiffly chartaceous, pubescent with scattered hairs to subglabrous above, densely sericeous to velutinous beneath, the secondary nerves 10-14 on each side of costa, spreading; domatia not evident. *Staminate inflorescences* not seen other than detached peduncles 5-9 mm long. *Pistillate inflorescences* 1-flowered, the peduncles 30-80 mm long, ca. 2 mm broad; bracts to  $12 \times 5$  mm, ovate-lanceolate, acuminate, in age irregularly lacerate; calyx limb sericeous inside and out, the tube ca. 5 mm long, the lobes 4-6, narrowly elliptic,  $6-15 \times 2-4$  mm; corolla tube ca. 16 mm long, ca. 4 mm broad, the lobes 5, narrowly elliptic, ca.  $8 \times 3$  mm, acute, white or yellowish; staminodia not seen; hypanthium ellipsoid,  $5-7 \times$  ca. 5 mm, densely pubescent, the style not seen. *Fruits* ellipsoid to obovoid, somewhat beaked at apex, tapering toward base,  $20-35 \times 15-25$  mm, densely sericeous, bright orange or yellow to red when mature, the pyrenes ca. 20, vertical.

*Distribution and ecology.* – Highlands of eastern Papua New Guinea in primary oak or *Nothofagus* Blume forests at elevations 1280-1980 m.

*Etymology.* – Excellent pistillate collections of this species were made by Thomas Hartley near the town of Akuna, Eastern Highlands, Papua New Guinea.

*Timonius akunensis*, *T. carrii*, and *T. repertus*, all from eastern New Guinea, are distinctive among species of subgen. *Pseudoboea* in having prominent calyx lobes which, in pistillate individuals, remain erect on mature fruits. However, in *T. carrii* and *T. repertus*, the leaf undersurfaces are appressed-pubescent, versus the usually velutinous pubescence of *T. akunensis*. In *T. sylvestris*, *T. clathratus*, and other species from the same region, the calyx lobes usually become strongly reflexed and appressed to the top of the fruit. Calyx lobes of *T. leptocalyx* remain erect, but these are exceptionally narrow (to 2 mm broad).

*Additional material examined.* – **PAPUA NEW GUINEA. Eastern Highlands:** Aiyura, 1830 m, 7.X.1957, *Robbins 995* (CANB!, LAE!); Kassam Pass, 1280 m, 15.I.1968, *NGF (Coode) 32675* (CANB!), *NGF (Coode) 32676* (A!, LAE!), *NGF (Coode) 32678* (LAE!). **Morobe:** 10.5 km NE of Wau, 1550 m, 28.I.1979, *Pratt NG 79-1048* (LAE!). **Central:** Uriko, road from Woitape to Kosipi, 1980 m, 8.I.1965, *NGF (van Royen) 20219* (LAE!).

2. *Timonius argenteus* Valeton in Bot. Jahrb. Syst. 61: 35. 1927.

**Lectotypus** (here designated): **PAPUA NEW GUINEA. Sepik:** [Augustafluss, Hauptlager Malu], flowering, *Ledermann 6693* (L!; iso-: A!, SING!).

*Trees* to 15 m tall and ca. 20 cm dbh. *Branchlets* ca. 3 mm broad toward apex, puberulent-strigillose. *Stipules* caducous, imbricate, ovate,  $6-11 \times 4-6$  mm, acuminate, densely strigillose to subglabrous outside, adaxially strigose toward center and base. *Petioles* 10-30 mm long, 1-1.5 mm broad at middle, canalliculate. *Leaf blades* elliptic to obovate,  $7-16 \times 4-8$  cm, acute to sharply acuminate at apex, cuneate at base, thinly chartaceous, dispersed- and appressed-puberulent above, appressed-puberulent beneath, the costa prominent beneath, the secondary nerves prominent, 8-11 on each side of costa, the veinlets prominulous, irregularly scalariform to subcorvate; domatia evident as tufts of hairs in nerve axils. *Staminate inflorescences* to 12-flowered, congested at anthesis,  $2-3 \times 3-4$  cm, the peduncles 4-10 mm long, ca. 1 mm broad, the bracts basally united, ovate, acuminate, to 3 mm long, the bracteoles small, often hardly discernible; calyx limb cupular-infundibular, 4-lobed, densely puberulent-strigillose inside and out, the tube 2-2.5 mm long from base, the lobes ovate to spatulate,  $1-5 \times$  ca. 1.5 mm; corolla narrowly infundibular, yellowish to brownish, the tube (late bud) 8 mm long, ca. 2 mm broad, densely puberulent-strigillose outside, the lobes 4, elliptic, 4-5 mm long (late bud); stamens 4, the filaments ca. 0.5 mm long, the anthers long-oblong, ca.  $5 \times 0.5$  mm, densely strigillose on back; pistillodium not seen. *Pistillate inflorescences* 1-flowered, the peduncles 5-12 mm long, ca. 1.5 mm broad, strigillose, the bracts ovate, acuminate, to 3 mm long; calyx limb cupular, 4-lobed, densely puberulent inside and out, the tube ca. 1 mm long, the lobes lanceolate, to  $5 \times$  ca. 1.5 mm; corolla not seen. *Fruits* subglobose to depressed-globose,  $8-15 \times 10-18$  mm, densely brown-puberulent, the pyrenes 10-14, probably in 4 radiating double-files, vertical.

*Distribution and ecology.* – Primary and disturbed secondary lowland forests of northeastern New Guinea, especially the Sepik and Ramu River drainages, from near sea level to 640 m elevation.

*Local names and uses.* – “Metaya” (Wagu); “Wagwem” or “Wagwim” (Waskuk). The timber is used for house construction (*Hoogland & Craven 10363*).

Similar to *T. branderhorstii* (south-central New Guinea), mainly differing in having four versus five staminate corolla lobes and stamens. In addition to the collections cited below, one sterile specimen from western New Guinea, probably the Mamberamo River region (*Moszkowski 201*, L: “Nord. Neu-guinea, Tana: Omeri”), may represent this species.



*Additional material examined.* – **PAPUA NEW GUINEA. West Sepik:** Pevi, Vanimo, 120 m, 25.I.1969, *NGF (Streimann & Kairo)* 39176 (A!, BISH!, CANB!, K!, LAE!, SING!); Prospect Creek near Frieda River, 640 m, 24.VI.1969, *NGF (Henty & Foreman)* 42585 (A!, BISH!, LAE!). **East Sepik:** [Augustafluss, Malu], *Ledermann* 8032 (SING!); near Wagu, ca. 60 m, 28.VI.1966, *Hoogland & Craven* 10363 (A!, BRI!, CANB!, LAE!); near Ambunti, ca. 150 m, 2.VI.1966, *Hoogland & Craven* 10195 (A!, BRI!, CANB!, LAE!); near Kumasal on trail to Tring (Wewak-Maprik road), ca. 300 m, 13.VIII.1959, *Robbins* 2164 (CANB!). **Madang:** Aiome to Ramu River, Dovulat, 60 m, 11.III.1968, *NGF (Coode & Katik)* 32778 (A!, CANB!, LAE!).

**3. *Timonius bracteatus* Merr. & L. M. Perry** in J. Arnold *Arbor.* 26: 246. 1945.

**Typus:** INDONESIA, IRIAN JAYA. **Djajapura:** Idenburg River, 15 km SW of Bernhard Camp, 1700 m, I.1939, *Brass* 12234 (holo-: A!; iso-: BM!, BO!, BRI!, LAE!).

*Trees* to 13 m tall. *Branchlets* 2-3 mm broad toward apex, brownish, puberulent to strigillose. *Stipules* deciduous to subsistent, imbricate, ovate-lanceolate, to 25 × 10 mm, acuminate, strigillose toward center outside, adaxially densely lanate to strigose. *Petioles* (3-)8-20 mm long, 1-2 mm broad at middle, semiterete. *Leaf blades* elliptic to oblanceolate, 6-16 × 2-7 cm, sharply acuminate at apex, cuneate at base, chartaceous, dispersed-puberulent above, minutely appressed-puberulent (strigillose on nerves) beneath, the costa prominent beneath, the secondary nerves prominent, 8-11 on each side of costa, the veinlets irregularly scalariform to subcorivate; domatia evident as tufts of hairs in axils of nerves. *Staminate inflorescences* 3-flowered, the peduncles compressed, to 25 mm long, to 3 mm broad, strigillose, the bracts basally united, conspicuous, ovate, acuminate and often lacerate, deciduous, 10-20 mm long, the bracteoles narrow, to 8 × 1 mm; calyx limb infundibular, unequally 4-lobed, strigillose inside and out, the tube to 8 mm long from base, the lobes lanceolate to narrowly elliptic, 5-8 × ca. 2 mm; corolla white, the tube to 15 mm long, 2-4 mm broad, densely strigillose outside, the lobes 4, narrowly elliptic, to 9 × 2 mm, acute, glabrous, the corolla limb ca. 16 mm across; stamens 4, the filaments short, the anthers narrowly oblong, ca. 5 × 1 mm, glabrous; pistillodium slender, 2-fid, ca. 12 mm long, ca. 0.5 mm broad, strigillose. *Pistillate inflorescences* 1-flowered, the peduncles compressed, 14-20(-60) mm long, 1.5-2 mm broad, finely strigillose, the bracts basally united, foliaceous, involucrate, often lacerate, to 15 mm long; calyx limb cupular-infundibular, 4-lobed, densely strigillose, the tube ca. 2.5 mm long, the lobes lanceolate, 5-10(-15) × 2-5 mm; corolla white, the tube to 17 mm long, to 3 mm broad, densely strigillose outside, the lobes 4, to 8 × 3 mm, the corolla limb 15-20 mm across; staminodia not seen; hypanthium subglobose, ca. 5 × 5 mm, densely strigillose, the style not seen. *Fruits* obovoid, 20-25 × 18-22 mm, appressed-puberulent, the pyrenes 10-18, vertical.

*Distribution and ecology.* – Mountains of western New Guinea at 760-1805 m elevation in primary forest.

*Local name.* – “Dedeka” (Kapaukoe language, Doglia).

*Timonius bracteatus* resembles *T. bracteoides* (also from Djajapura), but in that species the fruits are smaller (to 15 × 12 mm) and the calyx lobes narrower; both species have a rufous pubescence on calyces and fruits, and usually 3-flowered staminate inflorescences.

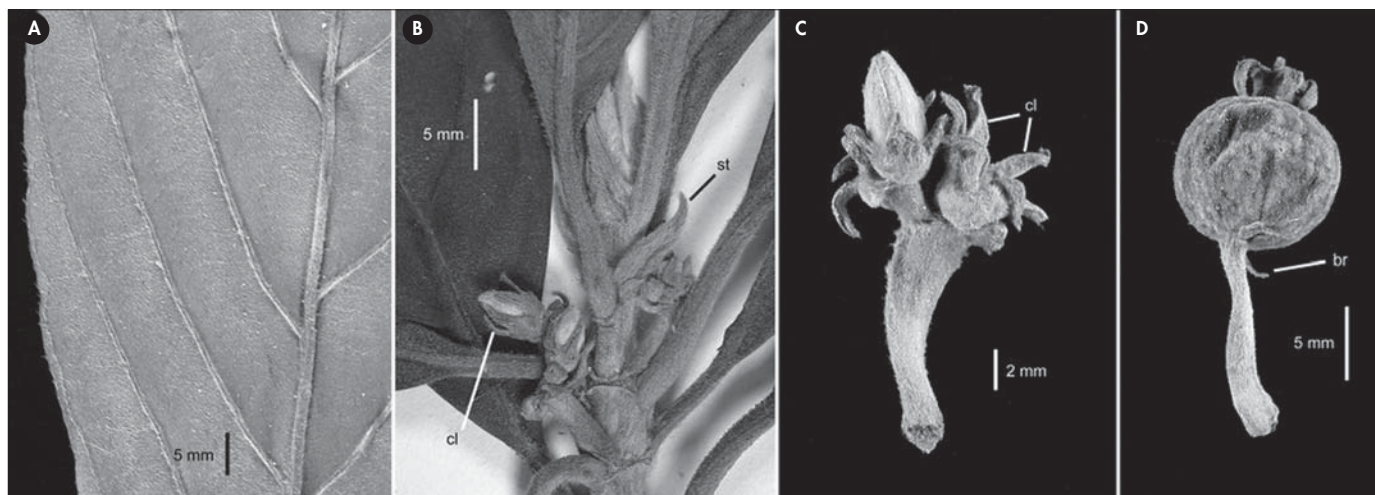
*Additional material examined.* – INDONESIA, IRIAN JAYA. **Jayawijaya (Snow Mountains):** Wissel Lakes, Doglia, N of Kebo, 1805 m, 23.V.1960, *BW (Vink & Schram)* 8851 (A!, CANB!, LAE!); Mamberamo River area, Doormantop, ca. 760 m, 13.XI.1920, *Lam* 1989 (BO!, L!); Hellwig Mountains, 1460 m, *von Römer* 1083 (L!). **Djajapura:** Idenburg River, 15 km SW of Bernhard Camp, 1790 m, I.1939, *Brass & Versteegh* 11982 (A!, BO!, BRI!).

**4. *Timonius bracteoides* S. P. Darwin, spec. nova** (Fig. 2)

**Typus:** INDONESIA, IRIAN JAYA. **Djajapura:** Sidoarsi Mountains, ca. 200 km W of Hollandia, in primary forest, ca. 200 m, 20.V.1959, fruiting, *BW (Vink)* 8435 (holo-: A!; iso-: CANB!, LAE!, SING!).

*Species Timonio argenteo et T. branderhorstii similis fructibus parvis et pedunculis longis, sed ab illo differt inflorescentiis staminatis (cymis) plerumque 12-floribus, ab hoc differt inflorescentiis staminatis 5- ad 15-floribus; a T. bracteato differt fructibus parvis et calycis lobis angustioribus.*

*Trees* to ca. 8 m tall. *Branchlets* 2-3 mm broad toward apex, strigillose. *Stipules* usually caducous, imbricate, ovate-lanceolate, to 10 × 5 mm, acuminate, strigillose outside, adaxially densely strigose. *Petioles* 10-25 mm long, ca. 1 mm broad. *Leaf blades* elliptic to oblanceolate, 7-16 × 2-5 cm, sharply acuminate at apex, attenuate at base, chartaceous, subglabrous above, scattered-stramineous over lamina beneath, the secondary nerves 7-10 on each side of costa, spreading, the veinlets scalariform to subcorivate; domatia usually evident as tufts of hairs in axils of secondary nerves. *Staminate inflorescences* 3- to 7-flowered, at anthesis to 1.5 × 1.5 cm, the peduncles 4-10 mm long, ca. 2 mm broad; bracts small, deciduous, long-acuminate, somewhat 3-fid, 2-4 × ca. 2 mm; calyx tube 1-2 mm long from base, the lobes 5-6, deltoid, 2-3 × ca. 1.5 mm; corolla seen in bud only, the lobes 5; stamens 5, the filaments short, the anthers ca. 4 × 0.5 mm, glabrous; pistillodium linear-columnar, ca. 2 mm long, puberulent. *Pistillate inflorescences* 1-flowered, the peduncles 10-25 mm long, ca. 2 mm broad; bracts as in staminate inflorescences; calyx limb cupular, densely strigillose inside and out, the tube ca. 2 mm long, the lobes 4-5, reflexed in fruit, linear-lanceolate, ca. 3 × 2 mm; corolla not seen; hypanthium subglobose, densely brown-velutinous, the style not seen. *Fruits* subglobose, to 15 mm × 12 mm, densely brown-velutinous, the pyrenes ca. 12, subvertical.



**Fig. 2.** – *Timonius bracteoides* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet apex with staminate inflorescences; **C.** Staminate inflorescence; **D.** Fruit. [br = bract; cl = calyx lobe; st = stipule].

[A: BW (Vink) 8435, A; B, C: BW (Vergeegh) 933, A; D: BW (Vink) 8435, LAE]

**Distribution and ecology.** – Endemic to limestone hills and mountains of Djajapura province, western New Guinea, in primary forests from ca. 100–700 m elevation.

**Etymology.** – In several respects (see below) resembling *T. bracteatus*.

*Timonius bracteoides* resembles *T. argenteus* and *T. branderhorstii* in having relatively small fruits (to 15 × 18 mm) on long peduncles, and the calyx lobes are reflexed at maturity. In *T. bracteatus* (Djajapura westward to Snow Mountains), the fruits are somewhat larger (to 25 × 22 mm) and the calyx lobes broader, but both species have relatively narrow and sharply acuminate leaf blades, rufous pubescence on calyces and fruits, and usually 3-flowered staminate inflorescences (these are 5- to 15-flowered in *T. branderhorstii* and usually 12-flowered in *T. argenteus*).

**Additional material examined.** – **INDONESIA, IRIAN JAYA.** **Djajapura:** Cycloop Mountains, Ifar Ormu, 700 m, 4.XI.1954, *BW* (Versteegh) 933 (A!, CANB!, LAE!); limestone hills E of Hollandia, 100 m, 13.VIII.1966, *Kostermans & Soegeng* 348 (L!).

**5. *Timonius branderhorstii*** Valeton in Bull. Dépt. Agric. Indes Néerl. 26: 33. 1909.

**Neotypus** (here designated): **INDONESIA, IRIAN JAYA.** **Digul:** Kabatiel, 6.XII.1907, fruiting, *Branderhorst* 259 (BO!; isoneo-: A!, L![2 sheets], U!).

= *Timonius strumarius* Merr. & L. M. Perry in J. Arnold Arbor. 26: 248. 1945. **Typus:** **PAPUA NEW GUINEA.** **Western Province:** E bank of lower Fly River at Gaima, XI.1936, flowering and fruiting, *Brass* 8293 (holo-: A!; iso-: BM!, BO!, BRI!).

**Shrubs** or **trees** to 18 m tall and ca. 32 cm dbh. **Branchlets** 2–4 mm broad toward apex, reddish brown to gray, strigillose. **Stipules** caducous or subpersistent, imbricate, ovate, 8–12 × 4–6 mm, acuminate, strigose toward center and base outside, adaxially strigose. **Petioles** 5–30 mm long, 1–2 mm broad at middle, semiterete or somewhat canaliculate. **Leaf blades** oblanceolate to obovate-elliptic, 7–20 × 3–9 cm, abruptly and sharply acuminate at apex, narrowly cuneate at base, chartaceous to subcoriaceous, sparsely pubescent with lax hairs to glabrous above, dispersed- and appressed-puberulent with ferruginous hairs beneath, the costa prominent beneath, the secondary nerves prominent, 8–12 on each side of costa, the veinlets prominulous, irregularly scalariform to subcoriaceous; domatia evident as tufts of hairs in axils of nerves, or absent. **Staminate inflorescences** 5- to 15-flowered, at anthesis congested, to 2.5 × 2.5 cm, the peduncles 5–20 mm long, ca. 2 mm broad, minutely strigillose, the bracts small, lacerate, to 5 mm long, the bracteoles small, deltoid; calyx limb cupular, unequally 5-lobed, strigillose inside and out, the tube 2–3 mm long from base, the lobes deltoid to rectangular-spatulate, 2–5 × 1–2 mm; corolla seen in bud only, white to yellowish, the tube 5 mm long, densely pubescent outside, the lobes 5, to 5 mm long (late bud); stamens 5, the filaments short, the anthers linear-sagittate, ca. 4 × 0.5 mm, pubescent on back; pistillodium not seen. **Pistillate inflorescences** 1-flowered, the peduncles 5–15 mm long, ca. 1 mm broad, strigillose, the bracts small, broadly deltoid to ovate, 1–3 × 1–2 mm, variously lacerate but frequently 3-fid, persistent; calyx limb cupular, 4- or 5-lobed, puberulent with short, appressed hairs, the tube 0.5–2 mm long, the lobes linear, to elliptic or obovate-spatulate, spreading or reflexed in fruit, 3–5(–7) × 1–2.5 mm;

corolla seen in bud only, strigillose outside, the lobes 4-5; staminodia 5, 1.5-2 mm long; hypanthium subglobose, ca.  $2 \times 2$  mm, densely strigillose, the disc prominent (expanding to height of calyx tube or beyond), yellowish-pubescent, the style not seen. *Fruits* depressed-globose to ovoid, (9-)11-18 mm  $\times$  12-14 mm, gray- to brown-puberulent with short, appressed hairs, often subglabrous, the pyrenes 9-14, vertical or subvertical.

*Distribution and ecology.* – South-central New Guinea, where locally common in lowland forest, savannah-forests, wet river beds, and sago swamps from near sea level to ca. 100 m elevation; a solitary collection from coastal north-central New Guinea (Djajapura) is also assigned here.

*Local name.* – “Mugubaimo” (Samotong language, Trisagobabi, Papua).

VALETON (1909, cited above) based *T. branderhorstii* on a solitary fruiting collection, *Branderhorst 1909*, from Kabatiel, New Guinea, but no such collection has been located. VALETON described the species again in 1911, based this time on *Branderhorst 259*, collected in 1907 from the same locality. The two descriptions are essentially identical. Assuming that *Branderhorst 1909* and *259* do represent different collections, the latter is here designated as neotype. MERRILL & PERRY (1945) based *T. strumarius* on three collections (*Brass 7742*, *8293*, and *8338*), all from the Fly River region (Western District) of Papua New Guinea. They considered their new species to be very close to *T. branderhorstii* (type collection from the Digul River, ca. 200 km to the west), but with less densely pubescent fruits, a more strongly developed floral disc, and more strongly reflexed calyx lobes. The collections now at hand show that these characters are quite variable, even within the same collection, and appear to be dependent on the developmental stage of the fruit. The Fly and Digul are among several rivers that dissect the low and swampy Fly-Digul shelf of south-central New Guinea. *Timonius branderhorstii* most closely resembles *T. argenteus* from northeastern New Guinea, but differs in having five rather than four staminate corolla lobes.

*Additional material examined.* – **INDONESIA, IRIAN JAYA.** **Djajapura:** near mouth of Tami River, E of Hollandia, ca. 15 m, 17.III.1956, *BW (Schram) 2680* (A!, CANB!, LAE!). **PAPUA NEW GUINEA.** **Western Province:** 6°45'S, 141°05'E, 70 m, 11.IX.1967, *Paijmans 1608* (CANB!); Trisagobabi, 3 mi NE of Nomad, 100 m, 18.IV.1978, *LAE (Kerenga & Lelean) 73926* (A!, BISH!, LAE!); Lake Daviumbu, Middle Fly River, IX.1936, *Brass 7742* (A!, BO!, BRI!, G!, K!); near Weam, ca. 30 m, 4.VIII.1967, *NGF (Ridsdale) 33601* (A!, BISH!, BRI!, CANB!, LAE!, SING!); Gaima, E bank of lower Fly River, XI.1936, *Brass 8338* (A!, BO!, BRI!).

## 6. *Timonius carrii* S. P. Darwin, **spec. nova** (Fig. 3)

**Typus:** PAPUA NEW GUINEA. **Northern:** above The Gap, shrub ca. 3 m tall, 12.XII.1935, fruiting, *Carr 13749* (holo: A!; iso: BM!, CANB!, K!, NY!).

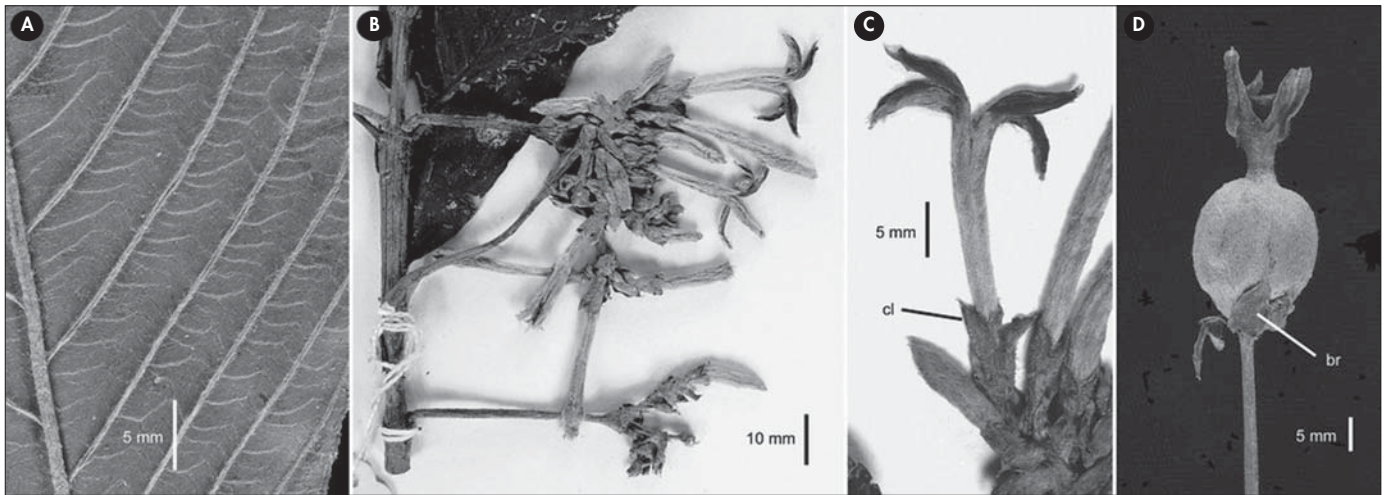
*Ab omnibus speciebus subgeneris cognitis differt pubescentia fructus et pedunculi praesertim pallida vel argentea et sericea; similis Timonio sylvestri sed calycis lobis sub fructu erectis.*

*Shrubs or trees* to 20 m tall. *Branchlets* 4-6 mm broad toward apex, reddish to silvery pubescent (the hairs often matted). *Stipules* deciduous, imbricate, ovate-lanceolate, 15-35  $\times$  8-12 mm, acuminate, densely appressed-pubescent to subglabrous outside, adaxially densely long-strigose toward center and base. *Petioles* 2-20 mm long, 1-3 mm broad at middle. *Leaf blades* broadly elliptic to suborbicular or obovate, (7-)10-18(-26)  $\times$  (3-)6-12 cm, sharply and often abruptly acuminate at apex, attenuate to cuneate to abruptly rounded at base, chartaceous, dispersed-sericeous and glabrate above, sericeous over lamina and on nerves beneath, the secondary nerves (8-)11-23 on each side of costa, the veinlets prominent, coriaceous; domatia usually evident as tufts of hairs in axils of secondary nerves. *Staminate inflorescences* 7- to 20-flowered, the peduncles (25-)40-80 mm long, 1-2 mm broad, densely puberulent and often subfloccose with matted hairs, the bracts irregularly lacerate, deciduous, the bracteoles sometimes involucrel beneath each flower; calyx long-cupular to subinfundibular, irregularly 4-lobed, pubescent inside and out, the lobes ovate to lanceolate, acute, 3-7  $\times$  2-4 mm; corolla infundibular, yellowish inside, greenish or reddish outside, the tube to 20 mm long, 2-3 mm broad, densely shaggy-pubescent outside, the lobes 4, lanceolate, 8-10  $\times$  ca. 2 mm; stamens 4, the filaments glabrous, the anthers 7-8  $\times$  ca. 0.5 mm, pubescent on back. *Pistillate inflorescences* 1-flowered, the peduncles 10-70 mm long, 1.5-2 mm broad, pubescent as in staminate inflorescences, the bracts basally united, ovate, acuminate, irregularly lobed to lacerate, 7-15 mm long; calyx limb cupular, pubescent, 4-lobed, the lobes ovate to lanceolate, 7-10 (-15 in fruit)  $\times$  3-4(-6 in fruit) mm, usually erect in fruit; corolla white to greenish yellow or purplish, the tube densely shaggy-pubescent outside; staminodia not seen; hypanthium densely pubescent; style not seen. *Fruits* ellipsoid to subglobose to obovoid, 20-25  $\times$  15-20 mm, hard, densely pale to reddish-pubescent, the pyrenes ca. 12, vertical.

*Distribution and ecology.* – Endemic to the Owen Stanley mountains of southeastern New Guinea in wet primary and secondary forests at 1370-2440 m elevation.

*Etymology.* – Named in honor of the species' earliest collector, Cedric Erol Carr (1892-1936).

*Timonius carrii* is readily distinguished from other species of subgen. *Pseudoboea* by the pubescence of the peduncles and fruits, which is pale (often silvery) and appressed-sericeous.



**Fig. 3.** – *Timonius carrii* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet with staminate inflorescences; **C.** Staminate inflorescence; **D.** Fruit. [br = bract; cl = calyx lobe; st = stipule].

[A-C: LAE (Croft) 65269, LAE; D: Carr 13749, A]

In other vegetative features, such as leaf blade and stipule dimensions and shape, *T. carrii* intergrades with *T. sylvestris*, which has an adjacent range in southeastern New Guinea, but at generally lower elevations; in that species the calyx lobes are strongly reflexed and appressed to the top of the fruit.

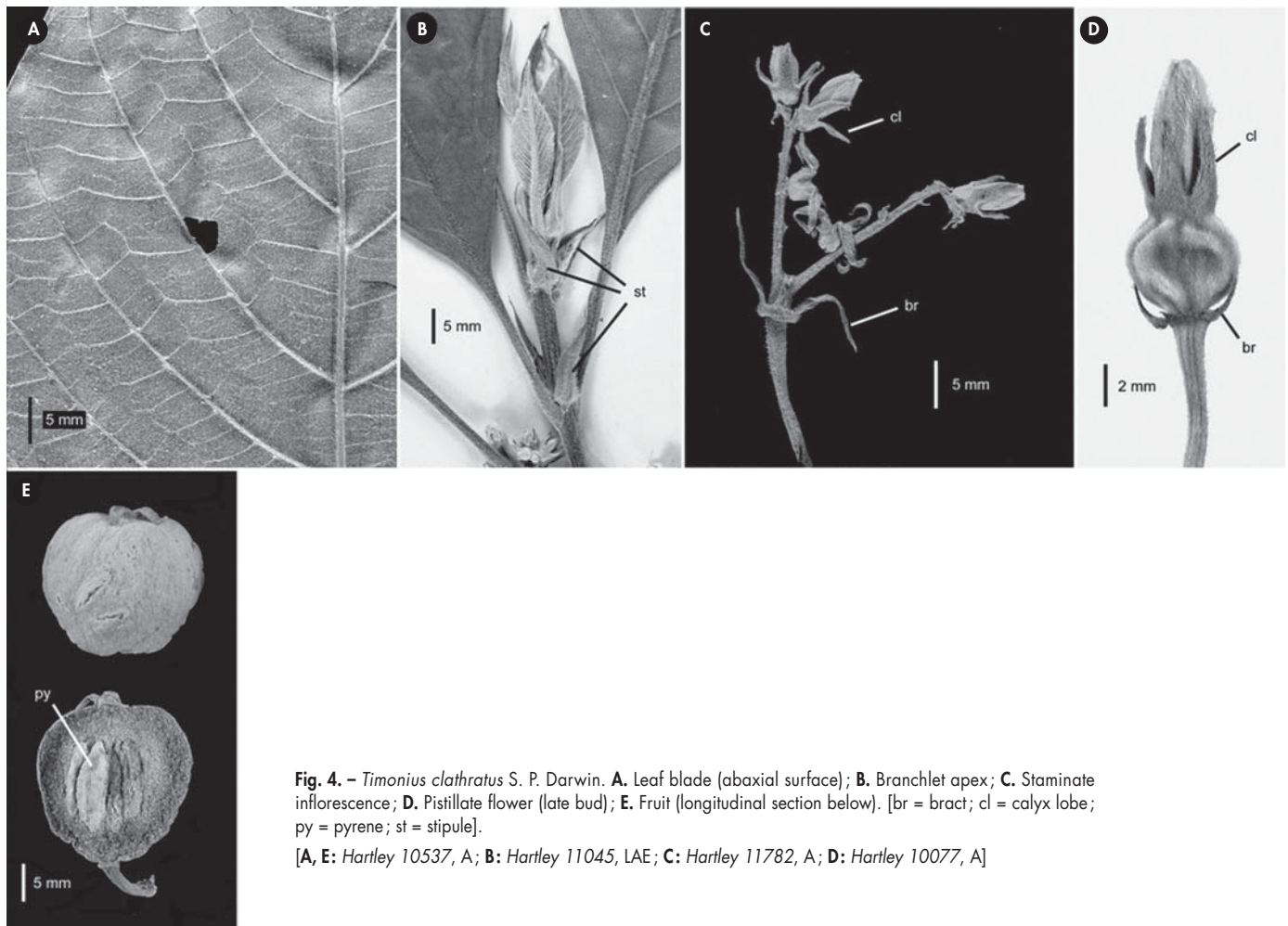
**Additional material examined.** – **PAPUA NEW GUINEA. Central:** Boridi, 1525 m, 12.IX.1935, *Carr 13283* (A!, CANB!, K!); E slope to Lake Myola no. 1, 2150 m, 30.IX.1973, *NGF (Croft & Lelean) 34989* (A!, BISH!, K!, LAE!, M!, QRS!), 2000 m, 23.VII.1974, *LAE (Croft & al.) 61990* (A!, BISH!, K!, LAE!, M!, QRS!); E side Lake Myola no. 2, W slopes of Mt. Kenive, 2000 m, 4.VIII.1974, *LAE (Croft) 65269* (A!, BM!, BISH!, BO!, CANB!, K!, LAE!, M!, MO!, SING!); Kagi Gap area, Kokoda Trail, 1920 m, 17.IX.1973, *NGF (Croft & Lelean) 34754* (A!, LAE!). **Northern:** above The Gap, 2440 m, 12.XII.1935, *Carr 13748* (BM!, CANB!, K!, NY!), 14.XII.1935, *Carr 13790* (A!, BM!, CANB!, K!, NY!); Lala River, 1524 m, 20.II.1936, *Carr 15662* (A!, CANB!, K!, NY!), ca. 1675 m, 28.II.1936, *Carr 15836* (CANB!); Isuarava, ca. 1370 m, 11.II.1936, *Carr 15170* (A!, BM!, CANB!, K!, NY!); Alola, ca. 1830 m, 4.XII.1935, *Carr 13612* (A!, CANB!, NY!), 7.XII.1935, *Carr 13674* (A!, CANB!, K!, NY!). **Milne Bay:** between Agaun and Bonenau, 1500 m, 2.VIII.1969, *Fisher 41* (A!, CANB!, LAE!).

#### 7. *Timonius clathratus* S. P. Darwin, *spec. nova* (Fig. 4)

**Typus:** PAPUA NEW GUINEA. **Morobe:** Sunkwep logging road, 6°35'S 146°55'E, rain forest, 90 m, 4.VIII.1971, *NGF (Katik) 46793* (holo-: LAE!; iso-: A!, BISH!, CANB!).

*Species Timonio grandifolio similis fructibus grandibus et calycis lobis sub fructu reflexis, sed differt inflorescentiarum bracteis et stipulis multum parvioribus.*

*Trees* to 26 m tall and 45 cm dbh with buttressed trunks. *Branchlets* 2-4 mm broad toward apex, finely strigillose. *Stipules* deciduous, imbricate only along margins, ovate to narrowly deltoid, 14-25 mm long, acuminate, densely puberulent-strigillose outside, adaxially strigose. *Petioles* 15-40 mm long, 1.5-3 mm broad at middle. *Leaf blades* obovate to elliptic, 8-30 × 4-14 cm, gradually or abruptly acuminate at apex, attenuate to cuneate at base, chartaceous, appressed-puberulent to glabrous above, usually with appressed as well as erect pubescence beneath, the secondary nerves 8-11(-14) on each side of costa, the veinlets submerged, clathrate; domatia evident as tufts of hairs in axils of secondary and tertiary nerves. *Staminate inflorescences* 5- to 15-flowered, at anthesis 2-5 × 2-4 cm, the peduncles 10-18 mm long, 1-2 mm broad, the bracts 3- to 5-fid and sometimes appearing verticillate, strigillose, deciduous, 4-10 × 1-2 mm, the bracteoles small, slender; calyx limb variably 4- or 5-lobed, the tube 2-3 mm long from base, the lobes narrowly deltoid, 1-7 × 1-2 mm; corolla seen in bud only, yellowish to greenish outside, white within, the tube ca. 8 mm long, 2-3 mm broad, the lobes 5, ovate-elliptic, ca. 5 × 2 mm, acute; stamens 5, the anthers oblong to subsagittate, ca. 4.5 × 0.5 mm, glabrous; pistillodium slender, bifid at apex, ca. 5 mm long, hirsute. *Pistillate inflorescences* 1-flowered, the peduncles 5-33 mm long, 1.5-2 mm broad, the bracts ovate, acuminate, lacerate in age, to 8 mm long; calyx limb variably 4- to 6-lobed, the tube ca. 1 mm long, the lobes subulate to deltoid, reflexed in age, 2-6(-10 in fruit) × 1-3 mm; corolla seen in bud, brownish white, the tube ca. 2 mm broad, the lobes 4, ovate; staminodia 4, oblong, acute at apex,



**Fig. 4.** – *Timonius clathratus* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet apex; **C.** Staminate inflorescence; **D.** Pistillate flower (late bud); **E.** Fruit (longitudinal section below). [br = bract; cl = calyx lobe; py = pyrene; st = stipule].

[**A, E:** Hartley 10537, A; **B:** Hartley 11045, LAE; **C:** Hartley 11782, A; **D:** Hartley 10077, A]

ca.  $2 \times 1$  mm; hypanthium depressed-obovoid to subglobose,  $3\text{--}5 \times 5\text{--}6$  mm, densely pubescent, the disc puberulent, 2–3 mm broad in fruit and prominent, the style 4-armed. *Fruits* broadly obovoid to ellipsoid to subglobose, sometimes somewhat 4-angled,  $12\text{--}20(-26) \times 9\text{--}14(-18)$  mm, yellow to orange when mature, densely pale- or yellowish-puberulent, the pyrenes 12–20 in 4 radiating double-files, vertical.

*Distribution and ecology.* – Endemic to northeastern New Guinea, from the Sepik River drainage eastward to the Huon Gulf in rainforests from near sea level to ca. 1000 m elevation. Flowers have been collected December–July; fruits have been gathered March–August.

*Etymology.* – The tertiary nerves of the leaf blades form a lattice-like (clathrate) pattern.

*Local name.* – “Numintiminti” (Rawa, Madang).

An unusual branching pattern, with a vegetative lateral branch arising under each inflorescence, is apparent in several collections. Some specimens (mostly from Sepik and

Madang provinces) have an especially fine pubescence on young branchlets, leaf blades of firm texture, and stipules that are subvalvate rather than strongly imbricate; but these distinctions are not always sharp and sometimes do not occur together.

*Timonius clathratus* is similar to *T. grandifolius* (western and central New Guinea), both species having relatively large fruits with reflexed calyx lobes; however, *T. grandifolius* has larger stipules (45–80 mm long) and inflorescence bracts (20–30 mm long in staminate inflorescences, to 50 mm long in pistillate specimens), and the staminate inflorescences are more compact. *Timonius sylvestris* (southeastern New Guinea) is similar to *T. clathratus*, but has somewhat larger fruits, leaf blades with more numerous lateral nerves, and subpersistent stipules. In *T. repertus* and *T. leptocalyx* (both from the Madang–Morobe region), the mature calyx lobes stand erect in fruit, among other distinguishing characters.

*Timonius villosus*, described from the Sepik region (Schraderberg, 2070 m) by VALETON (1927: 52), may represent the present taxon, but I have seen neither of the two original collections (*Ledermann 12214* and *11773*, both deposited at B and probably destroyed). *Timonius villosus* was described as a shrub with 12 pyrenes per fruit and stipules and petioles less than 15 mm long, but otherwise falls within the limits of *T. clathratus*, and future collections from the type locality may show that Valeton's name should be applied here. Valeton thought *T. villosus* most closely related to *T. branderhorstii* and *T. argenteus*, which also have relatively few pyrenes crowded in the center of the fruit.

**Additional material examined.** – **PAPUA NEW GUINEA. Sepik:** 7 miles E of Ossima above River Pual, 8.III.1964, *NGF (Sayers) 13272* (A!, CANB!, LAE!). **Madang:** below Wanuma on main track to Ramu, 600 m, 31.VII.1974, *NGF (Womersley) 48676* (A!, BISH!, CANB!, LAE!, M!, QRS!); near Aiup in coastal hills behind Madang, ca. 100 m, 6.VI.1955, *Hoogland 4867* (A!, BM!, BRI!, CANB!, K!, LAE!). **Morobe:** Oomsis Creek, Lac-Bulolo road, *Hartley 10008A* (p.p.) (BRI!); Oomsis, ca. 18 miles W of Lae, 12.VII.1962, *Hartley 10492* (A!, BRI!, C!, CANB!, LAE!), ca. 300 m, 20.VII.1962, *Hartley 10537* (A!, BRI!, CANB!, LAE!); Markham logging area, 30 m, 23.III.1964, *NGF (Womersley) 19216* (A!, BISH!, CANB!, LAE!); Sunkwep logging area, 240 m, 12.V.1969, *NGF (Womersley & Vandenberg) 43545* (A!, BISH!, LAE!), 1.III.1977, *LAE (Benjamin) 67833* (A!, LAE!); Bewape Creek, 4 miles W of Lae, ca. 60 m, 27.III.1962, *Hartley 10077* (A!, BRI!, C!, CANB!, LAE!); Lae, VII.1944, *NGF (White & al.) 1550* (A!, CANB!, LAE!); foothills of Atzera Range, 5 miles from Lae, 75 m, 1.VI.1961, *NGF (Womersley) 13431* (A!, CANB!, LAE!); S of Busu River, ca. 12 miles N of Lae, ca. 90 m, 24.XII.1962, *Hartley 11045* (A!, CANB!, LAE!); Busu River, 4.III.1954, *NGF (Floyd) 5545* (A!, BISH!, BRI!, CANB!, LAE!, SING!), ca. 30 m, 6.V.1960, *NGF (Henty) 12410* (CANB!, LAE!); near suspension bridge, Busu River, NE of Lae, 23.V.1960, *Thorne & Henty 27453* (BISH!, BRI!, GH!, LAE!); Yalu, 20.VII.1944, *NGF 232* (LAE!); Burep River, ca. 15 miles NE of Lae, ca. 15 m, 3.V.1963, *Hartley 11782* (A!, BRI!, CANB!, LAE!), 13.V.1963, *Hartley 11844* (A!, BRI!, CANB!, LAE!); Masba Creek area, 3 miles S of Pindiu, 610 m, 11.V.1964, *Hoogland 8921* (A!, BM!, BRI!, CANB!, K!, LAE!); Sattelberg, ca. 1000 m, 21.II.1936, *Clemens 1889* (A!, B!, BRI!, L!, NY!, Z!).

**8. *Timonius grandifolius* Valeton in Bot. Jahrb. Syst. 61: 41. 1927.**

**Neotypus** (here designated): **PAPUA NEW GUINEA. West Sepik:** Ossima, 30 m, 29.I.1969, *NGF (Streimann & Kairo) 39248* (A!; isoneo-: CANB!, K!, LAE!).

Slender trees to 10 m tall. *Branchlets* 5-10 mm broad toward apex, strigillose. *Stipules* persistent to second or third node below terminal bud, imbricate, broadly lanceolate to ovate, 45-80 × 20-40 mm, obtuse to acute or briefly acuminate, puberulent with appressed hairs outside, adaxially strigose toward center and base. *Petioles* 10-70 mm long, 3-6 mm broad at middle, semiterete. *Leaf blades* obovate to elliptic, 22-50 × 12-27 cm, obtuse to abruptly acuminate or apiculate at apex, broadly cuneate to

briefly rounded at base, chartaceous, sparsely puberulent to glabrous above, minutely appressed-puberulent (more densely so on nerves) beneath, the costa prominent beneath, the secondary nerves prominent, 18-30 on each side of costa, the veinlets irregularly scalariform to subcorvate; domatia small pubescent pits in axils of secondary nerves. *Staminate inflorescences* to 40-flowered, at anthesis to 8 × 6 cm with radiating arms in age, subcapitate when young, the peduncles compressed, 20-50 mm long, 2-4 mm broad, the bracts conspicuous, foliaceous, involucrate, broadly ovate, often lacerate in age, deciduous, 20-30 × ca. 20 mm, the bracteoles absent; calyx limb 4- to 6-lobed, puberulent inside and out, the tube 2-3 mm long from base, the lobes narrowly elliptic, (2-)-7-10 × 1-6 mm; corolla narrowly infundibular to salverform, white to brownish, the tube to 26 mm long, ca. 3 mm broad, densely pale strigillose outside, the lobes 5, elliptic, ca. 9 × 2 mm, acute, the corolla limb to 20 mm broad; stamens 5, the filaments short, the anthers narrowly oblong, ca. 7 × 0.5 mm, puberulent on back; pistillodium slender, 2-fid, to 7 mm long, pubescent. *Pistillate inflorescences* 1-flowered, the peduncles compressed, 10-30 mm long, 2-5 mm broad, the bracts involucrate, foliaceous, irregularly lacerate, persistent, to 50 mm long (in fruit); calyx limb 6-(or 8)-lobed, puberulent inside and out, the tube to 3 mm long, the lobes lanceolate to narrowly elliptic, acuminate, 15-25 × 3-5(-10) mm; corolla not seen. *Fruits* obovoid to subglobose, to 38 mm × 45 mm, puberulent with minute, scattered, usually yellowish hairs, the pyrenes 60-70, subvertical.

**Distribution and ecology.** – Scattered localities in New Guinea, from the Geelvink Bay area eastward to the Southern Highlands of Papua in primary or secondary riverine and seasonally flooded forests and montane forests, sometimes on limestone soils, from near sea level to ca. 825 m elevation.

**Local names.** – “Egiyama” (Hegisu, Southern Highlands); “Ida-ka’ano” (Kutubu, Southern Highlands).

The assignment of Valeton's name to the present taxon is based upon the protologue, as the solitary staminate collection cited by Valeton (*Ledermann 9455*, from Etappenberg, Sepik region of New Guinea, 850 m, X.1912), and deposited at Berlin, is apparently destroyed; no duplicate of the *Ledermann* collection has been located in any other herbarium. Nonetheless, the application of Valeton's name is unambiguous, and an excellent, pistillate collection from the same geographical region, *NGF (Streimann & Kairo) 39248*, is here selected as a neotype. *Timonius grandifolius* is most similar to *T. versteegii* (southwestern New Guinea), which differs in the absence of leaf domatia, and more densely pubescent inflorescences with shorter peduncles (ca. 15 mm in staminate, to 6 mm in pistillate specimens). *Timonius papuanus* (limited distribution in the adjacent East Sepik region) differs in having less densely pubescent branchlets, smaller (to 35 × 15 mm) and caducous stipules, and shorter (to 13 mm) calyx lobes in pistillate flowers and fruits.

*Additional material examined.* – **INDONESIA, IRIAN JAYA. Geelvink Bay:** Nabire, 3 m, 24.II.1940, *Kanehira & Hatusima 11515* (A!, BO!). **Djajapura:** Mamberamo River region, Otken River, 70 m, 29.VI.1920, *Lam 478* (L!). **PAPUA NEW GUINEA. Western Province:** Elevala River, near Gusure, ca. 28 m, 14.VIII.1971, *LAE (Streimann) 51895* (CANB!, LAE!). **Southern Highlands:** near Moro, Lake Kutubu, ca. 825 m, 5.X.1961, *Schodde 2388* (CANB!, LAE!); near Waro airstrip, 20 km SSW of Kutubu, 500-600 m, 14.X.1973, *Jacobs 9226* (L!); Hegisu, 670 m, 22.XI.1969, *NGF (Gillison & Kairo) 25783* (A!, BRI!, CANB!, LAE!).

9. *Timonius klossii* Wernham in Trans. Linn. Soc. London, Bot. 9: 74. 1916.

**Typus:** INDONESIA, IRIAN JAYA. **Mimika:** Utakwa River to Mount Carstenz, camp xi and xii, 28.I.1913, flowering, *Kloss s.n.* (holo-: BM!).

*Trees* to 10 m tall and ca. 25 cm dbh. *Branchlets* 2-3 mm broad toward apex, stramineous to reddish, spreading- or appressed-strigillose. *Stipules* deciduous, imbricate, ovate-lanceolate, 8-15 × 4-6(-10) mm, acute to acuminate, densely strigillose outside, adaxially densely appressed-strigillose toward center and base. *Petioles* 5-18(-25) mm long, 1-2 mm broad at middle, semiterete, strigillose. *Leaf blades* narrowly elliptic to ovate, 7-24 × 3-10 cm, acute to abruptly and sharply acuminate at apex, acute to attenuate at base, thinly chartaceous, pubescent with scattered, lax to erect hairs above, pubescent with appressed and erect-spreading hairs beneath, the costa prominent beneath, the secondary nerves prominent, 8-12 on each side of costa, the veinlets prominent, irregularly scalariform to subcorvate; domatia evident as tufts of hairs in axils of secondary and tertiary nerves. *Staminate inflorescences* 6- to 10-flowered, at anthesis 1.5-2 × 1.5-3 cm, the peduncles 2-5 mm long, 1-2 mm broad, the bracts inconspicuous, mostly hidden by indument, to 1 mm long; calyx limb cupular, 4-lobed, strigillose outside, more densely so within, the tube ca. 2 mm long from base, the lobes linear, mostly obtuse or rounded at apex, 4-5 × 0.5-1 mm; corolla seen in bud only, densely strigillose outside, the lobes 4 (or sometimes 5?), ca. 3 mm long, acute, puberulent; stamens as many as corolla lobes, the filaments short, the anthers linear, subsagittate at base, 4.5-5.5 × ca. 0.4 mm, pubescent on back; pistillodium not seen. *Pistillate inflorescences* 1-flowered, the peduncles compressed, 5-15 mm long, ca. 2 mm broad, densely strigillose, the bracts inconspicuous, deltoid-lanceolate, acute, 2-3 mm long, persistent; calyx limb cupular-rotate, 4- to 6-lobed, densely puberulent-strigillose, the tube 1-2 mm long, the lobes linear, 4-8 × 1-2 mm, reflexed in fruit; corolla not seen; hypanthium not seen, the disc densely puberulent, the style not seen. *Fruits* subglobose to ellipsoid to subobovoid, 13-20 × 13-18 mm, densely yellowish to brownish puberulent-velutinous, the pyrenes 4-6 in longitudinal section, vertical.

*Distribution and ecology.* – New Guinea, from the Vogelkop Peninsula eastward to the Western Highlands area, and from near sea level to ca. 1460 m elevation in primary forests.

*Local name.* – “Pokko” (Manikiong language, Manokwari).

The cited pistillate collections are assigned to *T. klossii* on the basis of their distinctively strap-shaped calyx lobes. So interpreted, *T. klossii* is most similar to *T. reflexus* (Vogelkop region), but in that species the calyx lobes are ovate to elliptic to lanceolate, and the fruits are larger (20-30 mm broad and long). *Timonius klossii* resembles *T. argenteus* (Sepik region), but the calyx lobes of that species are elliptic to lanceolate.

*Additional material examined.* – **INDONESIA, IRIAN JAYA. Vogelkop:** Manokwari, Momi, ca. 10 m, 19.VIII.1948, *Kostermans 264 (bb 33.463)* (A!, BO!, L!); Manokwari, Oransbari, 7.X.1955, *BW (Schram) 1880* (CANB!, LAE!). **PAPUA NEW GUINEA. Western Highlands:** Dagarunga Ridge, Baiyer-Jimi Divide, ca. 1460 m, 29.VIII.1968, *NGF (Henty & Streimann) 38884* (A!, CANB!, LAE!).

10. *Timonius leptocalyx* S. P. Darwin, *spec. nova* (Fig. 5)

**Typus:** PAPUA NEW GUINEA. **Morobe:** Gurakor, rocky banks of forest stream, 640 m, 9.V.1959, *Brass 29498* (holo-: A!; iso-: CANB!, LAE!, NY!).

*Ab omnibus speciebus subgeneris congnitis differt calycis lobis angustisubulatis et sub fructu erectis vel non valde reflexis.*

*Shrubs* or *trees* to 5 m tall. *Branchlets* ca. 3 mm broad toward apex, sometimes subquadrangular, velutinous-tomentulose to tomentose. *Stipules* deciduous, ovate to oblong-elliptic, 15-28 × 8-10 mm, long-acuminate, strigillose outside, adaxially strigillose. *Petioles* 5-12 mm long, ca. 2 mm broad. *Leaf blades* (narrowly) elliptic to obovate, 8-18 × 3-8 cm, sharply acute to acuminate at apex, rounded to truncate or rarely broadly cuneate at base, chartaceous, puberulent with scattered and appressed hairs over lamina (more densely so on nerves) above, tomentulose to velutinous beneath, the secondary nerves 9-12(-16) on each side of costa, the veinlets prominent beneath, clathrate to subcorvate; domatia evident as tufts of hairs in axils of secondary and tertiary nerves. *Staminate inflorescences* 7- to 11-flowered, at anthesis 5-9 × 3-7 cm, the peduncles 10-60 mm long, ca. 1 mm broad, the bracts deciduous, basally united, 3-fid, the central lobe long-subulate, 8-15 mm long, the lateral lobes shorter, acuminate; calyx limb usually unequally 4-lobed, strigillose with somewhat spreading hairs, reddish, the tube ca. 5 mm long, the lobes stiff, subulate, 6-16 × to 1.5 mm; corolla cream-colored to brownish pink, the tube ca. 20 mm long, ca. 1 mm broad, glabrous within except in throat behind anthers, the lobes 4, elliptic, ca. 6 × 2 mm, acute; stamens 4, the anthers ca. 6 × 1 mm, pubescent on back; pistillodium slender, bifid at apex, ca. 9 mm long, ca. 0.2 mm broad, strigillose. *Pistillate inflorescences* 1-flowered, the peduncles 25-50 mm long, 1-2 mm

broad, the bracts much as in staminate specimens, 6–10 mm long, persistent under developing fruit; calyx limb 4-lobed, strigillose, the tube 2–3 mm long, the lobes stiff, subulate, 5–8 (–15 in fruit)  $\times$  1–2 mm; corolla seen in young bud, the tube densely strigillose outside; staminodia not seen; hypanthium ellipsoid, 4–5  $\times$  2–3 mm, densely spreading-strigillose, the style not seen. *Fruits* narrowly obovoid, attenuate at base and somewhat beaked at apex, 23–25  $\times$  8–12 mm, spreading-puberulent, the pyrenes ca. 12, apparently in 4 radiating double-files, vertical.

*Distribution and ecology.* – Endemic to Morobe district of east-central New Guinea in forests (including dry *Castanopsis* forests) at 640–915 m elevation. Flowers have been collected in May, June, September, and November; fruits have been gathered between July and November.

*Etymology.* – In staminate and pistillate flowers, the calyx lobes are long and slender.

*Local use.* – The wood is used for fencing and house construction.

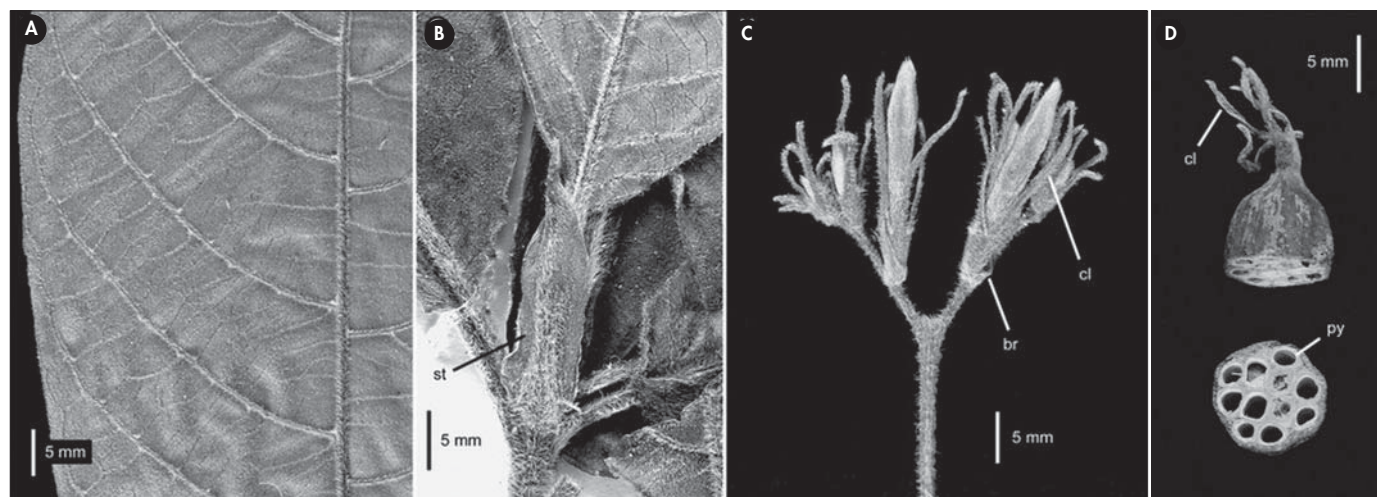
*Timonius leptocalyx* is a highly distinctive species with slenderly subulate calyx lobes which, in pistillate specimens, remain erect or at least are never strongly reflexed. The narrowly obovoid fruits and only moderately developed inflorescence bracts suggest an alliance with *T. akunensis* and *T. reptus*, both of which occupy adjacent ranges in north-eastern New Guinea, but at somewhat higher elevations.

*Additional material examined.* – PAPUA NEW GUINEA. **Morobe:** Herzog Mts. near Markham River, *Takeuchi 5980-B* (A!); Partep, near Bulolo, IX.1947, *NGF 3008* (LAE!), VII–VIII.1947, *Nutrition Survey Party (L. S. Smith) 8* (CANB!); Kapoba, ca. 914 m, 14.XI.1968, *NGF (Gillison & Kairo) 25732* (CANB!).

11. *Timonius merokensis* Wernham in J. Bot. 56: 130. 1918.

**Lectotypus** (here designated): PAPUA NEW GUINEA. **Central:** Sogeri region, Mount Meroka, 9°28'45"S 147°31'37"E, 5.IV.1886, fruiting, *Forbes 931* (BM!; isolecto-: L!, LAE!).

*Shrubs* or *trees* to ca. 10 m tall. *Branchlets* 1–1.5 mm broad toward apex, gray-brown, strigillose with gold-colored hairs. *Stipules* usually persistent 3–5 nodes below terminal bud, subimbricate, ovate-deltoid, 4–9  $\times$  2–4 mm, sharply acute, appressed-pubescent outside, adaxially densely strigose with stramineous hairs. *Petioles* 4–9 mm long, to 1 mm broad at middle, canaliculate to semiterete. *Leaf blades* obovate to elliptic to somewhat rectangular, 3–8  $\times$  1.5–3 cm, acuminate at apex, acute at base, stiff-chartaceous, glabrous above, sparsely appressed-puberulent beneath, the costa prominent beneath, the secondary nerves prominulous, 5–6 on each side of costa, the veinlets immersed, irregularly scalariform to subcorvate; domatia evident as tufts of hairs in secondary nerve axils. *Staminate inflorescences* 3- to 5-flowered, at anthesis 1–2  $\times$  ca. 1.5 cm, the peduncles 5–10 mm long, ca. 0.5 mm broad, appressed-puberulent, the bracts inconspicuous, lacerate, to 2 mm long, the bracteoles absent; calyx limb, 4- or 5-lobed, appressed-puberulent, the tube 2–3 mm long from base, the lobes linear-lanceolate, 4–5  $\times$  ca. 1 mm; corolla seen in bud only, the tube densely pale-puberulent outside; stamens not seen; pistillodium not seen. *Pistillate inflorescences* 1-flowered, the peduncles compressed, 6–20 mm long, ca. 1 mm broad, densely appressed-puberulent, the bracts basally united, deltoid, irregularly lobed or lacerate, persistent, to 3.5  $\times$  1.5 mm; calyx limb cupular, 4-lobed, appressed-puberulent, the tube ca. 1.5 mm long, the lobes linear-lanceolate, 3–4.5  $\times$  1–1.5 mm, spreading to reflexed; corolla not seen. *Fruits* subglobose to ellipsoid, 10–12  $\times$  7–12 mm, densely yellow-velutinous, the pyrenes 4–6, vertical.



**Fig. 5.** – *Timonius leptocalyx* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet apex; **C.** Staminate inflorescence (distal end, late bud); **D.** Fruit (sectioned). [br = bract; cl = calyx lobe; py = pyrene; st = stipule].

[A–C: *Brass 29498*, A; D: *NGF 3008*, LAE]



*Distribution and ecology.* – Known only from the Sogeri region of southeastern New Guinea at elevations of ca. 300–530 m in rain forests and on riverbanks.

The two pistillate collections cited in the protologue, *Forbes 699* and *Forbes 931*, are evidently conspecific, but neither was indicated as the type; *Forbes 931*, with rather more ample material is here designated the lectotype. *Timonius merokensis* differs from other species of subgen. *Pseudoboea* in having relatively slender branchlets (to 1.5 mm diameter), and small leaf blades (3–8 × 1.5–3 cm). Stipules often persist on branchlets up to five nodes below the apex, whereas stipules in other species are deciduous or persistent to the second or third node. The pyrenes are 4–6 per fruit; in other species of the subgenus for which fruits are known, the pyrenes number 9–60.

*Additional material examined.* – **PAPUA NEW GUINEA.** **Central:** Sogeri region, Gawasese, ca. 300 m, 24.XI.1925, *Brass 684* (A!, BM!, BRI!, K!); Sogeri region, ca. 530 m, 1886, *Forbes 699* (BM!, L!).

**12. *Timonius minahassae*** Koord. in Natuurk. Tijdschr. Ned.-Indië 63: 87. 1904.

= *Timonius stipulosus* Valeton in Boerl., Icon. Bogor. 3: 275, tab. 299. 1909 [nomen illeg.].

**Lectotypus** (here designated): **INDONESIA, SULAWESI.** Manado [Manado], near bivak Totok, close to Ratatotok, 200 m, 18.III.1895, fruiting, *Koorders 17188b* (BO!).

= *Polyphragmon stipulosum* Scheff. in Ann. Jard. Bot. Buitenzorg 1: 67. 1876 [nomen nudum].

*Trees or shrubs* to 6 m tall and 12 cm dbh. *Branchlets* 5–7 mm broad toward apex, pale to reddish brown, hispidulous to strigillose. *Stipules* caducous, imbricate, chartaceous and foliaceous, connate at base and cupular, 20–40 × 1–20(–30) mm, acute-apiculate to rounded at apex, scattered-hispidulous outside, abaxially subglabrous except densely strigose toward base. *Petioles* 5–12 mm long, 5–6 mm broad at middle, semiterete. *Leaf blades* broadly elliptic to obovate, 20–35 × 10–21 cm, abruptly and sharply acuminate-apiculate at apex, tapering and rounded-auriculate at base, stiffly chartaceous, glabrous or with a few lax, scattered hairs above, puberulent with scattered, stiff, erect to subappressed hairs over lamina (more densely so on costa and nerves) beneath, the costa prominent beneath, the secondary nerves prominent, 12–15 on each side of costa, the veinlets prominulous, irregularly scalariform to subcoriivate; domatia absent. *Staminate inflorescences* ca. 20-flowered, at anthesis to 4 × 3 cm; peduncles stiff, to 25 mm long, ca. 1.5 mm broad, the bracts ovate, to 8 mm long, the bracteoles small, more or less hidden by pubescence; calyx limb cupular, (4-)5-lobed, appressed-strigillose outside, more densely pubescent within, the tube 4–5 mm long from base, the lobes lanceolate to subulate, to 16 × 4 mm; corolla seen in bud only, white to yellowish, the tube to 12 mm long, ca. 2 mm broad, densely puberulent outside, the lobes 5, narrowly

elliptic-lanceolate, to 5 × 2 mm, acute, the corolla limb ca. 8 mm across; stamens 5, the anthers linear, ca. 5 mm long, glabrous; pistillodium not seen. *Pistillate inflorescences* 1-flowered, the peduncles 5–10 mm long, 2–3 mm broad, densely strigillose, the bracts sometimes basally united, lacerate, to 20 mm long; calyx limb 5- or 6-lobed, finely or densely strigillose inside and out, the lobes ovate to lanceolate, foliaceous, to 30 × 15 mm; corolla not seen; hypanthium depressed-obovoid, densely tomentose, the disc pubescent, the style not seen. *Fruits* depressed-globose to obovoid, 20–25 × 20–30 (–40) mm, tawny appressed- to spreading-pubescent, the pyrenes 40–60 in 6 or 8 radiating double-files, subvertical.

*Distribution and ecology.* – Islands of Sulawesi and Gebe at 200–1200 m elevation in primary forests on volcanic (sometimes ultrabasic) soils.

*Local names.* – “Empara” or “Para” (Malili); “Pokowah” or “Tokowah” (Manado); “Walaimbang” (Manado).

Apparently, Valeton was unaware that Koorders had validly named and described this taxon five years prior to his own publication of *T. stipulosus*, which was based on Scheffer’s earlier *nomen nudum* and on the two collections that Koorders had cited under *T. minahassae* in 1904 (*Koorders 17188b* and *Koorders 18739b*). I here lectotypify *T. minahassae* with the pistillate specimen on which Valeton’s excellent illustration was based.

*Timonius minahassae* differs from the other species of subgen. *Pseudoboea* in the Molucca Islands (*T. moluccanus*, *T. schefferi*, and *T. schumannii*) in having more robust branchlets and petioles, differing from *T. schefferi* and *T. schumannii* in having larger fruits (in those species not exceeding 15 mm diameter), and further differing from *T. moluccanus* in having narrowly elliptic-lanceolate (versus ovate) staminate corolla lobes and glabrous anthers.

*Additional material examined.* – **INDONESIA, SULAWESI.** Manado [Manado], near Kajoewatoe, 500 m, 2.III.1895, *Koorders 18742b* (BO!); near Pahocoere, 700 m, 10.IV.1895, *Koorders 18739b* (BO!); vicinity of Mt. Nokilalaki, near Tomado by Lake Lindu, ca. 1000–1200 m, 28.IV.1975, *Meijer 9721* (BO!); W of Towuti Lake, E of Malili, 19.VII.1976, *Meijer 11312* (BO!); Malili, Kawata, ca. 200 m, 28.VIII.1933, *Waturandang 402* (BO!); 12.IX.1933, *Waturandang 423* (BO!); Lellwao, near Malili, 16.X.1929, *Kjellberg 2547* (BO!); Todjamboe, 800 m, 23.VI.1929, *Kjellberg 1757* (BO!); S Celebes, Padang Kadjang, XI.1943, *Rachmat 830* (BO!); S Celebes, without further data, *Noerkas [Exped. L. v. Vuuren, 1912] 472* (A!, BO!, BRI!, SING!). **MOLUCCAS.** Gebe, without further data, *Teysmann 7416/7516a & b* (BO!), *Teysmann 7516* (A!, C!, L [908.221–928]!).

**13. *Timonius moluccanus*** S. P. Darwin, *spec. nova* (Fig. 6)

**Typus:** INDONESIA, MOLUCCAS. Morotai, forest Tjaw, 30 m, 16.V.1949, flowering, *Kostermans 788* (holo-: A!; iso-: B!, BO!, L!, SING!).

*Species Timonio reflexo valde similis sed differt indumento calycis rufo-tomentuloso non pallido-sericeo, stipulis adaxialle dense pubescentibus, foliorum nervis secundariis plerumque plus numerosis, et inflorescentiis staminatis 5- ad 9- (non 7- ad 25-) floribus.*

*Trees* to 30 m tall and 20 cm dbh. *Branchlets* 2-3 mm broad toward apex, pale-sericeous, sometimes subquadrangular. *Stipules* deciduous, imbricate, ovate, 10-13 × 4-6 mm, acute and often apiculate, sparsely sericeous outside, adaxially densely strigose toward middle and base; petioles 5-20 mm long, 1-2 mm broad. *Leaf blades* elliptic to obovate, 8-16 × 4-10 cm, acute to abruptly acuminate-cuspidate at apex, narrowly cuneate at base, thin-chartaceous, dispersed- and appressed-puberulent over lamina and eventually glabrous above, appressed-puberulent beneath, the secondary nerves (9-) 11-14 on each side of costa, the veinlets prominulous, cori-vate; domatia inconspicuous as tufts of hairs in axils of secondary nerves. *Staminate inflorescences* 5- to 9-flowered, at anthesis 2-6 × 2-5 cm, the peduncles 10-40 mm long, 1-2 mm broad, the bracts broadly ovate, acuminate to a subulate tip, persistent or deciduous, 2-5 × 2-4 mm, the bracteoles much like the bracts but smaller; calyx limb 5- to 6-lobed, densely puberulent, the tube 3-5 mm long from base, the lobes lanceolate to ovate, 4-7 × 1.5-3 mm; corolla pale green or brown, the tube 8-10 mm long, ca. 1.5 mm broad, the lobes 4 or 5,

ovate, seen in bud only; stamens 4 or 5, the anthers 3-5 × 0.5-1.5 mm, pubescent on back; pistillodium not seen. *Pistillate inflorescences* not seen. *Fruits* not seen.

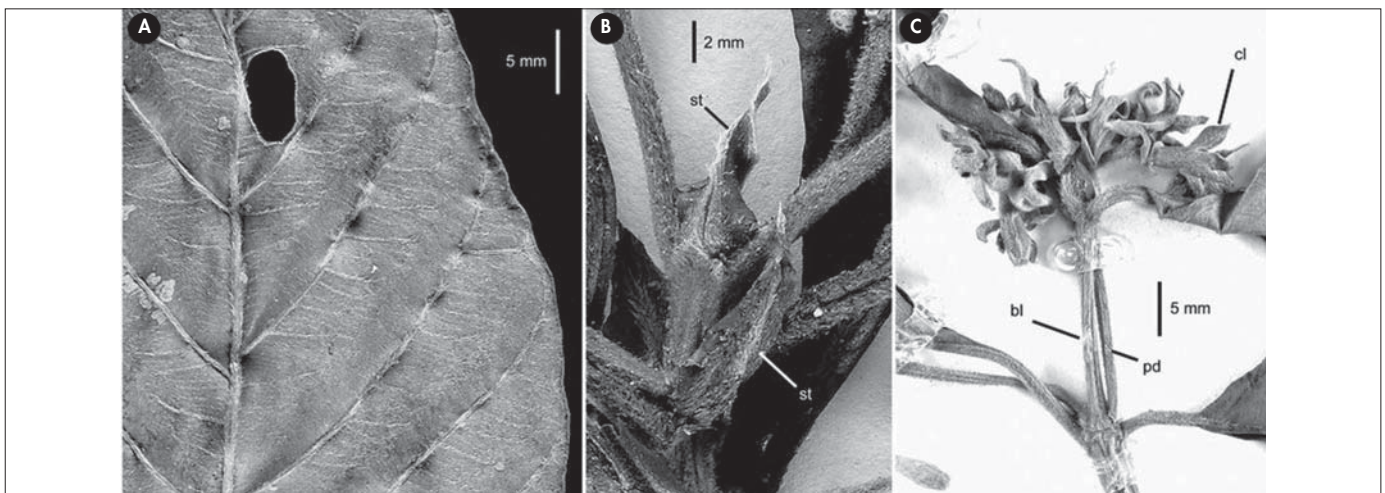
*Distribution and ecology.* – Endemic to Morotai and Halmahera, Molucca Islands, in lowland primary forests on volcanic soils.

*Etymology.* – The species is thus far known only from the Molucca Islands.

*Local use.* – The soft and coarse-grained wood is used for boat construction (*De Haan 1803*).

*Timonius moluccanus* resembles *T. reflexus* (Vogelkop region of western New Guinea), but the calyx indument is rufous-tomentulose (versus pale sericeous), the stipules are more densely pubescent adaxially, the leaf blades usually have more numerous lateral nerves (7-11 in *T. reflexus*), and the staminate inflorescences usually have fewer flowers (7-25 flowers in *T. reflexus*). Pistillate structures, when they become known, may show other distinguishing features. On the basis of the few collections available, *T. moluccanus* can be distinguished from *T. schumannii* (Sulawesi) in having less densely pubescent stipules that are usually acute rather than acuminate; additional distinguishing characters may present themselves when pistillate material of the former, and staminate material of the latter species becomes known.

*Additional material examined.* – INDONESIA, MOLUCCAS. Morotai, Tilai River, Tobelo subdistrict, 15 m, 24.VI.1949, *Tangkilisan (bb 33.887) 214* (A!, L!, SING!); Halmahera, Pajahi Road, Weda district, 50 m, 4.XI.1950, *De Haan 1803* (K!, L!, SING!).



**Fig. 6.** – *Timonius moluccanus* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet apex; **C.** Branchlet apex with staminate inflorescence. [bl = branchlet; cl = calyx lobe; pd = inflorescence peduncle; st = stipule].

[A-B: *Tangkilisan (bb 33.887) 214*, A; C: *Kostermans 877*, A]

14. *Timonius papuanus* Merr. in J. Arnold Arbor. 18: 132. 1937.

≡ *Timonius involucratus* Valetton in Bot. Jahrb. Syst. 61: 41. 1927 [non Merr. in J. Straits Branch Roy. Asiat. Soc. 77: 241. 1917].

**Lectotypus** (here designated): **PAPUA NEW GUINEA. East Sepik:** [Malu, 10 m, III.1912], *Ledermann 6820* (SING!).

*Trees* or *shrubs* to 7 m tall. *Branchlets* 5-6 mm broad toward apex, pale brown, appressed-puberulent to glabrous. *Stipules* caducous, imbricate, ovate, 22-35 × 10-15 mm, acuminate, finely appressed-puberulent outside. *Petioles* 15-30 mm long, 2-3 mm broad at middle, semiterete to canaliculate. *Leaf blades* elliptic to obovate, 15-30 × 8-13 cm, rounded and abruptly cuspidate at apex, broadly cuneate and briefly attenuate at base, thin-chartaceous to membranaceous, usually glabrous except over nerves above, dispersed-puberulent (more densely so on nerves) beneath, the costa prominent beneath, the secondary nerves prominent, (12-)15-30 on each side of costa, the veinlets prominulous, irregularly scalariform to subcorivate; domatia evident as pubescent pits in nerve axils. *Staminate inflorescences* 12- to 20-flowered, at anthesis compact, to 3 × 2.5 cm, the peduncles 3-10 mm long, 1.5-2 mm broad, the bracts basally united, involucrate, irregularly lacerate, ca. 20 mm long, the bracteoles small, lanceolate; calyx limb cupular-infundibular, unequally 5-lobed, appressed-puberulent, the tube 2-3 mm long from base, the lobes more or less lanceolate, to 10 mm long; corolla seen in bud only, densely pale-puberulent outside, the lobes 5; stamens 5, the filaments to 1 mm long, the anthers linear, ca. 6 × 0.7 mm; pistillodium not seen. *Pistillate inflorescences* 1-flowered, the peduncles ca. 3 mm long, 1.5-2 mm broad, the bracts involucrate as in staminate inflorescences; calyx limb cupular-infundibular, unequally 8-lobed, appressed-puberulent inside and out, the tube ca. 2 mm long, the lobes usually lanceolate, to 13 × 2-5 mm, usually reflexed in fruit; corolla not seen; hypanthium ellipsoid, ca. 6 × 4.5 mm, densely yellow-puberulent. *Fruits* (immature) obovoid, ca. 10 × 12 mm, white, hard, the pyrenes 40-50, oblique.

*Distribution and ecology.* – Eastern Sepik River drainage in swamps and riverside forests at 10-45 m elevation. One collection (*NGF 3681*) notes the branchlets and petioles as being myrmecophilous; in that collection and in *Hoogland & Craven 10220* the branchlets are hollow, and in the latter collection a small, porate opening penetrates a leaf scar into the branchlet interior.

*Local name.* – “Wagwam” (Waskuk, Ambunti).

The name *T. papuanus* was proposed by Merrill as a substitute for Valetton’s later homonym. The species is apparently restricted to riverine habitats of the Sepik River drainage. It most closely resembles *T. sylvestris* (southeastern New Guinea), which differs mainly in having longer staminate and

pistillate peduncles (>10 mm and >3 mm respectively), and a more coarsely strigose indument. *Timonius papuanus* also resembles the wider-ranging *T. grandifolius*, but has decidedly smaller stipules (22-35 × 10-15 versus 45-80 × 20-40 mm) and leaf blades (8-13 versus 12-27 cm broad). *Timonius argenteus* (also Sepik region) differs in having still smaller stipules (6-11 × 4-6 mm) and leaf blades (4-8 cm broad), shorter pistillate calyx lobes (to 5 mm long), and fruits that are densely brown-puberulent.

*Additional material examined.* – **PAPUA NEW GUINEA. East Sepik:** [Augusta River, Malu, 20-40 m, IV.1912], *Ledermann 6991* (L!, SING!); [River, 20-40 m, IV], *Ledermann 7544* (SING!); near Ambunti, ca. 45 m, 7.VI.1966, *Hoogland & Craven 10220* (LAE!); Karosomeri River, 10.VIII.1949, *NGF (Womersley) 3681* (CANB!, LAE!).

15. *Timonius reflexus* S. P. Darwin, **spec. nova** (Fig. 7)

**Typus:** **INDONESIA, IRIAN JAYA. Vogelkop:** Ajamaru, shrub growing on limestone, 240 m, 8.III.1962, fruiting, *BW (Vink) 15238* (holo-: A!; iso-: B!, CANB!, LAE!, Z!).

*Species Timonio moluccano et T. klossii similis; ab illo differt indumento calycis pallido-sericeo non rufo-tomentuloso et foliorum nervis secundariis utrinsecus 7-11 non (9-)11-14; ab hoc differt calycis lobis non linearis et fructibus majoribus (in T. klossii ad 20 × 18 mm).*

*Shrubs* or *trees* to 15 m tall and 15 cm dbh. *Branchlets* 4-5 mm broad toward apex, sometimes subquadangular, appressed-strigillose. *Stipules* deciduous, ovate, to 20 × 10 mm, acute, appressed-strigillose outside, adaxially strigose toward middle. *Petioles* 5-20 mm long, ca. 2 mm broad at middle. *Leaf blades* elliptic, 10-24 × 5-10 cm, acute to abruptly acuminate at apex, obtuse to acute to attenuate at base, stiffly chartaceous to subcoriaceous, dispersed-pubescent with lax hairs over lamina and eventually glabrous above, appressed-strigillose over nerves beneath, the secondary nerves 7-11 on each side of costa, the veinlets prominulous, subcorivate; domatia evident as small tufts of hairs in axils of secondary nerves, or absent. *Staminate inflorescences* 7- to 25-flowered, at anthesis ca. 4 × 5 cm, the peduncles 5-20 mm long, ca. 2 mm broad, the bracts ovate, acute to acuminate, often lacerate or cleft, strigillose, to 5 mm long, the bracteoles like the bracts but smaller; calyx limb irregularly 4- or 5-lobed, densely pale puberulent, the tube 5-8 mm long, the lobes ovate to elliptic, acute to obtuse at apex, unequally 5-8 × 1-5 mm; corolla seen in bud only, greenish white, the tube (in bud) to 12 mm long and 2-3 mm broad, the lobes 5, elliptic to lanceolate, ca. 5 mm long; stamens 5, the anthers linear, 6-7 × ca. 0.5 mm, dispersed-puberulent on back; pistillodium slender, ca. 10 mm long, densely strigillose. *Pistillate inflorescences* 1-flowered, the peduncles subterete, to 5 mm long, ca. 5 mm broad, the bracts not seen; calyx limb 5- or 6-lobed, strigillose, the tube 1-2 mm long, the lobes radiate to strongly reflexed in fruit, lanceolate to long-

elliptic, acute to obtuse at apex, 10-15 × 3-6 mm; corolla not seen. *Fruits* broadly ellipsoid to obovoid, 20-30 × 20-30 mm, densely reddish puberulent to velutinous, the pyrenes 24-28 in ca. 6 radiating double-files, vertical.

*Distribution and ecology.* – Endemic to lowland forests of the Vogelkop Peninsula of far western New Guinea.

*Etymology.* – The persistent calyx lobes are strongly reflexed at the fruit apex.

*Local name.* – “Hawitag” (Maibrat, Ajamaru).

*Timonius reflexus* resembles *T. moluccanus* (Morotai and Halmahera), differing principally in having fewer lateral nerves in the leaf blades (7-11 versus (9-)11-14); see the discussion under *T. moluccanus* for other distinguishing features. In vegetative characters, *T. reflexus* resembles *T. klossii*, but in that species the fruits are smaller (13-20 × 13-18 mm) and the calyx lobes are linear in outline.

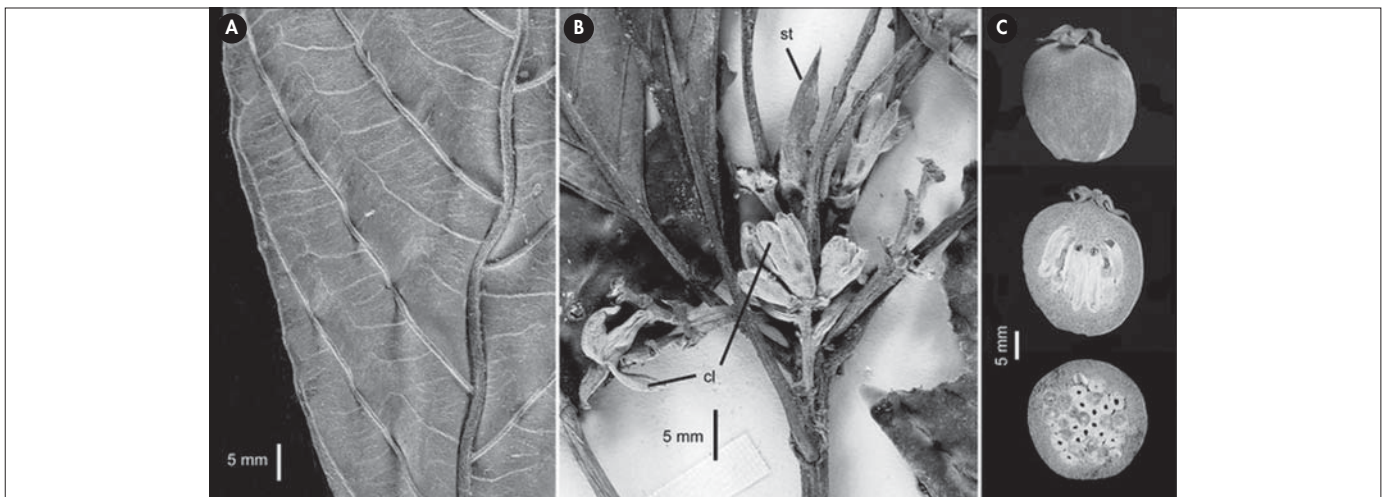
*Additional material examined.* – INDONESIA, IRIAN JAYA. **Vogelkop:** Sorong, Remoe, 50 m, 28.VIII.1948, *Pleyte 707* (A!, BRI!, L!, P!).

**16. *Timonius repertus*** S. P. Darwin, **spec. nova** (Fig. 8)

**Typus:** PAPUA NEW GUINEA. **Morobe:** Angabena ridge, ca. 3 km from Aseki-Menyamy Road (7°20'S, 146°10'E), tree in clearing in montane forest, 1550 m, 7.I. 1972, fruiting, *LAE (Streimann & Stevens) 53894* (holo-: LAE!; iso-: A!, CANB!, LAE!).

*Species Timonio akunensi et T. carrii similis, sed differt indumento inflorescentiarum dense sericeo et rufo-brunneo, nec velutino et fulvo (T. akunensis) nec pallido vel argenteo (T. carrii).*

*Trees* to 8 m tall. *Branchlets* 5-7 mm broad toward apex, appressed sericeous-strigillose. *Stipules* deciduous, elliptic-lanceolate, to 35 × 12 mm, appressed sericeous-strigillose outside, adaxially strigose, especially toward center. *Petioles* 20-30 mm long, 2-3 mm broad at middle. *Leaf blades* elliptic, 15-25 × 8-12 cm, acute to briefly acuminate at apex, obtuse to cuneate to attenuate at base, stiffly chartaceous, glabrous or with scattered, lax hairs above, finely and densely sericeous over lamina and nerves beneath, the secondary nerves 13-18 on each side of costa, the veinlets prominulous, subcoriivate; domatia evident as tufts of hairs in axils of secondary nerves. *Staminate inflorescences* not seen. *Pistillate inflorescences* 1-flowered, seen in fruit only, the peduncles 40-70 mm long, 3-5 mm broad, the bracts deciduous and not seen; calyx limb cupular, irregularly 4- to 6-lobed, sericeous, the tube ca. 5 mm long, the lobes linear-elliptic, 15-25 × 3-5 mm, reflexed in fruit; corolla not seen. *Fruits* ellipsoid to narrowly obovoid, 28-45 × 18-25 mm, densely sericeous with reddish brown hairs, the pyrenes ca. 30, arranged in 6 radiating double-files, vertical.



**Fig. 7.** – *Timonius reflexus* S. P. Darwin **A.** Leaf blade (abaxial surface); **B.** Branchlet apex with staminate inflorescences; **C.** Fruit (longitudinal and cross sections below). [cl = calyx lobe; st = stipule].

[A-B: *Pleyte 707*, A; C: BW (Vink) 15238, A]

*Distribution and ecology.* – As yet known only from two collections gathered near Aseki, Morobe province, Papua New Guinea. Reported from secondary forests at 1550–2075 m elevation.

*Etymology.* – From Latin “reperitus” (discovered), as the specimens representing this taxon were found among those not assignable to other species; not “reperitus” in the alternative sense of “invented.”

*Timonius reperitus* is similar to *T. akunensis* and *T. carrii*, which are confined to southeastern New Guinea. Among the limited number of specimens available for study, it appears that pubescence characters reliably distinguish *T. reperitus* (fruits and inflorescences densely sericeous with reddish brown hairs) from *T. akunensis* (fruits and inflorescences velutinous with tawny, spreading hairs), and from *T. carrii* (fruits and inflorescences mostly appressed-pubescent with pale, often silvery hairs).

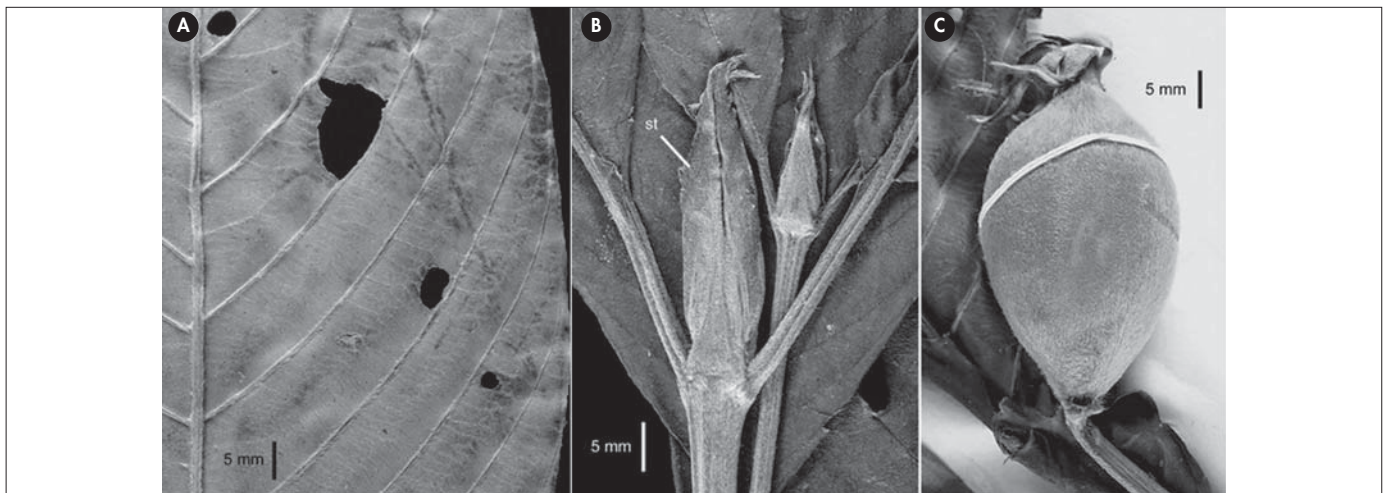
*Additional material examined.* – **PAPUA NEW GUINEA. Morobe:** Mepa River near Wangini, near Aseki, ca. 2075 m, 14.V.1968, *NGF* (*Streimann & Kairo*) 27600 (LAE!).

**17. *Timonius rosselensis* S. P. Darwin, spec. nova** (Fig. 9)

**Typus:** PAPUA NEW GUINEA. **Milne Bay:** Rossel Island, Mt. Rossel, S slopes, low forest on ridge crest, 700 m, 15.X.1956, flowering, *Brass* 28411 (holo-: LAE!; iso-: A!). *Species valde propria foliorum apicibus rotundatis et abrupte cuspidatis; a Timonio sylvestri etiam differt calycis lobis latioribus (in T. sylvestri ad 3 mm latis) et tubo corollae longiore (in T. sylvestri ad 18 mm longo).*

*Trees* to 10 m tall and ca. 10 cm dbh. *Branchlets* 5–8 mm broad toward apex, strigillose. *Stipules* more or less persistent, imbricate, broadly elliptic to ovate, to 30 × 20 mm, obtuse, strigose-lanate toward center, becoming subglabrous toward margin outside, adaxially glabrous except densely matted-lanate toward center and base. *Petioles* 4–10 mm long, 4–5 mm broad at middle, strigillose toward base. *Leaf blades* broadly elliptic to obovate, 8–15 × 6–11 cm, rounded to truncate and briefly cuspidate-acuminate at apex, obtuse to acute and decurrent onto petiole at base, stiff-chartaceous, glabrous or with a few scattered, lax hairs over lamina above, appressed-strigillose to -sericeous on nerves but subglabrous on lamina beneath, the secondary nerves 10–12 on each side of costa, the veinlets immersed in lamina, subcori-vate; domatia absent or obscure. *Staminate inflorescences* 3- to 5-flowered, subcapitate at anthesis, to 11 × 6 cm, the peduncles 30–55 mm long, ca. 2 mm broad, the bracts conspicuous, 3-fid, variously connate, 10–15 mm long, the bracteoles small or absent; calyx limb 4-lobed, the tube ca. 5 mm long, strigillose toward base, the lobes elliptic to lanceolate, 8–15 × 3–6 mm, pubescent on costa; corolla yellow in bud, becoming white, fragrant, the tube 25–30 mm long, ca. 5 mm broad, the lobes 4, elliptic, to 18 × 8 mm, obtuse to rounded, often reflexed; stamens 4, the filaments ca. 0.5 mm long, the anthers ca. 11 × 1 mm, glabrous; pistillodium filiform, undivided or bifid at apex, ca. 10 mm long, strigose toward base. *Pistillate inflorescences* not seen. *Fruits* not seen.

*Distribution and ecology.* – Endemic to the southern slopes of Mount Rossel, Rossel Island, Louisiade Archipelago, in low forests on ridge crests at about 700 m elevation.



**Fig. 8.** – *Timonius reperitus* S. P. Darwin. **A.** Leaf blade (abaxial surface); **B.** Branchlet apex; **C.** Fruit. [st = stipule].

[**A, C:** LAE (*Streimann & Stevens*) 53894, **A; B:** *NGF* (*Streimann & Kairo*) 27600, LAE]

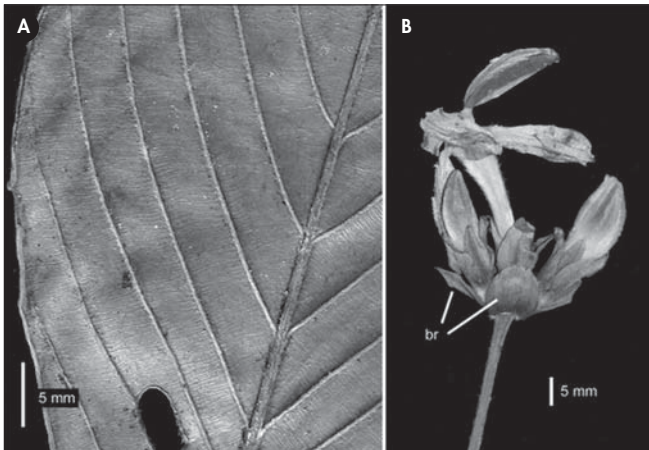


Fig. 9. – *Timonius rosseleensis* S. P. Darwin. A. Leaf blade (abaxial surface); B. Staminate inflorescence (distal end). [br = bract;].

[Brass 28411, A]

**Etymology.** – The species is thus far known only from Rossel Island, Milne Bay district, Papua New Guinea.

Although as yet known only from a few staminate specimens, *T. rosseleensis* is easily recognized by its broadly rounded and abruptly cuspidate leaf apices and exceptionally large corollas. It is most like *T. sylvestris*, which occurs in similar habitats on Rossel Island, but in that species the leaf apices are more sharply and gradually acuminate, and the staminate flowers have narrower calyx lobes (1.5–3 mm broad), and shorter corollas (tube 15–18 mm long).

**Additional material examined.** – PAPUA NEW GUINEA. **Milne Bay:** Rossel Island, Mt. Rossel, 700 m, 17.III.1979, LAE (Katik & al.) 70910 (CANB!, LAE!).

**18. *Timonius schefferi*** Valeton in Bull. Dépt. Agric. Indes Néerl. 26: 49. 1909.

**Lectotypus** (here designated): INDONESIA, MOLUCCAS. Gebe, without further data, flowering and fruiting, *Teysmann 7416/7516d* (BO!; isolecto-: BO!; possible isolecto-: L [908.221-902]!).

**Trees?** Branchlets 3–4 mm broad toward apex, pale to reddish brown, tawny to reddish hispidulous. *Stipules* deciduous, subvalvate or slightly imbricate, broadly lanceolate, to 25 × 10 mm, acute to acuminate, scattered- to densely hispidulous outside, adaxially densely strigose toward center and base. *Petioles* to 7 mm long, to 4 mm broad at middle, semiterete. *Leaf blades* ovate to broadly elliptic, 12–18 × 6–12 cm, gradually acuminate at apex, briefly cordate-auriculate at base, coriaceous, dispersed-puberulent to glabrous above, appressed- to somewhat spreading-puberulent (more densely so on nerves) beneath, the costa prominent beneath, the secondary nerves prominent,

6–10 on each side of costa, the veinlets prominulous, irregularly scalariform, not evidently corivate; domatia absent. *Staminate inflorescences* not seen. *Pistillate inflorescences* 3-flowered, at anthesis 2–3 × ca. 2 cm, the peduncles 4–18 mm long, ca. 2 mm broad, the bracts usually 3-fid, 5–10 mm long, the bracteoles narrow, lanceolate to subulate, to 7 mm long; calyx limb 4-lobed, dispersed-strigillose, the tube 1–2 mm long, the lobes ovate, to 8 × ca. 5 mm, reflexed in fruit; corolla not seen. *Fruits* subglobose to depressed-obovoid, 6–12 × 8–12 mm, tawny-strigillose to hispidulous, the pyrenes ca. 50, oblique.

**Distribution and ecology.** – Apparently endemic to the island of Gebe, Molucca Islands, Indonesia.

Two specimens at Bogor, *Teysmann 7416/7516d* and *7416/7516c*, almost certainly represent the same collection, and both specimens are annotated as *T. schefferi* in Valeton's hand; the former specimen is here chosen as lectotype. The collections *Teysmann 7416/7516a* and *7416/7516b*, also at Bogor, represent *T. minahassae*. On the basis of the few pistillate collections available, *T. schefferi* seems most similar to *T. minahassae* (Gebe and Sulawesi), but differs in having 3-flowered pistillate inflorescences as well as an appressed pubescence on leaf blade undersurfaces, and much smaller fruits (in *T. minahassae* (20-)30–40 mm diameter).

**19. *Timonius schumannii*** Koord. in Natuurk. Tijdschr. Ned.-Indië 63: 88. 1904.

**Lectotypus** (here designated): INDONESIA, SULAWESI. Minahasa, Medado [Manado], near Ratahan, 350 m, 12.III. 1895, fruiting, *Koorders 18684b* (BO!).

**Trees** to 12 m tall and 20 cm dbh. Branchlets 2–3 mm broad toward apex, strigillose. *Stipules* subpersistent, imbricate, lanceolate, 10–30 × 4–8 mm, acuminate, strigillose outside, adaxially densely sericeous. *Petioles* 5–15 mm long, 2–3 mm broad at middle, semiterete to subterete. *Leaf blades* elliptic, 10–22 × 4–14 cm, acute to abruptly and sharply acuminate at apex, narrowly cuneate-attenuate at base, thinly chartaceous, sparsely appressed-puberulent to glabrous above, appressed-puberulent (more densely so on nerves) beneath, the costa prominent beneath, the secondary nerves prominulous, 12–18 on each side of costa, the veinlets prominulous, irregularly scalariform to subcorivate; domatia occasionally evident as tufts of hairs in secondary nerve axils. *Staminate inflorescences* not seen. *Pistillate inflorescences* 1-flowered, the peduncles compressed, in fruit 15–20 mm long and 1–1.5 mm broad, minutely strigillose, the bracts small, lanceolate, persistent, to 4 mm long; calyx limb cylindrical-cupular, shallowly 4- or 5-toothed (seen in fruit), the tube ca. 2 mm long, the lobes broader than long; corolla not seen, the disc pubescent, usually elevated in fruit, the style not seen. *Fruits* ellipsoid to subglobose to obovoid, 13–15 × 13–15 mm, canescent to sparsely appressed-puberulent, the pyrenes ca. 50 in 5–6 radiating double-files, oblique.

*Distribution and ecology.* – Known only from the Minahasa Peninsula of Sulawesi, from 350 and 500 m elevations.

*Local names.* – “Ketil-im-ballatik” (Tolaur language, *Koorders 18712b*).

*Timonius schumannii* is still known only from the three original, pistillate collections. It resembles *T. schefferi* (Gebe) in having relatively large stipules, but differs in having solitary pistillate flowers and more finely pubescent fruits. In the size and shape of the fruits and pistillate calyces, *T. schumannii* resembles *T. celebicus* Koord. (not subgenus *Pseudoboea*), but in that species the stipules are conspicuously valvate, among other differentiating characters.

*Additional material examined.* – INDONESIA, SULAWESI. Pinamorong mountains, Kakas, 500 m, 29.I.1895, *Koorders 18711b* (BO!), 30.I.1895, *Koorders 18712b* (BO!).

**20. *Timonius sylvestris*** S. Moore in J. Bot. 65: 247. 1927.

**Typus:** PAPUA NEW GUINEA. **Central:** Basiatabu, rain forest ca. 457 m, 15.VIII.1925, flowering, *Brass 582* (holo-: BM!; iso-: A!, BRI!, K!).

*Trees* to 10 m tall and 25 cm dbh. *Branchlets* 3-4(-8) mm broad toward apex, stramineous-strigillose. *Stipules* usually persistent to third node below branchlet apex, imbricate, broadly ovate, acuminate, 20-35(-40) × 8-12(-16) mm, scattered-strigose outside, adaxially strigose, especially toward center and base. *Petioles* (5-)15-35 mm long, ca. 2 mm broad at middle, semiterete. *Leaf blades* elliptic-obovate to rhombic-elliptic, 8-26 × 4-14 cm, abruptly and sharply acuminate at apex, acute to obtuse and briefly attenuate at base, chartaceous, scattered- and appressed-puberulent to glabrous above, appressed-puberulent (more densely so on costa and nerves) to subglabrous beneath, the costa prominent beneath, the secondary nerves prominent, 11-18 on each side of costa, the veinlets irregularly scalariform to subcorvate; domatia evident as small tufts of hairs in nerve axils or absent. *Staminate inflorescences* 5- to 16-flowered, at anthesis often congested and subcapitate, 3-12 × 3-8 cm, the peduncles compressed, 10-50 mm long, 2-4 mm broad, the bracts conspicuous and subinvolute, sometimes developed at several inflorescence nodes, deciduous or persistent, broadly ovate but at length irregularly lacerate or divided, 5-15 × 5-6 mm, the bracteoles absent; calyx limb cupular-tubular, greenish or pinkish, unequally 4- or 5-lobed, strigillose inside and out, the tube 2-7 mm long from base, the lobes lanceolate to elliptic, 2-12 × 1.5-3 mm; corolla narrowly infundibular, white to yellowish or orange, the tube 15-18 mm long, 2-3 mm broad, densely strigillose to puberulent outside, the lobes (4 or)5, narrowly elliptic, to 10 × 4 mm, acute, minutely papillose, the corolla limb to 20 mm across; stamens 5, the filaments 1-3 mm long, the anthers linear, 6.5-8 × ca. 0.5 mm, glabrous or sparsely pubescent on back; pistillodium briefly 2-fid, 8-9 mm long,

ca. 0.5 mm broad, glabrous. *Pistillate inflorescences* 1-flowered, the peduncles compressed, 3-6(-10) mm long, 2-3 mm broad, the bracts basally united, deciduous or persistent, acute, in age variously lacerate or divided, often 2-fid, 10-25 mm long; calyx limb 4- to 6-lobed, appressed-strigillose inside and out, the tube 1-3 mm long, the lobes narrowly elliptic-lanceolate to ovate, 10-15 × 2-3(-8) mm, reflexed in fruit; corolla seen in young bud only; hypanthium globose, ca. 5 × 5 mm, densely pubescent, the disc ovoid, ca. 0.5 mm high, densely strigillose, the style not seen. *Fruits* subglobose to broadly obovate, 16-26 × 16-30 mm, brown-velutinous, the pyrenes ca. 6 in vertical section, radiating from distal end of fruit.

*Distribution and ecology.* – Southeastern New Guinea and Papuan Islands, in primary or secondary forests and grasslands, often on lateritic soils, or lower montane forests on ridges or in understory vegetation, at 60-915(-1550) m elevation.

Among the species of subgen. *Pseudoboea* indigenous to southeastern New Guinea, *T. akunensis*, *T. carrii*, *T. leptocalyx*, and *T. reptus* all have prominent calyx lobes which, in pistillate plants, remain erect on mature fruits. In the present species, as well as *T. merokensis* and *T. rosselensis*, the calyx lobes are reflexed or at least often spreading. *Timonius rosselensis* is distinctive in having leaf blades broadly rounded to truncate and briefly cuspidate-acuminate at apex, and lacking leaf domatia. In *T. merokensis*, the leaf blades are smaller (to 3 cm broad) and have 5-6 secondary nerves on each side of costa. In *T. carrii*, staminate peduncles are <10 mm long (versus 10-50 in *T. sylvestris*), and the fruits are pale- and appressed-sericeous (versus brown-velutinous). In leaf outline, *T. sylvestris* resembles the more widespread *T. grandifolius*, but in that species the leaf blades are larger (22-50 cm long, with 18-30 secondary nerves on each side of costa), the pistillate peduncles are longer (10-30 mm), the pistillate calyx lobes longer (15-25 mm), and the fruits to 45 mm diameter and covered with minute, yellowish hairs. *Timonius sylvestris* is similar to *T. clathratus* (northeastern New Guinea), but has somewhat larger fruits, leaf blades with more numerous lateral nerves, and subsistent stipules.

*Additional material examined.* – PAPUA NEW GUINEA. **Morobe:** 10.5 km NE of Wau, 1550 m, 4.II.1978, *Pratt 78-1190* (LAE!). **Central:** above Tapini, ca. 915 m, 1-4.V.1971, *NGF (Lelean) 46356* (A!, BISH!, LAE!); Mafulu, 335 m, IX-XI.1933, *Brass 5379* (A!, BO!, BRI!, NY!); Abau area, Mori River, 60 m, 16.II.1969, *NGF (Henty & Lelean) 41889* (A!, BISH!, CANB!, LAE!). **Milne Bay:** junction Ugat & Mayu Rivers, camp Mayu I, 450 m, 22.VII.1972, *NGF (Streimann & Katik) 18483* (LAE!); hills behind Koporika, track S to Mt. Delaia, 120 m, 21.XI.1975, *LAE (Larivita & Katik) 67146* (A!, LAE!); Woodlark Island, 100 m, 15.IX.1979, *Kairo 243* (A!, CANB!, LAE!); Misima Island, Mt. Sisa, N slopes, 350 m, 21.VII.1956, *Brass 27436* (A!, LAE!); Mt. Oia Tau, 600 m, 28.III.1979, *LAE (Sohmer) 75079* (A!, LAE!); Rossel Island, Mt. Rossel, 200 m, 16.III.1979, *LAE (Katik & al.) 70917* (CANB!, LAE!); Rossel Island, Bamba, near W point, ca. 457 m, 5.XI.1965, *NGF (Henty) 27021* (LAE!).

21. *Timonius versteegii* Valeton in Bull. Dépt. Agric. Indes Néerl. 26: 39. 1909.

**Lectotypus** (here designated): **INDONESIA, IRIAN JAYA.**

**Mimika:** [Noord-Fluss (Lorentz River), Geluks-Hügel, ca. 130 m, 19.VII.1907], fruiting, *Versteeg 1475* (BO!).

= *Timonius roemeri* Valeton in Nova Guinea 8: 476. 1911.

**Typus:** **INDONESIA, IRIAN JAYA. Mimika:** Noord-Fluss [Lorentz River], 1911, flowering and fruiting, *von Römer 151* (holo-: BO!).

*Trees* to 3 m tall. *Branchlets* (3-)5-7 mm broad toward apex, reddish- to pale-pubescent with lax hairs. Stipules persistent and sometimes basally sheathing, imbricate, lanceolate-ovate to elliptic or obovate, 20-75 × (8-)10-20(-35) mm, acute or acuminate, strigose to glabrous near margin outside, adaxially strigose toward center and base. Petioles 5-15 mm long, 3-5 mm broad at middle, semiterete. *Leaf blades* narrowly to broadly obovate to elliptic, 20-35 × 6-16 cm, obtuse or acute to abruptly or gradually and sharply acuminate at apex, broadly cuneate to briefly rounded at base, chartaceous, glabrous or with scattered, appressed hairs above, appressed-puberulent beneath, the costa prominent beneath, the secondary nerves prominent, 15-25 on each side of costa, the veinlets prominulous, irregularly scalariform to subcori-vate; domatia absent. *Staminate inflorescences* ca. 10-flowered, subcapitate, at anthesis 4-6 × 4-6 cm, the peduncles ca. 15 mm long, ca. 3 mm broad, the bracts involucrate, at length deeply lacerate, to 20 mm long, the bracteoles acuminate, to 3 × 8 mm; calyx limb 5-lobed, densely pubescent, the tube ca. 5 mm long from base, the lobes long-subulate, 5-15 × 1.5-2 mm; corolla seen in bud only, densely pale strigillose outside, the lobes 5; stamens not seen; pistillodium filiform, unbranched, ca. 7 mm long (late bud), strigillose. *Pistillate inflorescences* 1-flowered, the peduncles to 6 mm long, ca. 2 mm broad, the bracts involucrate, broadly ovate and irregularly lacerate, (15-)25-40 mm long; calyx limb 5- or 6-lobed, strigillose with long, stiff hairs inside and out, the tube ca. 3 mm long, the lobes long-lanceolate to subulate, erect or reflexed, (10-)20-30 × 2-5 mm; corolla narrowly infundibular, the tube 10-15 mm long, 3-4 mm broad, densely strigillose outside, the lobes 6 or 7, narrowly lanceolate, 10-15 × ca. 3 mm, acute, the corolla limb 30-35 mm across; staminodia not seen; hypanthium subglobose to obovoid, 5-6 × 5-6 mm, densely strigillose, the disc pubescent, the style columnar, ribbed, 7- or 8-armed, sparsely pubescent. *Fruits* ellipsoid to obovoid, 20-40 × 18-25 mm, tawny-velutinous, red when mature, the pyrenes 14-18, vertical.

*Distribution and ecology.* – Lorentz River drainage of southwestern New Guinea, with an additional collection from the Palmer River in southwestern Papua New Guinea, at 45-130 m elevation.

In describing *T. roemeri*, Valeton noted a close similarity with *T. versteegii*, the two species differing respectively in characters of leaf pubescence [*“folia ... utrinque nitidula, supra glabra, subtus in nervis et venis fortioribus parce appresse ferrugineo-sericea”* versus *“supra glabra ... subtus secus nervos et venas dense strigosa”*] and color [*“in sicco supra fusco-badia, subtus badia fere concoloria”* versus *“supra ... in sicco fusca, subtus ... pallidiora”*], as well as the texture and size of their stipules [30-70 mm versus 25-40 mm long]. Among the collections here examined, those features intergrade and any species-level differences disappear. *Timonius versteegii* resembles *T. branderhorstii* (western to south-central New Guinea), *T. reflexus* (Vogelkop region), and *T. sylvestris* (eastern New Guinea) in lacking abaxial leaf domatia, but those species differ in having smaller leaf blades (to 26 mm long) with usually fewer (8-12(-18)) secondary nerves on each side of the costa.

*Additional material examined.* – **INDONESIA, IRIAN JAYA. Mimika:** Lorentz [Noord] River, Bivak Alkmaar, ca. 130 m, [9.V.1908], *Branderhorst 355* (BO!); [Kuskus-Hügel], 7.X.1909, *von Römer 482* (BO!), 18.X.1909, *von Römer 622* (BO!), *von Römer 626* (BO!); Signal-Hügel, 45 m, [21.X.1909], *von Römer 634* (BO!). **PAPUA NEW GUINEA. Western Province:** Palmer River, 2 mi. below junct. Black River, 100 m, VI.1936, *Brass 7026* (A!).

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