

NOTES ON XANTHOSTEMON F. MUELLER AND
KJELLBERGIODENDRON BURRET

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GUGERLI'S * MONOGRAPH OF THE GENUS *Xanthostemon* F. Mueller was published in Germany in 1940 and did not become available to us until about a decade later. My interest in this work is not so much in the New Caledonian species considered, which form the bulk of the described forms, and the few Australian ones, but rather in his treatment of certain Philippine, eastern Malaysian, and Papuan species. He recognized forty-three species and a few subspecies and varieties, distributed into five newly proposed sections, *Vesicaria*, *Brevistyla*, *Cylindrica*, *Bullata*, and *Campanulata*, the latter subdivided into two subsections, *Multiflora* and *Pauciflora*. I do not criticize these minor categories. Like other revisions of its type it has the merit of a proposed system of classification, and of bringing together the widely scattered published data regarding all the species described up to 1940. One judges that perhaps certain obvious errors in nomenclature may be due perhaps more to a lack of critical editorial work on the manuscript than as wholly chargeable to a beginner who was working with a peculiarly difficult group of plants. In nomenclature the author was apparently misled by Pampanini's erroneous interpretation of the rules of nomenclature governing the validity of certain published binomials in 1905. The several cases are discussed under *Xanthostemon speciosum* Merr., *X. pubescens* C. T. White, *X. multiflorum* (Montr.) Beauvisage, and *X. gugerlii* Merr.

Xanthostemon is a genus of considerable significance from the standpoint of phytogeography. Its great center of diversification is New Caledonia, with a total of about thirty-three endemic species. Five species are recorded from northern and northeastern Australia, three from New Guinea, four from the Philippines, and one from Celebes (this Celebesian form also extending to Moena, Ternate and Batjan). To date no representative of the genus has been reported from any part of the Sunda or Lesser Sunda Islands, the latter group extending eastward from Java. Incidentally Gugerli's distribution map extends the range of the genus, within the Philippines, to northern Luzon, about 250 miles beyond the known actual range of the Philippine representatives.

One problem, not solved by Dr. Gugerli, as he did not have access to certain historical material, was the status of *Xanthostemon celebicum* Koord. He merely quoted the original distinctly unsatisfactory

*Gugerli, K. Monographie der Myrtaceengattung *Xanthostemon*. Repert. Sp. Nov. Beih. 10: 1-49. pl. 1-16. 1940. Reprinted without change in pagination as a doctorate thesis, University of Zurich, 1940.

description and left the species as one of the two unknown to him. The large fruits, described as 1.8 cm. long and 1.2 cm. in diameter, might lead one to assume that some genus other than *Xanthostemon* was represented, and this proves to be the case. Koorder's unpublished dissection notes and sketches clearly show that he knew the fruit to be indehiscent and 1-seeded, and that the stamens were arranged in five distinct phalanges; these are not *Xanthostemon* characters. It is unfortunate that he did not include these data in his published description. The species proves to be a representative of the very different *Kjellbergiodendron* Burret. When I initiated this study I had no intention of considering Burret's genus until an examination of material now available indicated that a representative of this genus was involved. Dr. van Steenis informs me that Beccari had recognized, named, and described this striking genus on the basis of his own Celebesian collections at some time previous to 1890. Unfortunately he never published his description. Had he done so his name would have antedated that of Burret by four or five decades and doubtless would have obviated the later Koorders errors.

In the course of this study I have been impressed with the excellent representation of the known species to be found in the herbarium of the Arnold Arboretum. At least two-thirds of the described species are represented by from one to many specimens, and it is of interest to note that many isotypes are to be found here. Most of this material has been acquired within the last fifteen years. I have accounted for both of the described species which Dr. Gugerli could not place, *X. celebicum* Koord. being transferred to *Kjellbergiodendron*, and *X. papuanum* Lauterb. being reduced to *X. novaguineense* Valetton. I add *X. crenatus* C. T. White, of New Guinea, described in 1942, and here describe as new *Xanthostemon brassii* Merr. from New Guinea and *X. confertiflorum* Merr. from Celebes. Certain adjustments in nomenclature are also involved for four previously described species, where Dr. Gugerli erred in selecting wrong specific names.

I am indebted to the officials of the Rijksherbarium, Leiden (L), the United States National Herbarium (U), and the Gray Herbarium (G), for the courteous loan of needed material. Except for collections indicated by the above symbolic letters all other material studied is in the Arnold Arboretum Herbarium (A), although before drafting this paper, and after its completion, I had seen the material at Kew and the British Museum.

Xanthostemon F. Mueller

NEW CALEDONIA

Xanthostemon gugerlii nom. nov.

Xanthostemon speciosum (Brongn. & Gris) Pamp. Nuovo Giorn. Bot. Ital. II. 12: 688. 1905, in obs.; Gugerli, Repert. Sp. Nov. Beih. 120: 97. 1940; Guillaumin, Fl. Nuov.-Caléd. 233. 1948, non Merr. 1904.

Fremya speciosa Brongn. & Gris, Bull. Soc. Bot. France **12**: 299. 1865.

Gugerli in accepting the validity of this New Caledonian species in 1940 adopted the name *Xanthostemon speciosum* (Brongn. & Gris) Niedenzu, but I can find no record of an actual transfer of the specific name to *Xanthostemon* antedating Pampanini's overlooked one of 1905. Even this, when published, was an unnecessary binomial as it was antedated by *X. speciosum* Merr. (1904), which belongs to a very different Philippine species. The only reference given by Gugerli is to Zahlbruckner, Ann. Naturhist. Hofmus. Wien **3**: 279. 1888, but there only the binomial *Fremya speciosa* Brongn. & Gris was used, as is the case in all other references I have found and checked. Of course *Fremya speciosa* Brongn. & Gris (1865) does not invalidate *Xanthostemon speciosum* Merr. (1904). The series of curious errors resulting from Pampanini's misinterpretation of the rules of nomenclature governing the validity of binomials, and perpetuated and expanded by Gugerli in 1940, is further discussed under *Xanthostemon speciosum* Merr., q.v. There is a duplicate of the type collection of this New Caledonian species, Vieillard 2579, in the Gray Herbarium.

Xanthostemon multiflorum (Montr.) Beauvisage, Ann. Soc. Bot. Lyon **26**: 46. 1901; Pamp. Nuovo Giorn. Bot. Ital. II. **12**: 673. 1905; Guillaumin, Bull. Soc. Bot. France **81**: 14. 1934.

Draparnaudia multiflora Montr. Mém. Acad. Lyon, **10**: 205. 1860, sphalm. "*Drapernandia*."

Fremya pubescens Brongn. & Gris, Bull. Soc. Bot. France **10**: 373. 1863.

Xanthostemon pubescens Pampaloni, Nuovo Giorn. Bot. Ital. II. **13**: 128. 1906; Gugerli, Repert. Sp. Nov. Beih. **120**: 126. 1940; Guillaumin, Fl. Nouv.-Caléd. 234. 1948, non C. T. White (1917).

Gugerli states that *Draparnaudia multiflora* was, in part, *Xanthostemon flavum* (Panch.) Schltr. However, Beauvisage clearly states that there was but one poor specimen in the Lyon herbarium named by Montrouzier as *Draparnaudia multiflora* Montr.; the type collection hence could not have been a mixture. But when Beauvisage drew up a complete description of *Xanthostemon multiflorum* (Montr.) Beauvisage, on the basis of about 20 individual collections, he cited about seven synonyms including not only Montrouzier's original *Draparnaudia*, but also *Fremya flava* Brongn. & Gris, *F. deplanchei* Brongn. & Gris, *F. pubescens* Brongn. & Gris, and *F. elegans* Brongn. & Gris, all published in 1863. Incidentally Montrouzier in 1860 did not prepare and publish an actual species description, other than as such data were included in his generic description, and as he had only one poor specimen there could have been no mixture in his original species concept. But Beauvisage's description of 1901 is definitely of a collective species. Here, then, must be the basis of Gugerli's statement that Montrouzier's species was, in part, *Xanthostemon flavum* (Panch.) Schltr. Yet Pampanini, op. cit. 675, definitely stated that he had seen the Montrouzier type, and on p. 682 repeated the statement. He concluded that this

specimen, admittedly a poor one, was the same as *Fremya pubescens* Brongn. & Gris and cited Montrouzier's binomial in the synonymy of *Xanthostemon multiflorum* (Montr.) Beauvisage, making it *X. multiflorum* (Montr.) Beauvisage, var. *typicum* Pamp., forma *pubescens* (Brongn. & Gris) Pamp. Under the circumstances I do not hesitate to replace Gugerli's invalid binomial *Xanthostemon pubescens* (Brongn. & Gris) Gugerli by the earlier name of Montrouzier. Until by a reexamination of the Montrouzier type it can be proved that Pampanini erred, there seems to be no other choice, unless one wishes to propose a new specific name which I consider to be uncalled for at present. The species is known only from New Caledonia.

Xanthostemon myrtifolium (Brongn. & Gris) Pamp. Nuovo Giorn. Bot. Ital. II. **12**: 682. 1905; Gugerli, Repert. Sp. Nov. Beih. **120**: 68. 1940.

Fremya myrtifolia Brongn. & Gris, Bull. Soc. Bot. France **12**: 299. 1865, Ann. Sci. Nat. V. Bot. **3**: 227. 1865.

Xanthostemon integrifolium Baker f. Jour. Linn. Soc. Bot. **45**: 311. 1921; Gugerli, op. cit. 58; Guillaumin, Fl. Nouv.-Caléd. 232. 1948, syn. nov.

Fremya integrifolia Brongn. & Gris ex Baker, f. l.c. in syn., syn. nov.

Gugerli noted, which Baker f. did not, that *Fremya integrifolia* Brongn. & Gris was an unpublished herbarium name. But Baker f. in transferring it to *Xanthostemon* in 1921 failed to provide a description, although he did publish Compton's field note to the effect that it was a shrub with small hard leaves with thickened margins, white corollas and pale yellow stamens. This Gugerli accepted as a description and with misguided confidence placed the species in his section *Brevistyla* where it does not belong. His judgment must have been based solely on the statement that the flowers were white.

The actual specimen on which the Brongniart and Gris and the Baker f. binomials were based is in the British Museum herbarium, and Baker f. was correct in referring to it *Compton 826*, but erred, as did Gugerli, in so identifying *Compton 375* (cited by Gugerli as Baker 375). The latter is a small-leaved form of *Metrosideros operculata* Labill. Guillaumin Not. Syst. **1**: 109. fig. 5, 1909, concluded that the proposed varieties of this species should be abandoned because of the intergrading forms. The British Museum specimen of *Fremya integrifolia* carried the collector's ample note, but no collector's name or number. I showed this to Dr. Tardieu-Blot, who was at the British Museum for a few days in July, 1951, and on her return to Paris she completed the record. The same field note appears on a New Caledonia collection, *Baudouin 638*; this Paris specimen is identical with the London one, and both match the type of *X. myrtifolium* (Brongn. & Gris) Pamp. Thus another minor mystery is solved, for in 1934 (Bull. Soc. Bot. France **81**: 14) Guillaumin had stated that *Xanthostemon integrifolium* Bak. f. *nomen* (*Fremya integrifolium* Brongn. et Gris) was totally unknown to him and that it was not represented in the Paris herbarium.

He accepted the species in 1948 solely on the authority of Gugerli. But neither Gugerli, who did not see the British Museum specimen, nor Guillaumin, had any reason to believe that *Baudouin 638*, with which both were familiar, was an isotype of the elusive *Xanthostemon integrifolium* (Brongn. & Gris) Baker f. which now proves to be the case.

AUSTRALIA

Xanthostemon whitei Gugerli, Repert. Sp. Nov. Beih. **120**: 83. 1940, sphalm. *whitii*.

Xanthostemon pubescens C. T. White, Proc. Roy. Soc. Queensl. **28**: 57. 1917; Queensl. Dept. Agr. Bull. **20**: 14. 1918, non Pampaloni, 1906.

The type of this species was from the Atherton and Herberton districts, Queensland, Australia. It is well represented by *Kajewski 1046* (A), May 24, 1929, from Gadgarra, Atherton, not far from the type locality. At first sight one infers that a new name was not needed here. At any rate Gugerli's reason for publishing the new name was invalid as *Fremya pubescens* Brongn. & Gris (1863) did not invalidate *Xanthostemon pubescens* C. T. White (1917); and yet it develops that the new name was needed because of the earlier and still unlisted *Xanthostemon pubescens* Pampaloni (1906) which all authors have overlooked. Gugerli's new specific name was misspelled, he should not have cited C. T. White as the parenthetical author, and the one collection cited by him is not *C. T. White 1046*, but is *S. F. Kajewski 1046*; the identification was by C. T. White.

NEW GUINEA

Xanthostemon brassii sp. nov. Sect. *Campanulata*, *Multiflora*.

Xanthostemon paradoxum sensu C. T. White, Jour. Arnold Arb. **23**: 83. 1942; non F. Muell.

Arbor usque ad 30 m. alta, decidua, inflorescentiis leviter et brevissime adpresso-pubescentibus exceptis glabra, ramulis ultimis rugosis, 4–5 mm. diametro, cicatricibus distinctis ornatis; foliis alternis, subconfertis, coriaceis vel junioribus subchartaceis, ellipticis vel oblongo-ellipticis, sicco brunneis vel pallide olivaceis, 6–15 cm. longis, 3–7 cm. latis, apice plerumque late rotundatis, rariter obscure retusis, junioribus distincte sed adultis obscure glanduloso-punctatis; nervis primariis utrinque circiter 15, irregulariter dispositis, patulo-curvatis, utrinque distinctis, leviter elevatis, arcuato-anastomosantibus sed venam intramarginalem vix formantibus; petiolo 6–14 mm. longo; inflorescentiis pseudoterminalibus, singulis in axillis foliorum vel delapsorum dispositis, totis ad 8 cm. diametro, leviter adpresse breviter pubescentibus, sub fructu glaberrimis, singulis 3–4 cm. longis, breviter (ca. 1 cm.) pedunculatis, 3–5-floris; floribus 5-meris, flavidis, breviter (5–8 mm.) pedicellatis, bracteolis haud visis, ut videtur cite deciduis; calycibus extus leviter pubescentibus, tubo infundibuliforme, circiter 4 mm. longo, 5–6 mm. diametro, intus glabro, lobis orbiculari-ovatis vel

reniformi-ovatis, basi 2–3 mm. latis, sursum vix angustatis, 1.5–2.5 mm. longis, apice late rotundatis; petalis ellipticis, late rotundatis, 4 mm. longis et 3 mm. latis, in partibus medianis obscure glandulosis; staminibus circiter 20, 1-seriatis, filamentis liberis, 1.5–2 cm. longis; antheris ellipsoideis, obtusis, 1.8 mm. longis; ovario glabro 3-loculare, subhemisphaerico; stylo ad 2.5 cm. longo; capsulis globosis, 1 cm. diametro, 3-locularibus, seminibus numerosis, compressis, ambitu subtriangularis, 3–4 mm. longis latisque.

BRITISH NEW GUINEA: type *Brass* 7869 (flowers), 7503 (fruits) taken from the same tree, Lake Daviumbu, Middle Fly River, the flowers September 1, the fruiting specimen August 26 "large tree, 30 m., briefly deciduous, a crop of flowers appearing a few days before the fall of the leaves, flowers yellow." Other specimens are *Brass* 6556, 5932 (both in fruit), common in the savannah forest at Dagwa, Oriomo River, and Mabaduan, Western Division, and *Brass* 8575, Tatara, Wassi Kussi River, abundant on savannah forest ridges, entering the rain forest. The full notes are given by C. T. White, l.c.

C. T. White after examining F. Mueller's apparently not very satisfactory type, from Arnhem Land [Northern Territory], Australia, considered that all of these Papuan collections represented *Xanthostemon paradoxum* F. Muell., *sensu lat.* While I have available only two good specimens representing the Australian species, and one of these (herb. Gray) is an isotype, there are so many differences that I feel justified in describing the New Guinea form as a distinct species. Gugerli, Repert. Sp. Nov. Beih. 120: 81. 1940, provided some additional descriptive data for the Australian form, citing about nine individual collections all from the Northern Territory of Australia. These notes are of such a character that they support my opinion that had he had access to the Brass collections at the time he studied the group, he would have recognized this New Guinea form as a distinct species. As White noted, F. Mueller had two individual collections, these not quite identical, and he based his description on the characters of both. In his original description of 1857 Mueller stated: "In collibus petraeis ad flumina Victoria et Fitzmaurice," these two rivers in the western part of what is now the Northern Territory of Australia. In his amplified description of 1858 Mueller cited only the Victoria River locality. It is this Victoria River collection, represented at Kew and at the Gray Herbarium, that I accept as the type. It has distinctly pubescent leaves, and densely cinereous-pubescent inflorescences, including the outside of the calyces. In this the densely pubescent bracteoles are persistent or at least subpersistent. There is in the U. S. National Herbarium another specimen of this pubescent form merely labelled "Schomburgk, North Coast"; this is undoubtedly the Port Darwin collection distributed by Schomburgk, *Schulz* 356 as cited by Gugerli. In addition to these two specimens which have been available to me for comparison, I made notes on the Kew collections of *Mueller*, *Cunningham*, *Basedow*, *Spencer*, and *Stokes*, these also seen by Dr. Gugerli.

The individual 3- to 5-flowered inflorescences in *Xanthostemon brassii* Merr. are associated with mature leaves or often with very young leaves, or occur in the axils of fallen leaves. Taken together they give the impression of a terminal many flowered panicle up to 8 cm. long and wide. These individual inflorescences are associated with the deciduous character of the tree, the flowers apparently commencing to develop with the fall of the old leaves and the almost simultaneous appearance of the new foliage.

Xanthostemon crenulatum C. T. White, Jour. Arnold Arb. **23**: 82. 1942. Sect. *Campanulata*, subsect. *Multiflora*.

This addition to the species considered by Dr. Gugerli in 1940 was based on *Brass* 5805, 8358, 8473, 8602, all in the Arnold Arboretum herbarium, collected from various parts of British New Guinea in 1934 and in 1936–37. Aside from its almost strictly opposite leaves (described as subopposite), which is an anomalous character in *Xanthostemon*, another striking feature is its unusually small flowers. These were described by Mr. Brass as white and as greenish white. The bracts and bracteoles, not described in the original description, are present but are deciduous, being present in inflorescences with young buds, falling as the flowers open. They are linear-lanceolate, pubescent, and up to 5 mm. long.

This species may better be placed in *Nani* Adanson (*Nania* Miquel) because of its opposite leaves. Adanson's genus, by common consent, is placed as a synonym of *Metrosideros* Banks. Valetton, however, Ic. Bogor. **1**: 63, 67, pl. 98, 99. 1901, accepted *Nania* Miq. as generically distinct from *Metrosideros* Banks, recognizing two species, *Nania vera* Miq., and *Nania petiolata* Valetton, calling attention to the fact that the fruits of *Nania* Miq. (= *Nani* Adanson) are entirely free from the calyx (superior), and that the placentas and seeds are quite different from those of *Metrosideros* Banks; I may add that the valves split to the very base, while in *Metrosideros* the fruits are inferior and open by radiately arranged valves across the truncate tops. I had, at first, included certain of these opposite-leaved species in *Xanthostemon* (New Guinea and Amboina), which I have eliminated, since I am now convinced that they do not belong in the latter genus, but really represent species of *Nani* Adanson. Involved here are *Metrosideros vera* Lindl. (1821–24; Roxb. 1832) from Amboina; *M. suberosa* Roxb. (1814, 1832), Moluccas, *Syncarpia vertholenii* Teysm. & Binn. (1855) = *Metrosideros vera* Lindl., and *Nania petiolata* Valetton (1900) (probably from Celebes, not Java). I have not had access to sufficient material to settle the various matters involved, both as to generic and as to specific limits among the taxa above listed.

Xanthostemon novaguineense Valetton, Bull. Dép. Agr. Ind. Néerl. **10**: [72]. 1907, Ic. Bogor. **3**: sub. pl. 239. 1907; Gugerli, Repert. Sp. Nov. **120**: 85. 1940.

Xanthostemon paradoxum sensu Valetton, Ic. Bogor. **3**: 95. pl 239. 1907, non F. Muell.

Xanthostemon papuanum Lauterb. Nova Guinea **8**: 854. 1910; Gugerli, op. cit. 130, inter sp. dub.; C. T. White, Jour. Arnold Arb. **23**: 82. 1942, syn. nov.

All the collections involved in this case were from the Humboldt Bay region, north coast of New Guinea. Valetton's type was from Tobadi, a village on the inner bay, and Lauterbach's type was from the lower slopes of the neighboring Cyclops Mountains. Hollandia is the important town here, and the other localities mentioned are near that place. *Sigafoos* 42 from near Lake Sentano, exactly matches a duplicate of *Wichtman* 125 in the Rijksherbarium, the type collection of Valetton's species and also agrees with the excellent illustration and detailed description of *X. novaguineense* Val., while *Brass* 8801 from Hollandia agrees perfectly with Lauterbach's description of *X. papuanum* Lauterb. and with *Gjellerup* 488, in the Rijksherbarium, the latter being the Lauterbach type collection. The only differences I have been able to detect after a searching comparison are that in the taxon of Valetton the inflorescences are glabrous, and in that of Lauterbach they are somewhat pubescent. The *Sigafoos* note reads, in part, "shrub in the grass savannah on laterite, common 250 to 400 ft., flowers brilliant red. A similar plant observed later was a tree 40 to 60 feet high." The *Brass* note is "common tree 15 to 17 m. in old seral rainforest, abundant as a small tree or shrub on dry forested slopes covered with grass and ferns, flowers red, alt. 20-100 m." It should be noted that the Lauterbach type from the neighboring Cyclops Mountains at 400 m. was from *alang* covered slopes, *alang* being the coarse grass *Imperata*.

Here Dr. Gugerli cleared up the nomenclatural difficulties appertaining to Valetton's erroneous concept of *Xanthostemon paradoxum* F. Muell. After Valetton's detailed description and illustration was in press he apparently saw authentic material of F. Mueller's Australian species, and published his new binomial first in his corrections to his list of Papuan plants in an unnumbered sheet of the Bulletin in Buitenzorg, and a little later in a supplementary unpagged sheet in the Icones which was printed in Holland. Unfortunately Dr. Gugerli did not see Lauterbach's type, and being unable to place the species in his arrangement of them, left it among the few of doubtful status. It is, however, rather strange that he should have expressed the opinion that a species of the Australian genus *Kunzea* Reichb. might be represented. The description is all of *Xanthostemon*, not at all of *Kunzea*, and apparently no *Kunzea* has as yet been found in New Guinea. My conclusion is that the very slight differences between the two supposedly distinct species, i.e., glabrous as opposed to somewhat pubescent inflorescences, are due to local conditions as to exposure, etc., and that but a single valid species is here represented.

CELEBES

Xanthostemon confertiflorum sp. nov. Sect. *Vesicaria*.

Ut videtur arbor vel arbor parva omnino glabra, ramulis ultimis 1.2–2 mm. diametro; foliis numerosis, plus minusve confertis, coriaceis, vix vel obscure puncticulatis, plerumque obovatis interdum subellipticis vel subelliptico-obovatis, apice late rotundatis vel rariter subretusis, basi late acutis, breviter (5–8 mm.) petiolatis, sicco subolivaceo-brunneis vel pallide brunneis, opacis vel subnitidis, 4–8 cm. longis, 3–5 cm. latis; nervis primariis utrinque 10–12, gracilibus, vix vel obscure elevatis, haud perspicuis, subtus dense reticulatis; inflorescentiis terminalibus, sessilibus, circiter 3 cm. diametro, floribus confertis, 5-meris, breviter (ad 3 mm.) crasseque pedicellatis; bracteolis binis, anguste oblongis, acutis, coriaceis, glabris, circiter 5 mm. longis et 1.2 mm. latis; calycibus, lobis inclusis, circiter 7 mm. longis, glabris, tubo subpatelliformibus, ad 1 cm. diametro, lobis 5, triangulari-ovatis, coriaceis, deorsum 3–4 mm. latis, sursum angustatis, 3 mm. longis, acutis vel subacuminatis, sub fructu saepe recurvatis; petalis 5, orbicularibus, late rotundatis, 6 mm. diametro; staminibus circiter 30, 1-seriatis, filamentis liberis, immaturis (inflexis) 6 mm., maturis rectis 1.5 cm. longis; stylo ad 2.5 cm. longo; ovario superiore vel semisuperiore, glabro, depresso-globoso, 3-loculare, cellulis multiovulatis; capsulis globosis vel subglobosis, 3-loculatis, punctato-glandulosis, circiter 1 cm. diametro; seminibus numerosis, compressis, obovatis, circiter 3 mm. longis.

CELEBES: Malili and vicinity, *Neth. Ind. For. Serv. Cel. III-103* (A, L), *bb. 18018* (L), *18011* (A), *18672* (A), *21782* (A), *22723* (A); Manado, *bb. 19636* (A, L), *31512* (A).

This series of specimens was collected in 1933, 1934, 1935, and 1939. Only *bb. 19636* is sterile, the others having either flowers or just opening flower buds, or mature fruits. The indicated type is the first cited specimen, although its flowers are not quite mature. The capsule characters were taken from *bb. 18011*, and *bb. 31512*. Notes regarding the plant are lacking except that the altitude is indicated as from 25 to 500 m.; all but one of the specimens (and that a sterile one) were apparently dried out from material originally preserved in alcohol, thus all traces of the flower color are lacking, but the flowers were probably purplish. It is the first true *Xanthostemon* to be discovered in Celebes. I have placed it in the section *Vesicaria* because of its shallow calyces, in spite of the fact that it lacks the five protuberances on the calyx tube, which is one of the characters of that section. It is distinguished from the Philippine *M. speciosum* Merr. (*M. merrillii* Pamp., *M. purpureum* Gugerli), not only by lacking the calyx protuberances but also by its leaves being very obscurely or not at all glandular-punctate.

PHILIPPINES

Xanthostemon speciosum Merr. Govt. Lab. Publ. 6: 10. 1904.

Xanthostemon merrillii Pamp. Nuovo Giorn. Bot. Ital. 12: 688. 1905.

Xanthostemon purpureum Gugerli, Repert. Sp. Nov. Beih. 120: 53. pl. 15. fig. a. 1940.

This species, Gugerli's description of 1940 having been based on *Merrill 682* from Culion (the type), *Weber 1551* from Busuanga, and *F. B. 29266 Cenabre* from Palawan, is also represented by *F. B. 28902* (A) from Culion, and *Philip. Nat. Herb. 218 Edano* (A), and *12431 Sulit* (A) from Palawan, the first from near Puerto Princesa, the second from the vicinity of Victoria Peak. I have examined specimens of all the numbers cited by Gugerli.

This is the type of section *Vesicaria* Gugerli. The species is distinct from *X. verdugonianum* Naves to which I erroneously reduced it in 1923 (Enum. Philip. Fl. Pl. 3: 183). Gugerli correctly reinstated it as a species in 1940, even if he erred in redescribing it as new, for already two other binomials had been published for it. In nomenclature and in the recognition of species we here have a strange comedy of errors, for Gugerli cites *Merrill 682* from Culion, as the type of *X. purpureum* Gugerli (1940). He said, op. cit. 131-132, that the Kew specimen of this number actually represented *X. verdugonianum* Naves. I have reexamined it and find it, like all other specimens of this number, to be *X. speciosum* Merr., and not the Naves species; Mr. H. K. Airy Shaw later verified this at my request. This now historical *Merrill 682*, all specimens taken by me personally from a single tree in the Cogonal Grande, Culion, Feb. 12, 1902, is thus the basis of *X. speciosum* Merr. (1904), *X. merrillii* Pamp. (1905), and *X. purpureum* Gugerli (1940). There is no possibility of a mixture of material under the number discussed. The holotype was destroyed when the Manila herbarium was burned near the close of World War II at the time of the reoccupation of Manila by American troops. I have examined the duplicate types at Kew, the Gray Herbarium, and the U. S. National Herbarium.

The errors commenced with Pampanini in 1905 who proposed the unnecessary new binomial *X. merrillii* Pamp. because, while he correctly accepted the reduction of *Fremya* Brongn. & Gris to *Xanthostemon* F. Muell., he erroneously concluded that *Fremya speciosa* Brongn. & Gris (1863) invalidated *Xanthostemon speciosum* Merr. (1904), which is utterly contrary to the rules of botanical nomenclature. I continued the error when, without checking the details, I accepted Pampanini's conclusion in 1923 and added to the confusion, thus probably aiding Gugerli in some of his misinterpretations, as I then erroneously reduced *X. speciosum* Merr. (*X. merrillii* Pamp.) to *X. verdugonianum* Naves. The superficial resemblances of *X. verdugonianum* Naves and *X. speciosum* Merr. (*X. merrillii* Pamp., *X. purpureum* Gugerli) are close, but the calyx characters are very distinct. And finally Gugerli, in 1940, misled by Pampanini's misinterpretation of the rules governing the

validity of binomials redescribed this already twice named Culion species as *Xanthostemon purpureum* Gugerli (p. 53), sect. *Vesicaria*, cited its type collection as representing *X. verdugonianum* Naves (p. 64), sect. *Cylindrica*, and finally (p. 131) listed and discussed *X. merrillii* Pamp. (1905), with *X. speciosum* Merr. (1904) as a synonym, as an excluded species. And all the time *X. speciosum* Merr. was the valid name for this now thrice-named species. He even mentioned the striking calyx characters specified by me in 1904 by which *X. speciosum* Merr. was distinguished from *X. verdugonianum* Naves, which were the very characters on which he based his section *Vesicaria*. And so a page or two of print is now called for to explain the details of this nomenclatural comedy of errors, in which Merrill, Pampanini, and Gugerli are involved.

There is no overlapping in the Philippine ranges of the two superficially similar species, *X. speciosum* Merr. and *X. verdugonianum* Naves. The latter is confined to the central and southern Philippines, the former to the Calamian-Palawan group in the central western part of the Philippines. Incidentally these islands all lie on the continental shelf, and their floras and faunas contain strong Bornean elements which do not extend into the Philippines proper.

Xanthostemon verdugonianum Naves ex F. Vill. in Blanco Fl. Filip. ed. 3, Novis. App. 82. pl. 300. 1880; Merr. Enum. Philip. Fl. Pl. 3: 183. 1923, excl. syn.; Gugerli, Repert. Sp. Nov. Beih. 120: 64. 1940, excl. syn.

To be excluded from Gugerli's consideration of this endemic Philippine species are the synonyms *X. merrillii* Pamp. and *X. speciosum* Merr., and from the specimens cited, *Merrill 682*, these being accounted for under *X. speciosum* Merr., above. Otherwise, all of the collections cited by Gugerli manifestly belong with this species of Naves. Additional collections are *F. B. 24422 Miras, Soriano & Mariano* (A, U), from Agusan Province, Mindanao, *F. B. 7546 Hutchinson* (U), *F. B. 22833 Ponce* (A,U), *F. B. 23023 Razon* (G), and *2302* (A), *F. B. 28158 Tomeldan* (A), and *F. B. 29419 Rojas*, all from Surigao Province, Mindanao, *F. B. 23942 Cortes & Knapp* (U), Panay, and *F. B. 19535 José* from Sibuyan. The species, type from Surigao no longer extant, is now known from more than 20 individual collections, its range being Sibuyan, Panay, Leyte, Dinagat, Tinago, and the Provinces of Agusan and Surigao in Mindanao.

UNLISTED BINOMIALS

In the course of this little study I have noted several unlisted binomials, one dating from as early as 1886. These are:

Xanthostemon *myrtifolium [Brongn. & Gris] Pampaloni, Nuovo Giorn. Bot. Ital. II. 13: 135. 1906 [*Fremya myrtifolia* Brongn. & Gris]; Gugerli, Repert. Sp. Nov. Beih. 120: 68. 1940.

Doctor Gugerli gave the reference to Pampanini's paper in the *Nuovo Giorn. Bot. Ital.* II. **12**: 682. 1905, this being an error; the binomial does not there appear, nor is it to be found elsewhere in Pampanini's paper of 1905. The next year it was published without its name-bringing synonym, as above indicated. Yet in his monograph of 1940 Dr. Gugerli also erroneously included a second reference to *X. myrtifolium* Pamp. [ex Baker f.] in *Jour. Linn. Soc. Bot.* **45**: 34. 1921. But there Baker f. credited the binomial to Guillaumin. Guillaumin however, apparently never published such a name, as a check on his various papers on the New Caledonian flora shows that he correctly credited the binomial to Pampanini. Pampaloni undoubtedly received his binomials from Pampanini.

Xanthostemon *pachyspermum F. Muell. & F. M. Bailey, *Occ. Pap. Queensl. Fl.* **1**: 4. 1886; F. M. Bailey, *Queensl. Fl.* **2**: 642. 1900; Gugerli, *Repert. Sp. Nov. Beih.* **120**: 132. 1940, inter sp. excl. = *Tristania pachysperma* (F. Muell. & F. M. Bailey) Francis, *Queensl. Nat.* **14**: 56. 1951 (*T. odorata* C. T. White, 1920).

Doctor Gugerli cited the authority for the binomial as F. M. Bailey, and gave the reference to the Queensland Flora only; there, however, the reference is to the earlier (but as yet unlisted) place of publication as I have above recorded the entry. He was correct in excluding the species from *Xanthostemon*, as it was described as having but one or two large seeds in each cell of the capsule, these seeds 7 to 10 mm. in diameter. He thought that Bailey might have had a specimen of *Kunzea*, sect. *Salicia*. The mystery is now solved by W. D. Francis' reëxamination of the type in 1950, who finds it to represent the same species as the Queensland *Tristania odorata* C. T. White.

Xanthostemon *pubescens [Brongn. & Gris] Pampaloni, *Nuovo Giorn. Bot. Ital.* II. **13**: 128. 1906; Gugerli, *Repert. Sp. Nov. Beih.* **120**: 126. 1940; Guillaumin, *Fl. Nuov. Caléd.* **234**. 1948. New Caledonia = *X. multiflorum* (Montr.) Beauvisage, supra.

Pampaloni cited no synonyms and no authorities; he received his binomials from Pampanini, with whom he was working; but nowhere did the latter author publish this binomial.

Xanthostemon *speciosum Pamp. *Nuovo Giorn. Bot. Ital.* II. **12**: 688. 1905, *in obs.* (*Fremya speciosa* Brongn. & Gris). New Caledonia.

In Dr. Gugerli's treatment, p. 97, he erroneously credited this binomial to Niedenzu who never published it, overlooking Pampanini's obscure entry. The proper name for this New Caledonian species is *X. gugerlii* Merr.

EXCLUDED SPECIES

XANTHOSTEMON CELEBICUM Koord. Meded. 's Lands Plant. **19**: 465, 637. 1898; Gugerli, *Repert. Sp. Nov. Beih.* **120**: 130. 1940 = **Kjellbergiodendron celebicum** (Koord.) Merr., *infra*.

XANTHOSTEMON PACHYSPERMUM F. Muell. & F. M. Bailey, Occ. Pap. Queensl. Fl. **1**: 4. 1886; Gugerli, op. cit. 132 = *Tristania pachysperma* (F. Muell. & F. M. Bailey) Francis, supra.

Kjellbergiodendron Burret

This genus was described in 1936, with two species, on the basis of two collections made by Gunnar Kjellberg in Celebes in 1929. The previously unplaced and inadequately described *Xanthostemon celebicum* Koord. is now found to belong in Burret's very distinct genus. The genus is strongly characterized by its relatively large, more or less fleshy, 1-celled and 1-seeded, indehiscent fruits, 2-celled ovaries, stamens arranged in five phalanges, and its alternate leaves. While the genus is a sharply defined one, this statement apparently does not apply to its few species, as they impress me as being difficult to distinguish from each other. It is probable that this difficulty stems largely from the inadequateness of the available herbarium specimens, most of these being sterile, or with young flower buds or with very immature fruits. Certain sterile specimens from Malili, Celebes, distributed as representing the undescribed *Tristania celebica* Koord., belong with *Kjellbergiodendron hylogeiton* Burret. This Koorders binomial appears as a *nomen nudum* in Koorders-Schumacher, Syst. Verzeich. **3**: 96. 1914; I have seen three of the four Koorders specimens listed under this *Tristania*, all sterile.

Kjellbergiodendron celebicum (Koord.) comb. nov.

Xanthostemon celebicum Koord. Meded. 's Lands Plant. **19**: 465, 637. 1898; Koord.-Schum. Syst. Verzeich. **3**: 96. 1914; Gugerli, Repert. Sp. Nov. Beih. **120**: 130. 1940, inter sp. ign.

In Koorders' report on the Celebes flora he first listed this species with brief comments on page 465, and on page 637 he published a short and inconclusive description, some of the reasons for this perhaps to be apparent in the following notes. It was not until 1914 that any of the Koorders Celebes numbers were actually associated with the description (for Koorders cited no numbers and indicated no type in 1898) when Mrs. Koorders listed eleven numbers, all but four of which represent sterile specimens. The description was of such a nature that Dr. Gugerli in 1940, without access to authentically named specimens, could not place the species in relation to the other described ones in *Xanthostemon*.

Five of the Koorders Celebes numbers are sterile, so that in selecting a type we are limited to four numbers only, 18097, 18544, with not fully developed flower buds, and 18240, 19302, with fruits. All of these have the smaller leaves, 10 to 15 cm. long, 3.5 to 5.5 cm. wide. I arbitrarily designate Koorders 18544, three sheets at Buitenzorg, as the type for flowers, and Koorders 19302 in the same herbarium as the type for fruits. I have actually seen Koorders 18097, 18964, 18322,

18960, 18321, all in the Leiden herbarium, but I deliberately ignore the last three of these as they are sterile and with very large leaves, up to 33×7 and 37×9.5 cm.; nos. 18192, 18305 also belong in this category. Koorders thought that these large leaved forms were from young plants; one cannot prove this short of intensive field work, but they may, of course, belong with the species. Numbers 18097, 18240, 18544, 19302 are apparently normal, as these are the specimens with flower buds or with fruits, the leaves being 10 to 15 cm. long and 3.5 to 5.5 cm. wide. They clearly belong to a single species, and 18964, (sterile) falls in this category.

It is rather curious that Koorders placed this species in *Xanthostemon*, because of its large fruits, which he mentioned as being 1.8 cm. long and 1.2 cm. thick (the largest at Buitenzorg is 1.9 cm. long), and which he apparently knew, from his dissections and sketches, were indehiscent and 1-seeded. In his dissection notes on the flower buds, which he also did not publish, he observed that the stamens were arranged in five phalanges. These fruit and flower characters are remote from those of *Xanthostemon*. A dissection of a flower bud of *Koorders* 18097 shows that the strictly inferior ovaries are 2-celled, each with a fair number of ovules. All these characters are those of *Kjellbergiodendron* Burret which was not characterized and published until 1936. I am indebted to Dr. J. H. Kern of Buitenzorg for copious notes on the Koorders Buitenzorg specimens and his unpublished dissection data.

In addition to the several Koorders numbers that I am willing to accept as representing *Xanthostemon celebicum* Koord. I feel safe in referring to this species the following collections, unfortunately all sterile:

CELEBES: Minahassa, *Koorders* 18097 (L), 18964 (L); Manado, *Neth. Ind. For. Serv. bb.* 19646 (A,L); Palopo. *bb.* 20895 (A,L); Moena Island immediately south of southwestern Celebes, *Neth. Ind. For. Serv. bb.* 21097 (A,L), 21386 (A), 4187 (L); Moluccas, Ternate and Batjan, *Neth. Ind. For. Serv. bb.* 16476 (A,L) (the small islands of Ternate and Batjan are close to the west coast of Halmahera, across the Molucca Passage from the classical locality, Minahassa, northeastern Celebes). Because of the small flower buds, *Neth. Ind. For. Serv. Cel. II.* 485 (L) from Malili probably belongs here while *Neth. Ind. For. Serv. bb.* 24124, 31513 (A) have puberulent calyces, the buds somewhat intermediate in size between those of Koorders' species and *K. limnogeiton* Burret.

While it is clear that *Xanthostemon celebicum* Koord. is a *Kjellbergiodendron*, it is not easy to determine its relationships with the two previously described species of that genus. The almost mature but as yet unopened flower buds are 6 mm. long, and under a lens the calyces are densely puberulent. Hence the flowers should be distinctly smaller than are those of *Kjellbergiodendron limnogeiton* Burret, which are described as glabrous, while the fruits (mature?) are very much smaller ($1.8-1.9$ cm. $\times$ $7-9$ mm.), as opposed to $5-6$ cm. $\times$ $3.5-3.8$ cm. in Burret's species. One may judge by Koorders' sketches and by the

thickness of cotyledons observed by him that his fruits were at least partly mature. It is suspected that Koorders species is closest to *K. hylogeiton* Burret, the fruits (mature?) of the latter described as 2.5 to 3 cm. long and 1.5 cm. thick; but its coriaceous leaves are described as being up to 25 cm. long and 9 cm. wide; they are actually up to 30 cm. long and 10 cm. wide.

Some additional descriptive data for this Koorders species are: Leaves normally 12 to 15 cm. long, 4 to 5 cm. wide, firmly chartaceous or subcoriaceous, usually olivaceous above, pale brownish beneath and glandular-punctate when dry; primary nerves up to 15 on each side of the midrib, slender but distinct and somewhat elevated on the lower surface, rather irregular, anastomosing and forming a distinct intramarginal nerve 3 to 5 mm. from the margin, and with a less distinct secondary marginal nerve close to the edge of the leaf; alternating with the primary nerves are less conspicuous secondary ones. Flowers apparently small (only unopened buds seen), the calyces rather densely puberulent, the buds seen not over 6 mm. long. Stamens many, in five distinct phalanges. Ovary wholly inferior, 2-celled, the cells with many ovules. Fruit indehiscent, 1-celled, 1-seeded.

Kjellbergiodendron hylogeiton Burret, Notizbl. Bot. Gart. Berlin 13: 103. fig. 5, 4-6. 1936.

Tristania celebica Koord. ex Koord.-Schum. Syst. Verzeich. 3: 96. 1914, *nom. nud.*, syn. nov.

The type is *Kjellberg* 2016, from Malili, Celebes, at sea level, its mature flowers not yet known. I have not seen the type, but confidently refer here *Neth. Ind. For. Serv. Cel.* 334 (L), two sheets, one with very immature flower buds, the other with immature fruits, and also *Cel.* II-261 and *bb.* 23269 (A), all from Malili, Celebes. On the sheet with the immature fruits of *Cel.* 334, the leaves are up to 30 cm. long and 10 cm. wide, the stout infructescences up to 20 cm. long, and the immature fruits (seeds not formed) 2 to 2.5 cm. long. It is, of course, possible that some of the smaller leaved sterile specimens above referred by me to *K. limnogeiton* Burret may belong with *K. hylogeiton* Burret. One concludes that it would perhaps be better not to name sterile specimens to the species in this difficult assemblage. I cannot help but feel that certain sterile specimens, and one or two with very immature inflorescences from Malili, partly distributed as representing the undescribed *Tristania celebica* Koord., mentioned above, belong with this Burret species. Some of these are *Neth. Ind. For. Serv. Cel.* IV-106, *Cel.* 106, *Cel.* 166, *Cel.* 193, *bb.* 18800, *bb.* 26286 (all A).

Kjellbergiodendron limnogeiton Burret, Notizbl. Bot. Gart. Berlin 13: 103. fig. 5, 1-3. 1936.

The type of this, which I have not seen, is *Kjellberg* 2170 from Towuti, Celebes, alt. 300 m., on lake margins, its leaves coriaceous, 15-19 cm. long, 5-6 cm. wide, its fruits 5-6 cm. long. Burret's flower-

ing material was very scanty and unsatisfactory, yet he described the flowers as "majusculi," and, as illustrated, about 2 cm. in diameter and 1.2 cm. long (he did not actually specify these measurements; his illustration shows only a single attached flower). This is a much larger flower than one would suspect to develop from the small buds of the Koorders species, as these, nearly mature, are but 6 mm. long. I am certain that the following specimens from Malili, Celebes, represent this Burret species; *Neth. Ind. For. Serv. bb. 23544* (A), its one fruit 4.5 cm. long, 3 cm. thick; *bb. 18920* (A,L), its flower buds about 1.4 cm. long, glabrous, oblong-obovoid, the stout calyx tube 4 mm. thick, glabrous, narrowed below, rugose, and 4-5 mm. long, the concave imbricate petals suborbicular or obovate, rounded, at least 1 cm. long. Sterile but almost certainly belonging here in spite of their, in general, smaller leaves are: *Neth. Ind. For. Serv. Cel. II. 240; II. 241; II. 243* (A,L); *Cel. II. 242, 253, 485* (L); *bb. 19820* (A,L); *bb. 22730, 23544, 29974* (A); and *Boschwezen Mantri bb. 1836, 1854, 1890* (L), from the Malili region.

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