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Notes on Polynesian *Glochidion* and *Phyllanthus*

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In order to identify the collection recently made by Otto Degener in Fiji, I have studied a number of Polynesian Euphorbiaceae. The results of my work on this family have appeared elsewhere (in *Sargentia* 1: 46-52, 1942), but I am free to discuss here certain aspects of taxonomy of particular interest in other parts of Oceania. All specimens including a type cited in this paper are preserved in the Arnold Arboretum.

Of all Polynesian euphorbiaceous genera, *Glochidion* Forster is probably the richest in forms and the most difficult to classify. The same species of *Glochidion*, *sensu lato*, may range from archipelago to archipelago, varying to some degree in each island. To name these variations on poor material and without field study is often impossible.

As I have pointed out in a previous publication (Croizat and Hara, *Jap. Jour. Bot.* 16: 315-316, 1940), *Glochidion* is a "good" genus in India, but a "bad" genus in Oceania because of forms which may be placed in either *Phyllanthus* or *Glochidion* depending only on certain technicalities of the flower. It is difficult to see how conservative taxonomists can avoid treating *Glochidion* as a section or subgenus of *Phyllanthus*, thus accepting the final disposition of Forster's genus made by Mueller of Argau.

Of all the characters which are supposed to separate *Glochidion* from *Phyllanthus*, I have found only one which is artificial but tenable. This character is the stoutish stylar column of the male flower of *Glochidion*, made of elongated anthers dehiscing longitudinally, exceeded at the apex by an apiculation of the connective. The staminal column, moreover, is only occasionally surrounded by small discrete

or continuous glandular bodies. The characters of the female flower and fruit are much less significant and trustworthy. The conventional idea of *Glochidion* as a genus with multilocular fruit, and styles connate to form a funnellform or tubular structure is fallacious. As every student of the flora of Polynesia knows, forms occur which must be ultimately assigned to *Phyllanthus* or to *Glochidion* because of sums of characters and intangibles, especially those of the male flowers, but which can be placed under either genus at will on the strength of the characters of their styles and capsules.

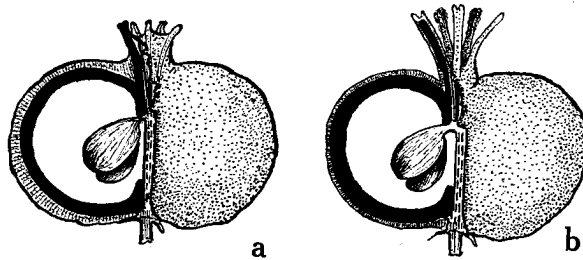


FIGURE 1.—Diagram illustrating unreliability of a concept of *Glochidion* and *Phyllanthus* based upon degree of connation of styles, and differences due to thickness of epicarp and slight variations in length of style: a, *Glochidion*; b, *Phyllanthus*.

Pax and Hoffmann's interpretation of *Glochidion* (*Nat. Pflanzenf.* 19c: 56-59, 1931) will bring about taxonomic chaos and cannot be allowed to go unchallenged. These two authors briefly characterize *Glochidion* as an aggregate which has "Blüten wie bei *Phyllanthus*, Diskusdrüsen aber allermeist fehlend; wenn vorhanden, dann die Griffel ungeteilt." Since the epicarp of the phyllanthoid capsule coats the carpels much in the same manner as the epicarp of *Malva viscus* encloses the underlying schizocarps, in many of the capsules the styles are connate at their base by a common ring of epicarp tissue. In a species of *Phyllanthus* with short and not or barely bilobed styles, it is possible to find the styles held together for most of their length, thus simulating the "muff" type of styler structure supposedly characteristic of *Glochidion*. In conclusion, if the styler structure is assumed as the generic character of *Glochidion*, the result is that two closely allied species of *Phyllanthus* may be separated generically for no better reason than that the epicarp is one half millimeter thicker or thinner (fig. 1). When it is considered that the species of the *Phyllanthus*-

Glochidion alliance number about 1,000, the weakness of the concept sponsored in the Natürlichen Pflanzen-familien is patent; this concept, no doubt, is exceedingly artificial and unworkable in practice and as such must be rejected. It is difficult to understand why Pax and Hoffmann treat such species as *Phyllanthus botryanthus* Mueller-Argau and *P. flexuosus* Siebold and Zuccarini under *Glochidion* when a glance at the specimens establishes their close affinity with *Phyllanthus*. To clarify these problems of inter-relationship in two large genera and to monograph the species, prolonged investigation is needed. In the meantime, I am accepting both genera, *Phyllanthus* and *Glochidion*. *Glochidion* is ultimately separable on the characters of the staminal column mentioned above.

Genus **GLOCHIDION** J. R. and G. Forster

Glochidion ramiflorum J. R. and G. Forster, Char. Gen., 113, pl. 57, 1776. G. Forster, Fl. Ins. Austr. Prodr., 68, 92, 1786.

This species is the stumbling block of every taxonomist who works on *Glochidion* in Oceania. I am unable to handle it now with hope of finality, because to do so I must see all the type specimens.

As is well known, the original publication does not mention a type locality, and the description is such that it applies to several related species. George Forster, however, speaks twice of Tanna and once of the Society Islands. The type of the binomial may, therefore, be a specimen from the New Hebrides. Under a different interpretation, we may argue that the type is the specimen which has been designated by the earliest author to interpret *G. ramiflorum*, possibly *Forster 191* in the Paris herbarium mentioned by Baillon in 1858 (*Étude Gén. Euphorb.*, 638, 1858). I believe that the former interpretation of type appears to be the more logical, as it is the interpretation of the majority of taxonomists who have worked on the flora of Oceania. I therefore suggest the following:

1. The type of *G. ramiflorum* is a plant from Tanna, which is probably conspecific with *G. tannaense* Guillaumin, and with *G. concolor* Mueller-Argau (see Croizat, *Sargenia* 1: 47, 1942). The latter may be a variety, the former a straight synonym of Forster's binomial.

2. Mueller of Argau is not justified in typifying *G. ramiflorum* by a plant from the Society Islands. The plant chosen by him as the type of Forster's species might be quite close to *G. Manono* Baillon.

3. *Glochidion ramiflorum* does not occur east of Samoa and, probably, Tonga, and may not actually range beyond the Fijian Islands.

These conclusions are liable to change as material becomes available. They are now suggested by literature in general and by the specimens I have seen. They are useful because they immediately dispose of some of the greatest uncertainties of the classification of this genus.

It is also indicated that:

A. *Glochidion ramiflorum* (Mueller-Argau) Pax var. *samoanum* (Muell.-Arg.) Pax, as represented by a classic specimen (U. S. Explor. Exped., Samoa, Muell.-Arg. det *P. ramiflorus samoanus*), appears to be close to *Christophersen and Hume 1991*. This specimen is correctly determined under Pax's name (Christophersen, B. P. Bishop Mus., Bull. 128: 119, 1935). However, it seems probable that this plant is a good species with characters intermediate between those of *G. concolor* Mueller-Argau and *G. Manono* Baillon. Unfortunately, the material available here is too poor to justify the publication of a new binomial.

B. The plant which, in our herbarium was determined by Mueller himself as *P. ramiflorus gamma* [= *P. ramiflorus lanceolatus* in DC Prodr. 15(2): 289, 1866] [U. S. Explor. Exped., Emio (Eimeo or Moorea, near Tahiti)], does not belong to Forster's species, insofar as this species may be based on such material from Tanna as is represented by *Kajewski 91*. It is worthy of notice that in publishing *G. tannaense* (type, *Kajewski 91*) Guillaumin voices the suspicion (Arnold Arb., Jour. 13: 90, 1932) that *Kajewski 91* may actually be the same as Forster's plant. I cannot place the Eimeo specimen, and the description makes it unlikely that it falls within the limits of *G. emarginatum* J. W. Moore. It is almost certain that the material from Nukuhiva and Fiji which Mueller credits to *P. ramiflorus lanceolatus* is not conspecific, and that the Nukuhivan collections of Jardin and Seemann are wholly outside the limits of *G. ramiflorum*.

C. In our herbarium, three different plants are mounted on one sheet under two labels. On the left, labeled *P. Gaudichaudi marianus* are two plants, *G. marianum* Mueller-Argau (upper plant, to which label obviously belongs, closely resembles *Guerrero 778*, Guam, 1916, and possibly *Kanehira 840*, Caroline Islands, Ponape, 1929) and a form from Tonga close to material of *G. concolor* Mueller-Argau from Fiji, which may represent an extreme form of *G. ramiflorum*

from the New Hebrides. On the right, one poor specimen (U. S. Explor. Exped., Samoa) is identified as *P. Gaudichaudii samoanus* in Mueller's handwriting. As previously discussed (see A), this specimen is possibly close to *Christophersen and Hume 1991*, and resembles material on another sheet in our herbarium which was identified by Mueller as *P. ramiflorus samoanus*. This other sheet also contains, on the left hand side, *P. ramiflorus gamma* and on the upper right hand side, *P. ramiflorus alpha*.

D. *Glochidion cuspidatum* (Mueller-Argau) Pax var. *samoanum* (Muell.-Arg.) Pax, according to the letter of the publication (Engler Bot. Jahrb. 25: 645, 1898), is a transfer to *G. cuspidatum* of the var. *samoanus* originally published by Mueller under *P. Gaudichaudii* [DC. Prodr. 15(2): 300, 1866]. The classic specimen in our herbarium determined as *P. Gaudichaudii samoanus* (see C) is certainly not conspecific with *G. cuspidatum* (U. S. Explor. Exped., Samoa), but fairly agrees, as stated, with the material of *P. ramiflorus samoanus* (see A, C). Thus two alternatives are suggested, either that the material of *P. Gaudichaudii samoanus* and *P. ramiflorus samoanus* has become hopelessly mixed at distribution or mounting, or that Pax has misinterpreted the specimens available to him. *Christophersen 256* and *Christophersen and Hume 2293* do not seem sufficiently distinct from the classic specimen of *P. cuspidatus* to warrant separate varietal recognition. It is worthy of note that these collections are all from Samoa.

I regret that the confusion now prevalent in the treatment and the material of these binomials and trinomials cannot be cleared. To do so, it would be necessary to bring together the material seen by Pax, the holotypes of all the entities involved, the specimens of the Bishop Museum herbarium and our own collections. It is essential, however, to record the existing chaos in order that nothing be done to make it worse. A great deal of responsibility falls on Mueller, who often treated one species as belonging to *Phyllanthus* and to *Glochidion* and used identical trinomials for different species. Some carelessness in recording and distributing material collected during the United States Exploring Expedition is also apparent, for the record of *G. Manono* for Fiji, based on this material by Mueller [DC. Prodr. 15(2): 296, 1866] is almost certainly misplaced. *Glochidion Manono* of Gillespie from Fiji (B. P. Bishop Mus., Bull. 91: 16, 1932) is a totally different species, *G. Gillespiei* Croizat (in *Sargentia* 1: 46, 1942). I have seen

no Fijian specimen which I can match with the authentic material of *G. Manono* Baillon available in our herbarium. The study of *Glochidion* in the area stretching from the New Hebrides to the Marquesas and to the Marianas must therefore be begun once again on a new basis.

Glochidion taitense Baillon ex Mueller-Argau, *Linnaea* 32: 66, 1863.

Phyllanthus taitensis Muell.-Arg., *Flora* 45: 380, 1865; DC. Prodr. 15(2): 300, 1866.

A fragment of *Lépine 209* generously given by Professor Humbert to our herbarium has leaves definitely pubescent underneath. The isotype of Mueller's var. *glabrescens* (U. S. Explor. Exped., Tahiti) is also available. Mueller's descriptions and characterizations are correct in the main. *Glochidion Manono* and *G. taitense* are similar, but the former, as far as seen, has wholly glabrous fruit, while the latter, including var. *glabrescens*, has puberulous fruit. *Setchell and Parks 79*, Tahiti, lower end of Punaruu Valley, Punaauia District, which is probably the same as *Setchell and Parks 70*, listed by Setchell (*Univ. Calif. Pub. Bot.* 12: 187, 1926) as *G. ramiflorum* is a poor specimen in our herbarium. This collection is certainly not *G. ramiflorum* and probably belongs to a glabrescent form of *G. taitense*. The blade itself is glabrous, but the midrib of the leaf is rather sparingly hispid-pubescent.

Glochidion vitiense (Mueller-Argau) Gillespie, B. P. Bishop Mus., *Bull.* 91: 17, 1932.

Phyllanthus vitiensis Muell.-Arg., *Flora* 48: 374, 1865; DC. Prodr. 15(2): 290, 1866.

Glochidion concolor obovatum Muell.-Arg., *Linnaea* 32: 63, 1863, new synonym.

Phyllanthus concolor obovatus Muell.-Arg., DC. Prodr. 15(2): 290, 1866, new synonym.

An isotype of variety *obovatum*, *Secmann 412*, is in our herbarium. This collection cannot be separated from the United States Exploring Expedition, Fiji, isotype of *G. vitiense*. *Gillespie 4411* is correctly determined and well figured (B. P. Bishop Mus., *Bull.* 91: fig. 18, 1932). However, in the ripening and ripe fruit, the styles tend to form a blunt and broadened nipple, usually darker in color than the surrounding epicarp, and not the narrowly columnar structure barely divergent at the apex shown by Gillespie in his figure 18, *f*.

Glochidion Christophersenii, new species (fig. 2, a, b).

Arbor in silvis udis montanis crescens, innovationibus gracilibus, firme lignosis, cortice brunneo conspicue cicatricoso-lenticellato. Foliis pro more generis parvis, glabris, 2-3.5 cm. longis, 1-1.5 cm. latis, valde anisomeris, fere cultriformibus, cuspidato-acuminatis, supra brunneis, subtus brunneo-olivaceis vel olivaceo-dicoloribus, venis primariis 6-8-jugis, patentibus, venis caeteris totis inconspicuis, petiolo vix 2 mm. longo, stipulis 1 mm. magnis vel minoribus nempe e cortice ipso rami editis, coriaceis. Inflorescentiis haud visis. Infructescentiis glaberrimis, fasciculatis, fructibus in axilla quave 2-4, pedicellis clavatis, sat gracilibus ca. 10 mm. longis, fructibus saepissime optime 4-locularibus, raro 5-locularibus, ca. 10 mm. crassis, 5-6 mm. longis, stylo erecto, integro, ca. 1.5-2 mm. longo, perianthii lobis (ut videtur) 6, ovatis costulatis, ad 0.75 mm. longis.

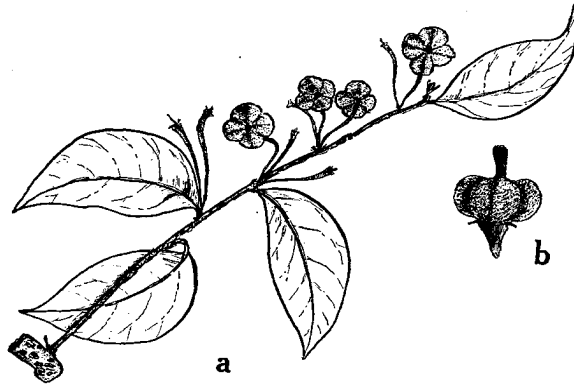


FIGURE 2.—*Glochidion Christophersenii*, new species: a, branchlet in fruit (type, no. 2134); b, nearly ripe capsule seen from side.

Savaii: above Matavanu, "tree in wet forest, alt. 1300 m., fruit red", type *Christophersen and Hume 2134*, July 24, 1931.

Christophersen lists this plant (*B. P. Bishop Mus., Bull. 128: 120, 1935*) as "*Glochidion* species", suggesting that it is undescribed. I agree with him, though the material is such that I am not certain whether *Phyllanthus* or *Glochidion* is involved. The latter seems to be the safer alternative, to judge from intangibles, but only the male flower may decide the issue. I find no species to which I can refer *G. Christophersenii* for a close comparison. The characteristic long, clavate pedicel of the fruit proves that this species cannot be related to *G. concolor* (= *G. ramiflorum* auct. saltem p.p.), *G. Grayanum*, *G. podocarpum*, and *G. Manono*. The wood is conspicuously and abundantly lenticelled, the leaves small and mostly subcultriform.

Genus **PHYLLANTHUS** Linnaeus

Phyllanthus pulcher Wallich ex Mueller-Argau, *Linnaea* 32: 49, 1863; DC. *Prodr.* 15(2): 421, 1866; Hooker f., *Fl. Brit. Ind.* 5: 301, 1887; Ridley, *Fl. Malay Pen.* 3: 201, 1924.

Rèidia glaucescens Miquel, *Fl. Ind. Bat.* 1(2): 374, 1855; Hooker f., *Bot. Mag.* 90: pl. 5437, 1864.

Faurie 482, 1909, "inter rudera" from Hilo, is a sterile specimen, but all its vegetative characters agree so well with those of good material of *P. pulcher* that it is doubtless that species. *P. pulcher* is a native to Malaysia proper but is cultivated throughout the Orient as an ornamental, and its occurrence in Hawaii as a ballast plant or as an escape is to be anticipated. So far, however, *P. pulcher* appears to be unrecorded in Polynesia, and *Faurie 482* has probably not been seen by Sherff, who lists (*Field Mus. Pub., Bot. Ser.* 17: 563-568) *Faurie 462, 484, 485, 489* that do not belong here.