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STUDIES OF THE EUPHORBIACEAE, PHYLLANTHOIDEAE II. THE AMERICAN SPECIES OF PHYLLANTHUS DESCRIBED BY LINNAEUS

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DURING THE COURSE of monographic studies of *Phyllanthus* L. and its near allies, it has become necessary to determine the identity of the species described by Linnaeus in order to typify the various genera. This is the more urgent, as the circumscription of a number of genera and subgenera in this subfamily will have to be modified. In this paper I wish to consider only those New World species of *Phyllanthus* described by Linnaeus and to correct, where possible, the misinterpretations they have undergone. The remainder of the Linnaean Phyllanthoideae offer their own special problems which will be dealt with later.

The investigation of the nomenclature of Linnaean *Phyllanthus* has been laborious, and the original draft of this paper could not have been written without the assistance of Drs. Richard A. Scott and Richard S. Cowan, who photographed and examined for me critical specimens at the British Museum of Natural History and at the Linnaean Society. Since then, with the cordial assistance of Mr. William Stearn and Mr. A. H. G. Alston of the British Museum and Mr. O'Grady of the Linnaean Society, I have been able to examine personally the collections in the herbaria of Linnaeus, Miller, Plukenet, and Sloane.

Linnaeus first referred to *Phyllanthus* in the "Systema Naturae" (ed. 1, 1735), where it appears as *Diasperus*, without a description. Otto Kuntze (Rev. Gen. 2: 599–601. 1891), following his extreme principle of strict priority, transferred some four-hundred-odd species of *Phyllanthus* to *Diasperus*, but this was rendered illegal by the decision of later botanical congresses to adopt the "Species Plantarum" as the starting date for genera. In the first edition of the "Genera Plantarum" (1737), Linnaeus adopted the name *Phyllanthus* and thereafter maintained it in the same sense.

In the "Hortus Cliffortianus" (1738) * appear for the first time three

* This book is dated "1737" on the title-page, but appears not to have been issued that year. Cf. Smith, Select. Corr. Linnaeus 2: 308 (1821), where Linnaeus in his

American species of *Phyllanthus*. The first species, which in the "Species Plantarum" (1753) appears as *P. epiphyllanthus* L., is the one from which Linnaeus took the generic name. The plant was first listed by Paul Hermann (Parad. Bat. Prodr. 365. 1689) * as *Phyllanthos americana planta, flores e singulis foliorum crenis proferens*. Linnaeus cited Hermann's work, but did not credit the genus to him in the "Genera Plantarum" (1737), perhaps because the latter did not provide a generic description.

Commelin (Hort. Med. Amstelodam. Rar. Pl. 199–200, *pl. 102*. 1697) provided an excellent illustration which leaves no doubt that the plant in question is the same as the one interpreted today as *P. epiphyllanthus*; the spirally arranged simple lanceolate phylloclades positively distinguish this species among the representatives of sect. *Xylophylla*. Furthermore, the specimen in the "Hortus Cliffortianus" Herbarium represents the same species, although it most likely was collected in the Bahamas, while Commelin's plant came from Puerto Rico.

Unfortunately, Linnaeus subsequent to 1738 obscured the circumscription of *P. epiphyllanthus* by including under it as synonyms several other distinct species of sect. *Xylophylla*. As we shall see, this excessive liberality in ascribing synonyms also led to difficulty with Linnaeus's other species of *Phyllanthus*. In the "Hortus Cliffortianus" only one of the eight synonyms cited, that of Sloane, represents a different element from *P. epiphyllanthus*; but when Linnaeus acquired Patrick Browne's Jamaican collections, he incorrectly incorporated both of Browne's species into his herbarium as *P. epiphyllanthus*. Since neither of these specimens had been seen by Linnaeus during the writing of the "Species Plantarum," the specimen in the "Hortus Cliffortianus" Herbarium must be regarded as the type.

Browne's erroneous description (Civ. Nat. Hist. Jam. 188. 1756) of his *Phyllanthus 1* was the cause of additional confusion, for he mistook the disk-segments of the female flower for anthers. Linnaeus, thus misled into thinking that the flowers of the Jamaican plant were hermaphrodite, established (Mant. 147. 1771) the new genus *Xylophylla* with its type species *X. latifolia* L. However, the specific name is superfluous and hence illegitimate, because Linnaeus cited *P. epiphyllanthus* as a synonym of it. It is clear from this and from Linnaeus's annotation of both of Browne's specimens that he considered all the American representatives of *Xylophylla* † to belong to a single species.

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letter to Haller of 3 January 1738 states: "Though the *Hortus Cliffortianus* has long been printed, it is not yet published, owing to the tardiness of the engravers." In his letter to Haller of March, 1738 (op. cit. 322), Linnaeus observes: "Mr. Cliffort does not intend writing till he can send you his *Hortus*, which I hope he will be able to do in a fortnight, or three weeks at longest."

* The Paradisi Batavi Prodromus follows the Schola Botanica (ed. Simon Warton) in the same volume which is paged continuously: Schola pp. 1–300, Paradisi pp. 301–386.

† Linnaeus included one other species, *Xylophylla longifolia*, based on the Moluccan *Xylophyllos ceramica* of Rumphius (Herb. Amb. 7: 19–20, *pl. 12*. 1755). Although it proved to be a species of *Exocarpus* (Santalaceae), this was the element from which Linnaeus adopted his generic name.

Swartz at first (Prodr. 28. 1788) accepted *Xylophylla* as a distinct genus, and due to Linnaeus's confused interpretation in the "Mantissa" was led to redescribe *P. epiphyllanthus* as a "new" species, *Xylophylla falcata* Sw. Later (Observ. Bot. 113. 1791) he recognized the confusion, and realigned the species with comparative success. He restricted the references of Commelin and Catesby to *X. falcata*, and those of Plukenet (Phytogr. *pl. 247, fig. 4.* 1692; Almagest. Bot. 154. 1696), Sloane (Nat. Hist. Jam. 80. 1707), and Browne to *Xylophylla latifolia*. Although he incorrectly referred some references to *X. angustifolia* Sw., this fortunately made no difference as far as later nomenclature is concerned. Swartz's revision, by removing all the extraneous elements, effectively typified *Xylophylla latifolia*. When he later (Flor. Ind. Occ. 1109. 1800) reduced *Xylophylla* to a synonym of *Phyllanthus* and transferred the species in question, the epithet *latifolia* was at last legitimized (according to present rules) in the combination *Phyllanthus latifolius* Sw.

As Fawcett and Rendle (Jour. Bot. **57**: 67. 1919) have pointed out, the typical element of *P. latifolius* Sw. must be the *Phyllanthus 1* of Browne; the holotype is therefore the Browne specimen in the Linnaean Herbarium. This species is characterized by female flowers with the disk divided into discrete segments, which were mistaken by both Browne and Swartz for stamens. However, in Mueller's revision of the Euphorbiaceae (DC. Prodr. **15**[2]: 431. 1866), *P. latifolius* is described as having a cupuliform disk as high as the ovary; but Mueller's description was based on a specimen of Swartz in the Stockholm herbarium, not on Browne's collection. At this writing I have before me Swartz's specimens from the Riksmuseum, Stockholm; there are three sheets labelled *Phyllanthus* (or *Xylophylla*) *latifolia*, but only one label is written in Swartz's hand. The other two specimens are in the hand of Wikstroem, and it is these which represent the different species interpreted by Mueller as *P. latifolius*. It seems evident that Mueller was misled by some confusion in labelling in the Swartzian herbarium, and that Fawcett and Rendle were correct in considering Mueller's plant as an undescribed species, which they named *P. swartzii* Fawc. & Rend. Unfortunately, they overlooked the previously published *P. swarzii* Kostel. (Allgem. Med. Pharm. Fl. 1771. 1836), based on an entirely different species in sect. *Phyllanthus* which was also collected in Jamaica by Swartz.

The plant confused by Mueller and renamed by Fawcett and Rendle represents a population confined to the hills of western Jamaica, between Dolphin Head and the Cockpit Country, but perhaps extending to near the coast.* Its incrassate floral receptacles, urceolate female disk, and stylar column as high as the ovary make it a morphologically very distinct entity. In many respects, indeed, it approaches *P. coxianus* Fawc. & Rend., from St. Ann and Trelawney parishes, which has brilliant red flowers of similar aspect and is vegetatively very similar as well. But on the basis

* In addition to the two sheets in the Riksmuseum there is also a specimen in Herb. Mus. Brit. labelled "Jamaica. Seacoast. Dr. Swartz." Evidently Swartz confounded this plant with true *P. latifolius* on the basis of its close vegetative resemblance.

of our present knowledge, the morphological discontinuity being so profound, the population in question seems best designated in the rank of species. Because of the preoccupation of name mentioned above, it is here designated as **Phyllanthus dingleri** (nom. nov.: *P. swartzii* Fawc. & Rend. Jour. Bot. 57: 67. 1919; non *P. swarzii* Kostel., 1836), in honor of Hermann Dingler (1846–1937), whose exhaustive researches on the morphology of sect. *Xylophylla* are eminently deserving of recognition.

With this perhaps over-lengthy discussion we have covered the history of *P. epiphyllanthus* L. and its literary offspring. One more point must still be mentioned. As noted above, the name *Phyllanthus* was first applied in 1689 by Hermann (as *Phyllanthos*) to *P. epiphyllanthus*, doubtless because the floriferous phylloclades appeared to be leaves with flowers in marginal notches. It might be supposed, therefore, that *P. epiphyllanthus* would be the type of the genus. This is a matter of some importance, because the phylloclade-bearing species have even in recent times occasionally been considered as constituting a distinct genus *Xylophylla* (e.g., L. H. Bailey, New Man. Cult. Plants). *Xylophylla latifolia* L. has already been shown to be based on the same type as *P. epiphyllanthus* L., so that if the latter species is considered the type of *Phyllanthus*, *Xylophylla* must be rejected as a superfluous and illegitimate name.

Hitchcock and Greene, in their compilation of "Species Lectotypicae Generum Linnaei" (Brittonia 6: 114. 1947) selected *Phyllanthus niruri* L. as the type of the genus. While their decision was likely purely arbitrary, it is supported by a critical study of Linnaean literature. In the first edition of the "Genera Plantarum" (1737, p. 282) Linnaeus noted that the floral characters were provided by *Niruri* (= *P. niruri* L.), although the name of the genus was taken from *P. epiphyllanthus*. Since for Linnaeus, floral characters always took precedence over vegetative ones in the definition of genera, it would seem only logical to fix on *P. niruri* as the type. His removal of *P. epiphyllanthus* to a separate genus *Xylophylla* even more obviously points to the same conclusion.

The matter, however, is not settled with the choice of *P. niruri* L. as the generic type. This species, as it happens, has been consistently misinterpreted by subsequent authors, the "Phyllanthus niruri" of recent floras and manuals almost invariably being one or more species different from the plant described by Linnaeus. The confusion is perhaps best documented in the treatment given the name by Mueller Argoviensis (DC. Prodr. 15[2]: 406. 1866). Here *P. niruri* is interpreted as composed of six varieties; actually, these entities represent five distinct species, no one of which is the *P. niruri* of Linnaeus!

Mueller (loc. cit.) noted under *P. niruri* β *genuinus* that he had seen an authentic specimen in the Linnaean Herbarium, but the specimen annotated "Niruri" in the Linnaean Herbarium (sheet 1105–2) obviously represents a different species from *P. niruri* sensu Mueller. The narrow, almost acicular, stipules of the plant are quite unlike the broader lanceolate ones of the plant mistaken for *P. niruri* by Mueller. The specimens in the Hortus Cliffortianus and Hortus Upsaliensis Herbaria are obviously con-

specific and even have the appearance of duplicates that were collected at the same time. When this is taken into account together with Linnaeus's description of the position of the sexes (Hort. Upsal. 282. 1748), there can be little doubt as to the plant described by Linnaeus as *Phyllanthus niruri*; it is the West Indian form of the widespread New World species currently passing as *P. lathyroides* H.B.K.

Research into the original citations given by Linnaeus in the "Hortus Cliffortianus" has made it possible to unravel some of the mystery surrounding the species. The specific epithet *niruri* was based, as was Linnaeus's wont, on a generic name: *Niruri*. First published by Rheede tot Draakestein (Hort. Malabar. 2: 45, *fig. 27*. 1679 [misquoted by Linnaeus as vol. 10, *fig. 27*]), it was adopted by Martyn (Hist. Pl. Rar. *pl. 8*. 1728) as the generic name for a West Indian species. Martyn's plant, splendidly illustrated in the first color-printed botanical book, bore the name *Niruri barbadense . . . petiolis florum brevissimis*. This name actually was originated by Isaac Rand in a list of plants presented to the Royal Society from the Chelsea Gardens by the Company of Apothecaries (Trans. Roy. Acad. 35: 293–296. 1727). Linnaeus's use of the epithet *niruri* and his assignment of the species to Barbados (with only a questionable reference to Malabar) plainly indicates that in the "Hortus Cliffortianus" he was describing the plant of Martyn and of Rand. In the preface of that work he acknowledges the receipt of tropical American plants from Philip Miller, and he may have obtained *P. niruri* in 1736 when he visited Miller at the Chelsea Gardens.*

The confusion which has attended the name *P. niruri* to the present day is due in large part to Linnaeus's inclusion under it of synonyms which actually belong to different species. His remark following the listing of the species in the "Hortus Cliffortianus" explains his attitude: "Variat foliorum figura & magnitudine, hinc plure tenentur species quam re ipsa sunt." Linnaeus would in this instance have done well to heed the advice of Haller (letter of 17 Oct. 1748, transl. Smith, Select. Corr. Linnaeus 2: 431. 1821): "Do not strike out species, and reduce them to varieties, so frequently as you are accustomed . . . I cannot, without concern, see good and genuine plants perish, as it were, and become lost to botanists, under the title of varieties."

Haller's warning was prophetic as far as concerns *P. niruri*, for the overly broad concept adopted by Linnaeus has led subsequent botanists to place at least a dozen different herbaceous species of *Phyllanthus* under this one name. Linnaeus's indication of range in the "Species Plantarum" of 1753 as merely "in Indiis" certainly encouraged these later misidentifications. In fairness to Linnaeus, however, it should be made clear that not

* Rand's comment on the plate of *P. niruri* in his review of Martyn's "Historia Plantarum Rariorum" (Trans. Roy. Acad. 36: 5. 1729) would indicate that Martyn's plant was the one from the Chelsea Gardens. Furthermore, Rand's specimen and a duplicate sheet with the notation "Herbar Miller" are preserved in Herb. Mus. Brit. Evidently, therefore, Martyn, Rand, Miller, and Linnaeus all were dealing with duplicates or descendants of the same stock in the Chelsea Gardens.

only are some of the relatives of *P. niruri* "cryptic" species which are superficially very similar, but also some of these weedy species appear to have very early been carried from one hemisphere to the other. Consequently, references in the "Species Plantarum" to illustrations of Plukenet, Rheede, et al., may be meaningless unless the specimens from which the illustrations were taken happen to be still in existence. For example, Linnaeus singled out the drawing by Plukenet (Phytogr. *pl. 183, fig. 5*) as "good" for *P. niruri*; but an examination of Plukenet's specimens * shows that the plant is poorly depicted in the drawing and certainly is not the species which Linnaeus had before him when writing the account in the "Hortus Cliffortianus."

The treatment of *P. niruri* by Mueller must now be gone into more thoroughly, since his work has been followed by the majority of later workers. I have already pointed out that the plant designated by Mueller as *P. niruri β genuinus* is not the same species as *P. niruri* L.; the latter differs from Mueller's plant by its much narrower and longer stipules, unisexual cymules, and verruculose rather than striate seeds. Yet Mueller claimed (DC. Prodr. 15[2]: 406. 1866) to have seen an authentic specimen in the Linnaean Herbarium. The sheet which is obviously true *P. niruri* (1105–2) was annotated as such by Linnaeus; but there is one specimen among the Linnaean collection which represents *P. niruri* sensu Mueller. It is on the right-hand side of sheet 1105–5; but the left-hand specimen is *P. urinaria* L. and the sheet is pinned to sheet 1105–4, which is also *P. urinaria*, and annotated as such by Linnaeus. It seems probable, therefore, that the plant which Mueller equated with *P. niruri* was considered by Linnaeus to be only a form of *P. urinaria*. It is consequently difficult to understand why Mueller ignored sheet 1105–2, plainly marked as *Niruri*.

The result of Mueller's misinterpretation has been a curious duplex adaptation of the name *P. niruri*. The plant originally introduced into the Chelsea Gardens and given to Linnaeus by Miller appears to have been distributed to several different botanical gardens under the correct name. Thus when Pax illustrated *P. niruri* from a living plant in the first edition of the "Natürlichen Pflanzenfamilien" (3[5]: *fig. 14*. 1890), the plant was correctly identified; but the vast majority of the dried specimens in the Berlin herbarium under that name were doubtless misidentified, as they were everywhere else. Most of these mislabelled specimens represent a single weedy species, which has become circumtropical, in contrast to the strictly American *P. niruri*.

We now have to determine the correct name of this usurper which Mueller designated as *P. niruri β genuinus*. The first post-Linnaean author

* There are in Plukenet's Herbarium, which is incorporated in Herb. Sloane at Herb. Mus. Brit., two collections associated with plate 183, fig. 5 of the "Phytographia." The first, vol. 92 p. 173, which bears the legend "ex Coromandel," is of special interest in indicating that this West Indian species, *P. amarus* Schum. & Thon., had reached India before 1690. The second, vol. 96 p. 46, is also *P. amarus*; Plukenet appears not to have had true *P. niruri* L.

to deal critically with the identity of *P. niruri* was F. K. Medicus, who in his monograph of the Malvaceous Alliance (1787) published the name *Urinaria erecta*, apparently based on John Burman's *Urinaria indica, erecta, vulgaris* (Thes. Zeyl. 230. 1737). The identity of Burman's plant is uncertain,* but in any event *Urinaria erecta* Medic. is not Mueller's plant, as is evident from Medicus's earlier description (Bot. Beobacht. 263. 1783) of the inflorescence and flowers. In fact, in the earlier reference Medicus called his plant *P. niruri*, and — judging from his description — correctly so. Since Medicus proposed *Urinaria erecta* as a deliberate substitution for *P. niruri* L. (he said he was "restoring the older name,") his name is not only synonymous but also superfluous and hence illegitimate.

Recently, when dealing with the herbaceous species of sect. *Phyllanthus* for the West Indies (Contr. Gray Herb. 176: 53. 1955), I thought that the two species confused under the epithet *niruri* had been first distinguished by Kosteletzsky (Allg. Med. Pharm. Fl. 1771. 1836). Following his description of *P. niruri*, to which are correctly ascribed male flowers "unten und gepaart" and female "oben und einzeln," he added:

"In Jamaika findet sich eine sehr ahnliche Art: *Ph. Swarzii.* (Ph. Niruri. Sw.) welche jedoch nur einzelne Blüthen in den Blattachseln (die ♂ und ♀ gemengt unter einander) und 5-theilige Kelche besitzt."

The new species was presumably based on Swartz's description of "Phyllanthus niruri" in his "Observationes Botanicae," pp. 354–355 (1791); there is no way of being sure if Kosteletzsky saw a specimen of Swartz. In Swartz's herbarium in the Riksmuseum, Stockholm, there are a number of sheets annotated by him or by some of his colleagues as *P. niruri*. No less than three species are represented, but only one of these has the flowers arranged in the manner which fits the descriptions of Swartz and Kosteletzsky. This species is the one designated by Mueller as *P. niruri β genuinus*, and I therefore (loc. cit.) adopted *P. swarzii* Kostel. as the correct name for the plant.

However, since then and while studying the collections in Herb. Kew, I have discovered that Kosteletzsky's proposed species had been anticipated by the *P. amarus* of Schumacher and Thonning (Beskr. Pl. Guin. 2: 195–196. 1829), based on a type from West Africa which I had not examined. I had partially been misled by the fact that Mueller (DC. Prodr. 15[2]: 407. 1866) associated *P. amarus* with *P. debilis* Willd., a very different species. However, drawings and observations of the type specimen (in Herb. Copenhagen) made by Brenan and deposited in Herb. Kew, together with his excellent published discussion (Kew Bull. 1950: 215–218. 1950),

* Burman's second species, *Urinaria zeylanica repens cauliculis rubentibus* (op. cit. 231) is represented in Herb. Hermann (BM) by three specimens on the following sheets: vol. 2, p. 7; vol. 3, p. 55; vol. 4, p. 41. These, and illustrations nos. 11 and 429 of Hermann's "Icones" (also in Herb. Mus. Brit.), certainly represent *P. urinaria* L. But there appear to be no specimens of *Urinaria indica, erecta, vulgaris*; and of the two Icones supposed to refer to this species, no. 53 appears to be a *Breynia*, while no. 56 suggests the widespread weedy species of sect. *Menarda*, *P. tenellus* Roxb. The illustration in the "Thesaurus" represents a different herbaceous species which could be *P. amarus* but whose exact identity must remain in doubt.

leave no doubt as to the identity of the species in question. Brenan's description of the unisexual cymules — which Schumacher and Thonning, like Kosteletzsky, recognized as a chief distinguishing character of the species — clearly indicates that *P. niruri β genuinus* Muell. Arg. and *P. swarzii* Kostel. are synonyms of *P. amarus* Schum. & Thon. It is to this last species that many, perhaps most, of the Old-World records of "Phyllanthus niruri" must be referred.

As previously mentioned, the true *P. niruri* L. is native of and restricted to the New World. There is every reason to believe that *P. amarus* is also natively an American species, although it (as "Phyllanthus niruri") has in many floras been indicated as native to the Old World. The closest relative of *P. amarus*, however, is certainly *P. abnormis* Baill., a plant confined to sandy areas in Texas and Florida which has the same flower-arrangement and differs only in its perennial habit and larger fruit. It is therefore most likely that *P. amarus* originated in the Caribbean area as a vicarious species of *P. abnormis* of the southern U. S., but was in early colonial days spread around the tropics by trading vessels.

On the other hand, as is the case with several other American species, *P. amarus* shows a rather close relationship to one Old World species.* This plant, which was designated by Mueller (Linnaea 32: 43. 1863) as *P. niruri β scabrellus*, is superficially so like *P. amarus* that the two have almost invariably been confused. In my recent consideration of the West Indian species (Contr. Gray Herb. 176: 53. 1955), I applied the new specific name *P. fraternus* to this plant, which appears to be originally native to Pakistan and India but which has appeared in a few widely-scattered localities in the West Indies. However, while making a routine survey of the collections in Herb. Kew, I discovered that Hutchinson had already in 1920 independently described this species from a South African collection as *P. asperulatus* Hutch.; this well demonstrates how difficult it is, despite the greatest precautions, to establish and define specific names in this complex of widely and capriciously distributed weeds.

In order to finish this detective story of what happened to *P. niruri*, we now have to return to *P. niruri* sensu Swartz (Obs. Bot.). Swartz's description has been shown to have served as the basis for *P. swarzii* Kostel., but this disposes of only one of the three elements included therein. The erratic C. S. Rafinesque now enters upon the stage, for he also based a new species on *P. niruri* sensu Sw. in his "revision" of *Phyllanthus* (Sylva Tellur. 91–92. 1838). In Rafinesque's own words, his attempt "must be deemed very imperfect"; one can surmise from such uncharacteristic modesty that this is an understatement. The "revision," in fact, reveals a shocking lack of taste and judgment even for Rafinesque, and one can understand why it was ignored *in toto* by Mueller.

Nevertheless, there is one passable specific description in the article,

* As examples may be adduced the evident close relationships of *P. niruri* and *P. stipulatus* with *P. benguelensis* and *P. microphyllinus*, respectively, both the latter from west Africa.

under the genus *Moeroris* (taken from Rumphius's name for some herbaceous species of *Phyllanthus*):

"MOERORIS Raf. diff. cal. 5phyl. glandulis 5 ad basis, caps. 3loc. 6valv. . . *Moeroris stipulata* Raf. Phyll. niruri, Swartz. Herbacea, foliolis obl. glaucis subsess. stipulis 2 geminatis coloratis, fl. axil. ped. nutantib. — Mts. of Jamaica."

As with Kosteletzsky's description, so this too appears to be taken from the treatment in the "Observationes Botanicae." But the details specified by Rafinesque — "stipulatis 2 geminatis coloratis" and "Mts. of Jamaica" — effectively eliminate two of the three elements in the Swartzian concept. Kosteletzsky's plant, (*P. amarus*) is rather unusual among the West Indian herbaceous species in having stipules which are *not* at all reddish-tinged; and the third element, which according to Swartz (loc. cit.) was collected on Hispaniola, proves to be *P. fuertesii* Urb., a species which does not occur in Jamaica. This leaves as representing Rafinesque's name the plant with reddish stipules and the flower arrangement (though not the seeds) of *P. niruri* L. It is the widespread species of swampy habitats in tropical America which at present goes under the name of *P. diffusus* Kl. This species must now be known as *P. stipulatus* (Raf.) Webster (Contr. Gray Herb. 176: 53. 1955).

No doubt it may appear unusual and even undesirable that two different species should both be based on *P. niruri* sensu Sw., but the application of modern principles of typification leads irresistibly to this conclusion. In a sense, the species of both Kosteletzsky and Rafinesque may be said to have been established by "blind luck," for it is quite possible that both authors merely pilfered from Swartz's description without seeing any specimens. But in evaluating their proposed names we must give these authors the benefit of the doubt, particularly since their names can be associated with definite specimens.

The history of the first two species described in the "Hortus Cliffortianus" having been followed out to what may appear painful lengths, we have to consider the third species, *P. grandifolius* L., which has been as badly misinterpreted as *P. niruri*. Linnaeus's original description (Hort. Cliffort. 439) is brief:

3. PHYLLANTHUS caule arboreo, foliis ovatis obtusis integerrimis. Niruri arborescens, foliis singularibus subrotundis & subtus incanis, fructo maximo. *Houst. mss. Crescit in* America, *communicata per Millerum. Folia magnitudine palmi, subtus glauca.*

Even from this short description, it is easy to guess what species is indicated, and this is confirmed by examination of the specimen in the Hortus Cliffortianus Herbarium. It consists of a sterile branch mounted with Houston's manuscript label, and is obviously the species which was described in 1817 from a Campeche collection as *P. glaucescens* H.B.K.

Some generally overlooked additional information about *P. grandifolius* is furnished by Philip Miller (Gard. Dict. ed. 8. 1768), who redescribed the same plant,* apparently having overlooked Linnaeus's account:

* There is in Herb. Mus. Brit. a sheet of *P. grandifolius* with the MS label: "Niruri

3. ANDRACHNE (*Arborea*) foliis ovatis obtusis, subtus incanis, caule arboreo. . . discovered by the late Dr. William Houston, growing naturally at Campeachy. . .

This clears up the mystery of *Andrachne arborea* Mill., a name which Mueller overlooked and which Pax and Hoffmann (Pflanzenr. IV. 147. XV.: 178. 1922) were unable to place, remarking it as "vix recognoscenda et omnino dubia."

Mueller Argoviensis unfortunately brought the application of *P. grandifolius* into serious confusion by applying the name to an entirely different plant from the West Indies, which does not occur in Mexico or Central America. This West Indian plant had been described by Willdenow (Enum. Pl. Hort. Berol. Suppl. 64. 1813) as *P. juglandifolius*. Willdenow gave as a synonym "Phyllanthus grandifolius *Hortul.*," indicating that the plant had acquired this name while in cultivation. Herbarium sheets of the species collected from various European botanic gardens in the early nineteenth century often bear this name, which was simply a misidentification.

Since Willdenow's name was accepted for the West Indian plant by Grisebach (Pl. Wright. 1: 158. 1860) and Baillon (Adansonia 1: 38–39. 1860–61) not long before Mueller's revision, it is difficult to see what led to the latter's erroneous application. Even if Mueller did not look at the original description in the "Hortus Cliffortianus," an attentive reading of the passage in the "Species Plantarum" should have sufficed to show that Linnaeus was not dealing with the West Indian plant. The phrase "foliis ovatis obtusis integerrimis" clearly sets the plant off from the other five species included in *Phyllanthus*, all of which (except possibly *P. maderaspatensis*) Linnaeus considered to have either pinnate or crenate leaves. As is suggested by Willdenow's choice of the epithet *juglandifolius*, the West Indian plant would certainly have been considered pinnate-leaved by Linnaeus.

There can be no doubt, therefore, that *P. juglandifolius* Willd. is the name which must be applied to the West Indian species called *P. grandifolius* γ *genuinus* by Mueller. The plant interpreted by Mueller as *P. glaucescens* H.B.K. must be called *P. grandifolius* L. Although a number of species closely related to *P. glaucescens* have been described, it is highly probable that that species is a positive synonym of *P. grandifolius* L., for both were collected from the same region, and the type specimen in the Hortus Cliffortianus Herbarium closely resembles typical material of *P. glaucescens*.

The impression which remains from this excursion into the Augean stables of nomenclature is that the typification of Linnaean species was not considered very seriously by Mueller, or most of the authors succeeding him. The interpretations adopted here are those which fix the Linnaean

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fructo maximo Houst. ms. 159. Campeachy, Houston." This sheet, presumably from Herb Miller, is evidently a duplicate of that in the Hortus Cliffortianus Herbarium, so that Miller's and Linnaeus's species are exact synonyms.

names to the plants actually familiar to Linnaeus himself. It must be admitted, of course, that this is possible chiefly because authentic specimens are available in the various Linnaean herbaria; it would have been impossible, in the instance of *P. niruri*, ever to have untangled the confusion on the basis of the illustrations cited by Linnaeus and later authors.

Svenson (Rhodora 47: 388. 1945) has pointed out that the Linnaean species is an aggregate — often of several different species by modern standards — based on descriptions, plates, dried specimens, and living plants. He concludes that since "all synonyms seem to have been of equal value . . . selection of a representative element for each species would seem largely dependent on usage." The involved discussions in the present paper certainly illustrate how much caution should be exercised in selecting "representative elements," but I cannot agree that "usage" is the touchstone to solve the problem. In fact, the dangers attendant on typifying species through "usage" are very great; it was exactly by such an adoption of usage that Mueller made such serious errors in interpreting two of Linnaeus's three American species of *Phyllanthus*. When, as in the nomenclatural history of *P. niruri*, usage is so ill-informed and remote from biological reality, it is futile to expect that it can provide any stability. The only positive course to follow in interpreting Linnaean species is to determine which of the elements of the species were personally familiar to that author and, wherever possible, to designate a particular specimen as holotype. Even though this may not always be possible, taxonomists should attempt to reduce the chaos as much as possible.

SUMMARY

Linnaeus in the "Hortus Cliffortianus" described three American species of *Phyllanthus* which in the "Species Plantarum" became *P. epiphyllanthus*, *P. niruri*, and *P. grandifolius*. Material of the latter two species was probably given to Linnaeus by Philip Miller, of the Chelsea Gardens; and Linnaeus was familiar with *P. niruri*, at least, from living specimens. Linnaeus took the generic name from Hermann's original citation of *P. epiphyllanthus*, but based the generic character on the flower of *P. niruri*. The latter species is therefore the generic type.

Linnaeus confused the application of *P. epiphyllanthus* by erroneously including with it some distinct species collected in Jamaica by Patrick Browne, and redescribed the entire ensemble as a new genus and species *Xylophylla latifolia*, because of a misinterpretation of Browne's floral description. Olaf Swartz, though still misinterpreting the flower structure, nevertheless reduced *Xylophylla* to the synonymy of *Phyllanthus* and redefined *P. epiphyllanthus* and *P. latifolius*. The latter species was misconstrued by Mueller Argoviensis, who confounded it with an undescribed species of Swartz finally established as *P. swartzii* Fawc. & Rend.; the latter name being preoccupied, *P. dingleri* Webster is proposed in its stead.

Linnaeus's *P. niruri*, though well defined in the "Hortus Cliffortianus," became confused owing to his erroneous conclusion of other species as

synonyms, and to later misidentifications by subsequent authors. The commonest weedy species so mistaken for *P. niruri*, by Mueller and others, was defined as *P. swarzii* by Kosteletzsky in 1836, based on the *P. niruri* of Swartz; but the earliest name for it appears to be *P. amarus* Schum. & Thon., as established by Brenan. Another weedy species also often confounded with *P. niruri*, was — by a curious coincidence — also based on Swartz's *P. niruri* by Rafinesque. Rafinesque's epithet having priority over the generally accepted *P. diffusus* Kl., the species in question must be known as *P. stipulatus* (Raf.) Webster.

Linnaeus's *P. grandifolius*, based on a collection of William Houston from Campeche, became confused owing to the name being misapplied to a very different West Indian species. The latter, *P. juglandifolius* Willd., was correctly interpreted until the monograph of Mueller Argoviensis, who adopted the prevalent horticultural misidentification and called Willdenow's plant *P. grandifolius*. The latter name must now be adopted for the plant currently passing as *P. glaucescens* H.B.K., and Willdenow's name readopted.

It is concluded that Svenson's appeal to "usage" as the determining factor in typifying Linnaean species is futile, and that the only practicable course is to fix the names on actual specimens, if at all possible.

NOMENCLATURAL RESUME *

Phyllanthus epiphyllanthus L. Sp. Pl. 981. 1753.

Phyllanthos americana planta, flores e singulis foliorum crenis proferens Herm. Par. Bat. Prodr. 365. 1689; Commelin, Hort. Med. Amst. Rar. Pl. 199–200, *fig. 102*. 1697; Catesb. Nat. Hist. Carol. 26, *pl. 26*. 1725 [*Catesby* (BM)].

Phyllanthos Americana angustiora & longiori ramosa &c. Pluk. Phytogr. 3: *pl. 247, fig. 4*. 1692 [Herb. Sloane 97: 100; 101: 106 (BM)].

Phyllanthus foliis lanceolatis serratis: crenis floriferis L. Hort. Cliffort. 439. 1738 (excl. ref. Sloane & Plukenet) [Herb. Hort. Cliffort. (BM)].

Xylophylla latifolia L. Mant. Alt. 221. 1771 (ex. p., excl. ref. Browne); non *X. latifolia* Sw.

Xylophylla falcata Sw. Prodr. 28. 1788 [*Swartz* (S, HOLOTYPE)].

Phyllanthus falcatus Sw. Fl. Ind. Occ. 2: 1115. 1800.

Xylophylla epiphyllanthus (L.) Britton in Small, Fl. Florida Keys 76. 1913.

Exocarpus epiphyllanthus (L.) Merr. Interpr. Rumph. Herb. Amb. 208. 1917.

Phyllanthus latifolius Sw. Fl. Ind. Occ. 2: 1109. 1800.

Hemionitidi affinis Americana epiphyllanthos &c. Pluk. Phytogr. 1: *pl. 36, fig. 7*. 1691 [Herb. Sloane 90: 51 (BM)].

* The references in brackets indicate the herbarium material examined by me on which the descriptions, and often the illustrations, are based. The numbers of Herb. Sloane refer to the volume and page numbers of this large herbarium, which is bound in folios and kept in separate cabinets in Herb. Mus. Brit. The abbreviations otherwise are the standard ones of Lanjouw and Stafleu. The synonymy does not purport to be complete; only the older names or those specially relevant are cited.

Lonchitidi affinis arbor anomala folio &c. Sloane, Cat. Pl. Jam. 16. 1696; Nat. Hist. Jam. 1: 80. 1707 [Herb. Sloane 1: 62 (BM)].

Phyllanthus 1. Foliis latioribus utrinque acuminatis &c. Browne, Civ. Nat. Hist. Jam. 188. 1756 [Herb. Linn. 1105–1 (LINN)].

Xylophylla latifolia L. Mant. Alt. 221. 1771 (as to the plant of Browne only); Sw. Prodr. 28. 1788; Obs. Bot. 113. 1791.

Phyllanthus isolepis Urb. Symb. Ant. 3: 290. 1902 [Ferry Pen, Jamaica, *Campbell 6280* (NY, fragment of type)].

Phyllanthus dingleri Webster, nom. nov. [Jamaica, *Swartz* (S, HOLOTYPE; BM, ISOTYPE)].

Phyllanthus latifolius sensu Muell. Arg. in DC. Prodr. **15**(2): 431. 1866; non Linnaeus nec Sw.

Phyllanthus swartzii Fawc. & Rend. Jour. Bot. **57**: 67. 1919; non *P. swarzii* Kostel., 1836.

Phyllanthus niruri L. Sp. Pl. 981. 1753 [Herb. Linn. 1105–2 (LINN)].

Niruri barbadense. . . petiolis florum brevissimis Rand, Trans. Roy. Soc. **35**: 295. 1727 [ex Chelsea Garden (BM)]; Martyn, Hist. Pl. Rar. *pl. 8.* 1728.

Phyllanthus foliis alternis alternatim pinnatis &c. L. Hort. Cliffort. 439. 1738 (excl. ref. Burm. & Rheede) [Herb. Hort. Cliffort. (BM, HOLOTYPE of *P. niruri*)].

Phyllanthus lathyroides H.B.K. Nov. Gen. & Sp. **2**: 110. 1817 [Herb. Humboldt (P, type collection)].

Phyllanthus purpurascens H.B.K. ibid. [Herb. Humboldt (P, type collection)].

Phyllanthus chlorophaeus Baill. Adansonia **1**: 27. 1860–61. [Mexico, *Jurgensen 858* (G, HOLOTYPE)].

Phyllanthus amarus Schum. & Th. Kongl. Danske Vidensk. Selsk. Skr. **4**: 195–196. 1829 * [type fragment ex Herb. Copenhagen & drawings of floral details by Brenan (K)].

Fructiculus capsularis, hexapetalis &c. Pluk. Phytogr. **3**: *pl. 183, fig. 5.* 1692 [Herb. Sloane 92: 173; 96: 46 (BM)].

Phyllanthus niruri sensu Sw. Obs. Bot. 354–355. 1791 (ex p.).

Phyllanthus swarzii Kostel. Allgem. Med. Pharm. Fl. 1771. 1836 [Jamaica, *Swartz* (S, HOLOTYPE)].

Phyllanthus niruri β genuinus Muell. Arg. in DC. Prodr. **15**(2): 406. 1866; et auct. seq., non *P. niruri* L.

Phyllanthus nanus Hook. f. Fl. Br. Ind. **5**: 298. 1887 [Burma, *Griffith* (K, HOLOTYPE)].

Phyllanthus stipulatus (Raf.) Webster, Contr. Gray Herb. **176**: 53. 1955.

Phyllanthus niruri sensu Sw. Obs. Bot. 354–355. 1791 (ex p.).

Moeroris stipulata Raf. Sylva Tellur. 91–92. 1838 [Jamaica, *Swartz* (S, HOLOTYPE)].

* This is often cited as "Beskr. Guin. Pl.", a separately issued reprint usually considered as dating from 1827, but fide Fl. Males. (**4**: ccii. 1954) appearing in 1829.

Phyllanthus diffusus Klotzsch, Bot. Voy. Herald 105. 1853 [Panama, *Seemann 198* (K, HOLOTYPE)].

Phyllanthus asperulatus Hutch. Kew Bull. 1920: 27–28. 1920 [Transvaal, *Schlechter 11866* (K, HOLOTYPE)].

Phyllanthus niruri β scabrellus Muell. Arg. Linnaea **32**: 43. 1863; not *P. scabrellus* Webb, as to type.

Phyllanthus fraternus Webster, Contr. Gray Herb. **176**: 53. 1955 [Punjab, *Thomas Thomson* (K, HOLOTYPE)].

Phyllanthus grandifolius L. Sp. Pl. 981. 1753 (as *P. grandifolia*).

Phyllanthus caule arboreo, foliis ovatis obtusis integerrimis L. Hort. Cliffort. 439. 1738 [Herb. Hort. Cliffort. (BM)].

Andrachne arborea Miller, Gard. Dict. ed. 8. 1768 ["Campeachy," *Houston* (ex herb. Miller, BM)].

Phyllanthus glaucescens H.B.K. Nov. Gen. & Sp. **2**: 115. 1817 [Campeche, Herb. Humboldt (P, type collection)].

Phyllanthus juglandifolius Willd. Enum. Pl. Hort. Berol. Suppl. 64–65. 1813 [Herb. Willdenow (B, HOLOTYPE)].

Phyllanthus grandifolius sensu Poir. Encycl. Method. **5**: 296. 1804; et auct. seq., non L.

Agyneia berterii Spr. Syst. Veg. **3**: 19. 1826 [Puerto Rico, *Bertero* (P)].

Phyllanthus quinquefidus Sessé & Moc. Fl. Mex. 212. 1894 [*Sessé et al.*, Pl. Nov. Hisp. (F, type collection)].

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