

TAXONOMIC AND NOMENCLATURAL CHANGES IN AMERICAN EUPHORBIACEAE SENSU LATO

Grady L. Webster¹
Herbarium, Section of Plant Biology
University of California, Davis 95616

ABSTRACT. Name changes of species in genera of Euphorbiaceae sensu lato affected by revisions of genera and suprageneric taxa are documented. The genus *Reverchonia* (Phyllanthoideae-Phyllanthae) is reduced to a section of *Phyllanthus*, and a new name, *Phyllanthus warnockii*, is provided for *Reverchonia arenaria*. In the Acalyphoideae-Plukenetieae, the genus *Bia* is recognized as separate from *Tragia*, with two sections, *Bia* and *Zuckertia*; several new combinations are proposed: *Bia cordata*, *B. fallax*, and *B. fendleri*. In the Crotonoideae-Codiaeae, *Anomalocalyx* is reduced to a synonym of *Dodecastigma*, and its single species is now named *Dodecastigma uleana*. In the Euphorbioideae-Hureae, *Tetraplandra* is accommodated in *Algernonia* as subgenus *Tetraplandra*, and the species are transferred to *Algernonia*: *Algernonia amazonica*, *A. bahiensis*, *A. dimitrii*, *A. kuhlmannii*, *A. leandrii*, and *A. riedelii*.

During a review of the genera and suprageneric taxa of Euphorbiaceae sensu lato it has become evident that a large number of taxonomic and nomenclatural changes are necessary. These changes, which include both the relegation and resurrection of genera, necessitate new combinations or new names for species in some of the genera affected. The sequence of genera follows that of Webster (1994).

PHYLLANTHOIDEAE-PHYLLANTHEAE

Phyllanthus section **Reverchonia** (A. Gray) G. L. Webster, stat. nov. *Reverchonia* A. Gray, Proc. Amer. Acad. Arts 16: 107. 1880.—TYPE: *Reverchonia arenaria* A. Gray [= *Phyllanthus warnockii* G. L. Webster].

In his description of *Reverchonia*, Gray (1880) noted “The relationship of this plant to *Phyllanthus* is so close that were it not for a combination of characters, it might be taken for aberrant *Phyllanthus*.” Johnston and Warnock (1963) were emphatic in questioning its generic distinctness. In the same year, Webster and Miller (1963) published a detailed study of *Reverchonia* and noted a number of morphological similarities to *Phyllanthus*. We pointed out in particular that the basic chromosome number of 8 suggested an affinity with *Phyllanthus* subg. *Isocladius*. Although I previously (Webster 1994) maintained *Reverchonia* as distinct, because “it would appear excessively foreign if placed in that genus,” further consideration leads me to conclude that maintaining it as a distinct genus would make *Phyllanthus* even more paraphyletic than it already is. In addition, molecular phylogenetic studies clearly demonstrate that *Reverchonia* is nested within *Phyllanthus* (Kathriarachchi et al. 2005; Kathriarachchi et al. 2006).

Phyllanthus warnockii G. L. Webster, nom. nov. *Reverchonia arenaria* A. Gray, Proc. Amer. Acad. Arts 16: 107. 1880, non *Phyllanthus arenarius* Beille, 1927.—TYPE: U.S.A. Texas: Baylor Co., Sep 1879, *Reverchon* 876 (lectotype, designated by Webster and Miller, 1963: GH; isolectotypes: F, MO).

¹The manuscript for this article was found among unpublished work by the late Grady Webster; it was revised and submitted for publication by Victor W. Steinmann.

It is appropriate to name this species in honor of Barton Warnock (1911–1998), an outstanding authority on the plants of the Texas Big Bend country, who doubtless was familiar with the species during his decades of botanical rambling.

ACALYPHOIDEAE—PLUKENETIEAE

Bia Klotzsch, Arch. Naturg. 7(1): 189. 1841.—TYPE: *Bia sellowiana* Klotzsch ex Baill. [= *Bia alienata* Didr.].

This neotropical genus of five species, although not recognized as generically distinct from *Tragia* by Pax and Hoffmann (1919) or recent authors (e.g., Múlgara de Romero & Gutiérrez de Sanguinetti 1989), appears distinct in its larger stamen number (8–40) and distinctive bifurcate inflorescences with staminate and pistillate flowers on different axes. Furthermore, a preliminary analysis based on DNA sequence data suggests that *Bia*, as represented by *T. fallax* Müll. Arg., is not sister to the remaining species of *Tragia* included (Wurdack et al. 2005). I propose two sections that are distinguished on the basis of differences in the staminate flower and pollen morphology (see Gillespie 1994); one occurs in South America and the other in Mexico and Central America.

I. Bia section **Bia**.—TYPE: *Bia sellowiana* Klotzsch ex Baill. [= *Bia alienata* Didr.].

Staminate flowers with a dissected disk; stamens 8–20, anthers muticous; pollen spheroidal to ellipsoid-spheroidal, inaperturate; South America.

1. Bia alienata Didr., Kjöb. Vidensk. Meddel. (1857): 131. 1857. *Tragia alienata* (Didr.) Múlgara & Gutiérrez, Candollea 46: 523. 1991.—TYPE: BRAZIL. São Paulo: Hytú [Itú], Feb 1834, *Lund s.n.* (holotype: C).

Bia sellowiana Klotzsch ex Baill., Étude Gén. Euphorb. 502. 1858. *Tragia sellowiana* (Klotzsch ex Baill.) Müll. Arg., Linnaea 34: 178. 1865.—TYPE: BRAZIL. Rio de Janeiro: *Sellow s.n.* (lectotype, here designated: G).

Although *Tragia sellowiana* has been generally used as the name for this species, it was published by Klotzsch as a nomen nudum, and Baillon's validation was preempted by the earlier name of Didrichsen.

2. Bia fallax (Müll. Arg.) G. L. Webster, comb. nov. *Tragia fallax* Müll. Arg., Linnaea 34: 179. 1865.—TYPE: PERU. *Pavón s.n.* (holotype: G).

Tragia japurensis Müll. Arg., Fl. brasil. 11(2): 404. 1874.—TYPE: BRAZIL. Rio Negro: “ad Maribi in ditone Japurensi,” *Martius s.n.* (holotype: M?).

3. Bia fendleri (Müll. Arg.) G. L. Webster, comb. nov. *Tragia fendleri* Müll. Arg., Linnaea 34: 179. 1865.—TYPE: VENEZUELA. Aragua: Biscaina, 3000 feet, *Fendler 1208* (holotype: G).

4. Bia lessertiana Baill., Étude Gén. Euphorb. 502. 1858 [as “*lessertiana*”]. *Tragia lessertiana* (Baill.) Müll. Arg., Linnaea 34: 178. 1865.—TYPE: BRAZIL. Without locality or collector (holotype: G).

II. *Bia* section *Zuckertia* (Baill.) G. L. Webster, stat. nov. *Zuckertia* Baill., Étude Gén. Euphorb. 495. 1858. *Tragia* section *Zuckertia* (Baill.) Müll. Arg., Linnaea 34: 178. 1865.—TYPE: *Zuckertia cordata* Baill. [= *Bia cordata* (Baill.) G. L. Webster].

Staminate flowers without a disk; stamens 30–40, anthers apiculate; pollen oblate-spheroidal, tricolpate; Central America and Mexico.

5. *Bia cordata* (Baill.) G. L. Webster, comb. nov. *Zuckertia cordata* Baill., Étude Gén. Euphorb. 496, t. 10, figs. 10–13. 1858. *Tragia bailloniana* Müll. Arg., Linnaea 34: 178. 1865.—TYPE: MEXICO. Tabasco: Teapa, *Linden s.n.* (holotype: P).

CROTONOIDEAE—CODIAEAE

Dodecastigma Ducke, Notizbl. Bot. Gart. Berlin 11: 343. 1932.—TYPE: *Dodecastigma amazonicum* Ducke.

Anomalocalyx Ducke, Notizbl. Bot. Gart. Berlin 11: 344. 1932.—TYPE: *Anomalocalyx uleanus* (Pax & K. Hoffm.) Ducke [= *Dodecastigma uleanum* (Pax & K. Hoffm.) G. L. Webster].

Ducke (1932, 1933) recognized two species of *Dodecastigma*: *D. amazonicum* Ducke and *D. integrifolium* (Lanjouw) Lanjouw & Sandwith. In the same publications, he created the monotypic genus *Anomalocalyx*. Both genera were accepted by Secco (1990) in his thorough revision of South American Crotonoideae. In Webster (1994), *Anomalocalyx* was even placed in a separate tribe (Aleuritideae) because of its characteristic staminate flowers with sepals fused in the bud; however, further study of flower structure in Crotonoideae suggests that fusion of staminate sepals may well be a homoplasious character. Although the plants also differ in pubescence, styler configuration, and foliar glands, they agree in other characters (malpighiaceous trichomes, connate staminate sepals, numerous stamens with introrse anthers, and woody capsular walls). *Anomalocalyx* could be treated as a subgenus of *Dodecastigma*, but there seems little point in recognizing subgenera in a genus of only three species.

Dodecastigma uleanum (Pax & K. Hoffm.) G. L. Webster, comb. nov. *Cunuria uleana* Pax & K. Hoffm., Pflanzenr. IV. 147. XIV. Additamentum VI (Heft 68): 51. 1919.

EUPHORBIOIDEAE—HUREAE

Algernonia Baill., Ann. Sci. Nat., sér. 4, 9: 198. 1858; Étude Gén. Euphorb. 546. 1858.—TYPE: *Algernonia brasiliensis* Baill.

Baillon described *Algernonia* and *Tetraplandra* as distinct genera, and both were recognized by Müller (1866). Bentham (1878) pointed out that the distinction between the two genera made by Müller was based on a fictitious interpretation of the androecium, and in *Genera plantarum* (1880), he unequivocally demoted *Tetraplandra* to a synonym of *Algernonia*. Pax and Hoffmann (1912) admitted that the

two genera were very close, but retained *Tetraplandra* as a distinct genus, a decision followed by Emmerich (1981) in her critical revision of Hureae in Brazil. Taxonomic inertia has so far kept *Tetraplandra* afloat, and it was still maintained in Webster (1994). Yet, there is clearly no significant gap between the two, and it is now clear that recognition of two separate genera can no longer be supported, although I believe that they warrant recognition as subgenera.

I. *Algernonia* subgenus *Algernonia*.

Filaments of the stamens free; styles connate halfway or more.—Subgenus *Algernonia* includes six species: *Algernonia brasiliensis* Baill., *A. gibbosa* (Pax & K. Hoffm.) Emmerich, *A. glaziovii* Emmerich, *A. obovata* (Müll. Arg.) Müll. Arg., *A. pardina* Croizat (a dubious species), and *A. paulae* Emmerich.

II. *Algernonia* subgenus *Tetraplandra* (Baill.) G. L. Webster, stat. nov. *Tetraplandra* Baill., Ann. Sci. Nat., sér. 4, 9: 200. 1858; Étude Gén. Euphorb. 549. 1858.—TYPE: *Tetraplandra leandrii* Baill. [= *Algernonia leandrii* (Baill.) G. L. Webster].

Filaments of the stamens connate; styles connate less than halfway.—The six species of subgenus *Tetraplandra*, all from Brazil, are enumerated below.

1. *Algernonia amazonica* (Emmerich) G. L. Webster, comb. nov. *Tetraplandra amazonica* Emmerich, Arq. Mus. Nac. Rio de Janeiro 56: 95. 1981.
2. *Algernonia bahiensis* (Emmerich) G. L. Webster, comb. nov. *Tetraplandra bahiensis* Emmerich, Arq. Mus. Nac. Rio de Janeiro 56: 95. 1981.
3. *Algernonia dimitrii* (Emmerich) G. L. Webster, comb. nov. *Tetraplandra dimitrii* Emmerich, Arq. Mus. Nac. Rio de Janeiro 56: 96. 1981.
4. *Algernonia kuhlmannii* (Emmerich) G. L. Webster, comb. nov. *Tetraplandra kuhlmannii* Emmerich, Arq. Mus. Nac. Rio de Janeiro 56: 96. 1981.
5. *Algernonia leandrii* (Baill.) G. L. Webster, comb. nov. *Tetraplandra leandrii* Baill., Étude Gén. Euphorb. 550. 1858.
6. *Algernonia riedelii* (Müll. Arg.) G. L. Webster, comb. nov. *Tetraplandra riedelii* Müll. Arg., Fl. bras. 11(2): 534. 1874.

Emmerich (1981) relegated to a dubious status two species, *Algernonia pardina* Croizat and *Tetraplandra anomala* Pax & K. Hoffm. There appears to be no further evidence to determine whether either taxon is a species of *Algernonia*, and I have refrained from proposing a new combination for *Tetraplandra anomala*.

ACKNOWLEDGMENTS

The following herbaria allowed access to their collections: C, F, G, GH, M, MO, P.

[This paper was prepared for publication by Victor Steinmann, who thanks an anonymous referee for a thorough review of the original manuscript, and Paul Berry, Lynn Gillespie, Petra Hoffmann, and Kenneth Wurdack for their comments and suggestions.]

LITERATURE CITED

- Ducke, A. 1932. Neue Gattungen aus der Hylaea Brasiliens. Notizbl. Bot. Gart. Berlin 105: 343–345.
- . 1933. Plantes nouvelles ou peu connues de la region amazonienne. Arq. Jard. Bot. Rio de Janeiro 6(5): 58–61.
- Bentham, G. 1878. Notes on Euphorbiaceae. J. Linn. Soc. London, Bot. 17: 185–267.
- . 1880. Euphorbiaceae. In *Genera plantarum* by G. Bentham and J. D. Hooker, 3: 239–340. London: L. Reeve & Co.
- Emmerich, M. 1981. Revisão taxinômica dos gêneros *Algernonia* Baill. e *Tetraplandra* Baill. (Euphorbiaceae-Hippomaneae). Arq. Mus. Nac. Rio de Janeiro 56: 91–110.
- Gillespie, L. J. 1994. Pollen morphology and phylogeny of the tribe Plukenetieae (Euphorbiaceae). Ann. Missouri Bot. Gard. 81: 317–348.
- Gray, A. 1880. Contributions to North American botany. Proc. Amer. Acad. Arts 16: 78–108.
- Johnston, M., and B. Warnock. 1963. *Phyllanthus* and *Reverchonia* in Far Western Texas. Southw. Nat. 8: 15–22.
- Kathriarachchi, H., P. Hoffmann, R. Samuel, K. J. Wurdack, and M. W. Chase. 2005. Molecular phylogenetics of Phyllanthaceae inferred from five genes (plastid *atpB*, *matK*, *3' ndhF*, *rbcL*, and nuclear *PHYC*). Mol. Phylog. Evol. 36: 112–134.
- Kathriarachchi, H., R. Samuel, P. Hoffmann, J. Mlinarec, K. J. Wurdack, H. Ralimanana, T. F. Stuessy, and M. W. Chase. 2006. Phylogenetics of tribe Phyllantheae (Phyllanthaceae; Euphorbiaceae sensu lato) based on nrITS and plastid *matK* DNA sequence data. Amer. J. Bot. 93: 637–655.
- Múlgara de Romero, M. G., and M. M. Gutiérrez de Sanguinetti. 1989. Actualización taxonómica de *Tragia* (Euphorbiaceae) para Argentina y regiones limítrofes. Darwiniana 29: 77–138.
- Müller Argoviensis, J. 1866. Euphorbiaceae [except Euphorbieae]. In *Prodromus systematis naturalis regni vegetabilis*, ed. A. de Candolle, 15(2): 189–1261. Paris.
- Pax, F., and K. Hoffmann. 1912. Euphorbiaceae-Hippomaneae. Das Pflanzenreich, ed. A. Engler, IV. 147. V (Heft 52): 1–319.
- . 1919. Euphorbiaceae-Additamentum VI. Das Pflanzenreich, ed. A. Engler, IV. 147. XIV (Heft 68): 1–81.
- Secco, R. S. 1990. Revisão dos gêneros *Anomalocalyx* Ducke, *Dodecastigma* Ducke, *Pausandra* Radlk., *Pogonophora* Miers ex Benth. e *Sagotia* Baill. (Euphorbiaceae-Crotonoideae) para a América do Sul. Belém: Museu Paraense Emílio Goeldi.
- Webster, G. L. 1994. Synopsis of the genera and suprageneric taxa of the Euphorbiaceae. Ann. Missouri Bot. Gard. 81: 33–144.
- Webster, G. L., and K. Miller. 1963. The genus *Reverchonia* (Euphorbiaceae). Rhodora 65: 193–207.
- Wurdack, K. J., P. Hoffmann, and M. W. Chase. 2005. Molecular phylogenetic analysis of uniovulate Euphorbiaceae (Euphorbiaceae sensu stricto) using plastid *rbcL* and *trnL-F* DNA sequences. Amer. J. Bot. 92: 1397–1420.

