Realignments in American *Croton* (Euphorbiaceae)

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**ABSTRACT.** Revisional studies in *Croton* to achieve a more nearly phylogenetic classification necessitate a number of nomenclatural changes. The genera *Crotonopsis* and *Eremocarpus* are reduced to sections of *Croton*, and the new names *Croton michauxii* and *C. willdenowii* are proposed for the two species of *Croton* sect. *Crotonopsis*. For *Croton* sect. *Julocroton*, the 25 species accepted are enumerated, including 19 new names or new combinations.

In the course of an unpublished review of the sections of *Croton* L., I have found it necessary to make a number of changes in classification. Consequently, in order to be able to cite representative species for the 38 sections of *Croton*, a number of nomenclatural changes must be validated.

The generic circumscription of *Croton* that has been almost universally accepted by systematists for more than a century is that proposed by Jean Mueller (1865, 1866, 1873). In contrast to the earlier classification of Baillon (1858), Mueller recognized only four genera in the *Croton* alliance (subtribe Crotoneeae Muell. Arg.): *Croton* L., *Julocroton* Mart., *Crotonopsis* Michaux, and *Eremocarpus* Bentham. These four taxa have in common (with rare exceptions in individual species) the diagnostic characters of stellate or lepidote indumentum, thyrsoid inflorescence with pistillate flowers at base, staminodes in the bud, and carunculate seeds.

Although Bentham (1880) noted that *Julocroton* was excessively close to *Croton*, he accepted it hesitantly. A more definite rejection of the Muellerian circumscription was made by Macbride (1951), who refused to recognize *Julocroton* as a distinct genus and incorporated the Peruvian species into *Croton*. Mueller (1866) had distinguished *Julocroton* from *Croton* by a supposed difference in the relative position of the sepals to the subtending bract, although in subsequent taxonomic treatments (as by Macbride), the highly asymmetrical and falcate pistillate calyx of *Julocroton* was used as the distinguishing character. In agreement with Bentham (1880), who was one of the first to question the generic distinctness of *Julocroton*, I find the topology of sepal position versus bract an unusable character; and I concur with Macbride that the irregular laciniate calyx does not adequately distinguish *Julocroton* from various South American species of *Croton*.

In a review of the Euphorbiaceae in the southeastern United States (Webster, 1967), I reduced *Julocroton* to a section of *Croton*, but rather differently accepted *Crotonopsis* as a distinct genus. However, in reviewing all of the sections of *Croton*, it has become apparent to me that *Crotonopsis* is excessively close to *Croton* sect. *Gynamblossis* (Torrey) A. Gray. In particular, the main generic character of *Crotonopsis*—unicarpellate gynoeicum and indescent fruit—represents merely the end-point in a reduction series from the 3-carpellate gynoeicum of most *Croton* species through the 2-carpellate gynoeicum of *Croton monanthogynus* Michaux to the 1-carpellate gynoeicum of *Crotonopsis*. Consequently, there appears to be a much stronger case for treating *Crotonopsis* as a section of *Croton* than as an independent genus.

Although I did not consider the problem of *Eremocarpus* earlier, its situation is comparable to that of *Crotonopsis*. When Hooker (1838) described *Croton setigerus* Hook., he expressed doubt as to its position in his citation of the name as *Croton ? setigerus*. Following the creation of the monotypic genus *Eremocarpus* to accommodate this species (Bentham, 1844), it has been almost universally accepted (except by Greene (1891), who is hardly renowned as a "lumper"). However, *Eremocarpus setigerus* (Hook.) Benth. has a habit reminiscent of various herbaceous species of North American *Croton*, such as *C. capitatus* Michaux of section *Pilinophyton* (Klotzsch) A. Gray and *C. lindeimierianus* Scheele of section *Gynamblossis* (Torrey) A. Gray. The obsolete pistillate perianth was used by Mueller (1866) as the main generic character for *Eremocarpus*, but the staminate flowers are typical for *Croton*; and the 1-carpellate gynoeicum apparently represents a reduction parallel to that discussed above for *Crotonopsis*. Thus, although I earlier accepted both *Crotonopsis* and *Eremocarpus* as distinct from *Croton* (Webster, 1975), their claim to generic separation now appears no better founded than that for *Julocroton*.

For all three of these satellite genera of *Croton*, a serious argument against their acceptance at the
generic rank is that it would lead to a blatantly nonphylogenetic classification; or, to use cladistic parlance, it would make Croton a thrice-paraphyletic genus. The only way to salvage such genera as Julocrotont would be to split Croton into a large number of segregate genera, as Klotzsch (1841) attempted. Such an alternative, I believe, would be highly unacceptable because of problems in defining and recognizing the segregates, and because it would obscure the phylectic coherence of this great genus of nearly 1,000 species. Consequently, the three segregates are here treated as sections of Croton, and the necessary nomenclatural adjustments are proposed.


**SECTION CROTONOPSIS**


This section contains two species, sometimes combined but well discriminated by Pennell (1918), followed by Correll & Johnston (1970). Unfortunately, both species have to be renamed because all available epithets are preoccupied in *Croton*.

1. **Croton michauxii** Webster, nom. nov. Replaced name: *Crotonopsis linearis* Michaux, Fl. Bor.-Amer. 2: 185. 1803, non *Croton linearis* Jacq., 1760. *Crotonopsis argentea* Pursh, Fl. Amer. Sept. 1: 206. 1814, nom. superfl.; non *Croton argenteus* L., 1753. TYPE: U.S.A. South Carolina: Long Bay, Michaux s.n. (lectotype, selected here, Michaux Herbarium, P; microfiche seen). The only specific location given by Michaux was Long Bay, which is in South Carolina according to Ewan (1974); it seems appropriate to select it as the lectotype.


2. **Croton willdenowii** Webster, nom. nov. Replaced name: *Crotonopsis ellipitica* Willd., Sp. Pl. 4: 380. 1805, non *Croton ellipitica* Gei-

**SECTION EREMOCARPUS**


**SECTION JULOCROTONT**


*Cieca* Adanson, Fam. Pl. 2: 355. 1763, nom. rej. TYPE: *Croton argenteus* L.


*Centandra* Karsten, Linnaea 28: 440. 1857. TYPE: *Centandra kondensis* Karsten [= *Croton kondensis* (Karsten) Webster].


In the only general revision of *Julocrotont* so far, Croizat (1943, 1944) recognized about 25 species. Species discrimination in the genus is difficult, and much work remains to be done in order to evaluate Croizat’s proposals and determine how many valid binomials there are. Here I am making new combinations only for those species being cited as rep-
representatives of section *Julocroton* in an unpublished survey of the sections of *Croton*. This includes most of the species cited by Mueller (1873), as well as those names of Croizat that I have been able to evaluate. Pending a critical revision of section *Julocroton*, it is not possible to evaluate all of the binomials that have been proposed, but possible synonyms have been indicated where appropriate. In the following enumeration the correct names under *Croton* are given for those species of *Julocroton* that could be verified and judged distinct. Unless otherwise noted, microfiches and photographs cited are at DAV.


It is appropriate to rename this species for my colleague Antonio Allem, who has contributed important publications on the systematics of *Croton* in southern Brazil.

5. **Croton argenteus** L., Sp. Pl. 1004. 1753. TYPE: America (probably in Hortus Cliffortianus Herbarium, BM not seen; possible isotype, 1140.8 in LINN, microfiche).

Probable synonyms, mostly indicated by Croizat (1943), include: *Julocroton camporum* Chodat & Hassler, *J. elaegnoideae* Spencer Moore, and *J. integer* Chodat & Hassler. Although accepted by Croizat as a distinct species, *J. montevidensis* Klotzsch ex Muell. Arg. may prove to be synony-


The specific epithet acknowledges the contributions of my colleague, Iris Cordeiro, to the systematics of Euphorbiaceae (including sect. *Julocroton*) in São Paulo and adjacent areas of Brazil.


Probable synonym: *Julocroton paulensis* Usteri, as pointed out by Croizat (1943).


Possible synonym: *Julocroton valenzuelae* (Chodat & Hassler) Croizat.


*Julocroton velutinus* (Chodat & Hassler) Croizat, based on a variety of *J. rupestris*, is doubtfully distinct.


*Julocroton pycnocephalus*, as originally proposed by Schléchtendal (Linnaea 19: 245. 1847), was not validly published. Although Mueller validated it in the *Prodromus*, Baillon had already provided a description under the name *Julocroton salzmannii*.


The original type collection of Sellow at B cited by Mueller (1866) having been destroyed, the Riedel specimen cited by Mueller (1873) can be chosen as neotype because it has a specific locality. There is a photograph of the Sellow specimen at B.

Probable synonym: *Julocroton typhacecephalus* Croizat.


Owing to the curious history of publication of this species, the holotype of *Julocroton subpannosus* Muell. Arg. is the same specimen as the isotype of *Croton subpannosus* Muell. Arg. ex Griseb. Croizat (1941) discussed the priority of the names of Mueller over those of Grisebach.

*Croton dentosus* Griseb., Pl. Lorentz. 49. 1874. TYPE: Argentina. Córdoba: *Lorentz 292* (holotype, GOET not seen; photograph of isotype at B).


There is the same relation between the two names and their types as in the preceding paragraphs. Croizat (1943) appears to be correct in combining C. dentosus with C. subpinnatus.


Croizat (1943) reduced Morong’s species to the synonymy of C. subpinnatus.


25. Croton verbasceoides Webster, nom. nov. Replaced name: Julocroton verbascifolius Muell. Arg., DC. Prodr. 15(2): 701. 1866, non Croton verbascifolius Willd., 1803. TYPE: Brasilia meridionalis, Sellow s.n. (lectotype, selected here, G not seen; microfiche, DAV). Typification was effected by the Royal Air Force in destroying the other syntype at B.

Acknowledgments. I thank Robert Rhode for assisting in preparation of the manuscript, and curators of the herbaria cited for assistance in examining specimens and references.

Literature Cited


