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A Provisional Synopsis of the Sections of the Genus Euphractus (Euphractus)

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described many species and provided valuable discussions of interspecific relationships, but have not revised particular taxa except for the study of Croizat (1943) on Croton sect. Juculcrat. Some workers, such as Leandri (1939) and Johnston (1959), abandoned Müller's formal classification in the Prodomus and used informal groups, apparently because of the perceived irrelevancy of the Müllerian sectional classification.

The lack of an intelligible arrangement of taxa within Croton has, in my opinion, greatly impeded progress in understanding relationships between species and species groups. Since species of Croton are prominent in subtropical and tropical vegetational communities (especially secondary ones), and have potential utility as sources of medicinal compounds, the lack of a meaningful classification is particularly deplorable. Biochemically, Croton is very diverse in alkaloids, terpenoids, and other compounds (Farnsworth et al., 1969), and it appears that biochemical data could provide important systematic characters, but this potential has gone unrealized at least partly because of the unintelligibility of the Müllerian classification.

Croizat (1940, 1941, 1944) rejected the classification of Müller but declined to provide a new one utilizing the sections of Baillon and Grisebach, partly because he lacked material of critical Madagascar species but also because he felt that it was premature to offer a revision. I sympathize with his point of view, but after several decades have passed feel that it is now timely to provide at least the scaffolding of a classification that can serve as a precursor to a truly phylogenetic system.

In the present synopsis of Croton, 40 sections are recognized, and a key is provided. For the most part, the various sections proposed by Baillon are integrated into an overall classification. In some respects, the writing of this paper has taken on the character of an archaeological dig, as a considerable number of taxa have been rescued from oblivion. Clearly, some of the sections provisionally accepted in this synopsis (e.g., Croton sect. Quadrilobus, sect. Decalobium, and sect. Decapetalum) are of dubious standing. However, this synopsis does have the advantage of accounting for all of the proposed sectional (and generic) names that have been applied to Croton. Perhaps more importantly, it exposes problems that will need to be addressed by future workers on the genus.

Although I earlier (Webster, 1975) followed previous workers in accepting the genera Crotonopsis and Eremocarpus as distinct from Croton, reconsideration during this study has led me to question that judgement. As earlier writers have noted, Crotonopsis is morphologically similar to Croton sect. Gymnablosis except for its indehiscent fruit. Eremocarpus, although distinctive in having highly reduced pistillate flowers (apparently correlated with a shift to wind pollination), is quite similar in vegetative characters to North American species of Croton sect. Pilinaphyton and sect. Velamea. Continued recognition of Crotonopsis and Eremocarpus as distinct genera would clearly involve a starkly paraphyletic concept of Croton. Consequently, I see no reasonable alternative to treating these two small “satellite” genera under sections of Croton (Webster, 1992). This still leaves two West Indian genera, Cabucroton Alain and Moacrocroton Croizat as apparent satellites of Croton; but these taxa are much more distinctive and their status remains to be critically evaluated.

In this synopsis, in addition to the synonymy and description for each section, the constituent species, or a representative selection of them, are enumerated by geographical areas. For the first time, patterns of geographical distribution that have been obscured by the Müllerian classification now begin to emerge. Croizat, in various publications on individual species, has made some perceptive comments about distributional relationships, but these have been largely ignored by the botanical community.

A significant fact that may not be immediately apparent is that a considerable number of species are not listed under any section. In a few instances, especially in Croton sect. Cascarilla and sect. Velamea, this is done for expediency because of the large number of species involved. In many instances, however, omissions of species are due to uncertainty about their position. I have deliberately tried to avoid describing new taxa to accommodate these doubtful species, but have sometimes listed them parenthetically within the section to which they show the greatest resemblance.

This is not the place for an extended discussion of the morphological characters important in the sectional classification of Croton. The key and descriptions in fact mostly use the classical characters of Müller (1866, 1873), with the important difference that vegetative characters are given much greater weight. Because of his uncompromising Linnean principles of classification, Müller used only reproductive characters for his major divisions, and these were applied in a rigid hierarchy fashion (Webster, 1987). However, one of the most fertile sources of characters in Croton is the indumentum, which shows great diversity (Frohlich, 1896). Unfortunately, due to the incompleteness of available data, it has seemed necessary in this study to utilize the rather crude distinction between stelate and lepidote trichomes; by further studies one should be able to achieve considerable refinement, especially in elucidating the transitional stelate-lepidote types. The presence of glands on leaves and stipules (as well as perianths) is another important character that was justifiably used by Baillon and Müller. In a large number of species, there is a pair of glands (sometimes accompanied by additional ones) at the junction between the lamina and petiole; these paired glands are referred to in this work as the leaf base glands. In addition, there are in some species glandular pads on the midrib of the leaf; these are morphologically different (smaller, globose rather than flattened, often stalked), and generally species with conspicuous marginal foliar glands do not have well-differentiated basal ones.

With regard to reproductive characters, Müller (1866, 1873) placed excessive weight on the number and degree of symmetry of perianth parts. A particularly problematic character, upon which Müller heavily relied, is that of the degree of development of petals in the pistillate flower. Müller (1866) brought together in Croton sect. Eluteria all the species in which the pistillate flowers have well-developed petals. However, as Radcliffe-Smith (1987) and other workers have indicated, there are all degrees of reduction of these petals, even within individual species. It is quite clear that Croton sect. Eluteria in the sense of Müller is unnatural. Another character used by Müller that is similarly problematic because of transitional states is that of the presence of bisexual cymes in the inflorescence (i.e., stamine flowers associated with the pistillate ones at the lower nodes). This feature, as with well-developed petals in pistillate flowers, appears to be primitive (plesiomorphic) within Croton, and thus cannot be used as a diagnostic criterion except when it is correlated with other features. Furthermore, there is widespread variability in inflorescence expression in Croton; a common and misleading situation in some groups (e.g., C. sect. Cleodora and sect. Cyclotigua) is the production of purely stamine inflorescences; individual specimens may appear entirely stamine, and this has led to some species being incorrectly described as dioecious.
More justifiable is Müller's use of the term "reduplicate" to refer to calyces of the pistillate flowers in which adjacent pairs of valvate sepals form a projection at the base; reduplicate calyces are usually distinctly angular and recognizable even in the bud stage. A character that has been treated rather arbitrarily in the degree of staminal division, a feature greatly favored by Müller. In the present treatment, the term "multifid" has been used to apply to styles in which the branches are divided, whether once (quadrifid) or many times. Fruit and seed characters have scarcely been used at all at the sectional level, even though they often supply distinctions between species; they need to be looked at attentively in the future.

It is only fair to point out here a major bias in this study: my personal lack of familiarity with the living plants in Africa, Madagascar, and Asia; as a result, the treatment of Old World taxa is much more cursory than that of New World taxa. The Madagascar species have been particularly exasperating to deal with, despite the review by Leandri (1939) and his later publications. Baillon (1858, 1861) based several of his sections on Madagascar plants, and I am far from confident that I have correctly assigned African or Asian plants to these sections. It is striking that the majority of Madagascar species, whether with stellate or lepidote indumentum, have opposite or subopposite leaves - a feature rare in other parts of the world. Baillon (1861) suggested that this opposite peltoidy is correlated with sympodial branching; and Leandri (1971) has provided a plausible scenario, that the many shrubby sympodial species in Madagascar may have evolved from ancestors such as Croton goudotii with arboreal habit and alternate leaves. This suggests that in a future revision of Croton these Madagascar taxa may need to be brought together into a single group. However, it should be noted that sympodial branching with opposite or subopposite leaves does occur in a number of extra-Madagascar species, especially in herbs. The character therefore may show a high degree of homoplasies.

One of the reasons why the systematic arrangement of Croton is difficult at the supraspecific level is the pervasiveness of parallelism and convergence (homoplasies) in many of the classical characters. There may have been several instances of independent transitions between multifid and bifid styles, stellate and lepidote indumentum, and leaves with and without basal glands. On the other hand, a few of the characters used by Müller may represent truly shared derived characters (synapomorphies); examples include the presence of glandular stipules and calyces, reduplicate-valvate calyces, and possibly the opposite phyllotaxy in Malagasy species. More critical studies of morphological features such as trichomes and foliar glands may provide additional synapomorphies that may greatly facilitate construction of a truly phyletic classification of Croton.

In the following synopsis, 40 sections are enumerated, with types generally cited in accordance with Farr & al. (1979); they, however, overlooked the article by Wheeler (1975), in which a significant number of generic typifications were proposed. A number of new lectotypifications, made in this text, are indicated as such. A reviewer has pointed out that this proposed classification is regenerative inasmuch as it relies almost exclusively on the single rank of section, in contrast to Müller's complex hierarchical system. My plea to this is "guilty," and it must be kept in mind that the present system is provisional and intended as only the starting point for critical investigations. Very likely, subgenera, subsections, and series will creep back into use as our knowledge of the evolutionary patterns in Croton becomes more refined.
Key to the sections of Croton

1. Lower nodes of inflorescence with bisexual cymules; leaves usually biglandular at base
   2
   1. Lower nodes of inflorescence with only pistillate flowers; leaves with or without glands at base
   6
   2. Sepals of pistillate flower distinctly imbricate
       3
   3. Sepals of pistillate flower valvate
       4
   4. Styles multifid; sepals of pistillate flower ± connate; indumentum stellate
       1. sect. Cleodora
   5. Styles bifid (tips at most emarginate); sepals of pistillate flower distinct; indumentum stellate-lepidote
       2. sect. Euphorbia
   6. Indumentum stellate
       3. sect. Cyclostigma
   7. Indumentum lepidote
       4. sect. Geiseleria
   8. Styles bifid
       22. sect. Geiseleria
   9. Styles multifid
       24. sect. Argyrocroton
10. Sepals of pistillate flowers well developed
    7
11. Sepals of pistillate flowers obsolete; ovary 1-locular, styles unbranched
    24. sect. Eremocarpus
12. Petals ± equaling sepals in both staminate and pistillate flowers
    8
13. Petals reduced or absent in pistillate flowers
    11
14. Indumentum stellate; leaves glandular at base
    9
15. Indumentum lepidote
    10
16. Stamens over 20; leaves alternate, palmately veined
    3. sect. Klotschipythum
17. Stamens under 20; leaves opposite or subopposite, pinnately veined
    15. sect. Andrichnia
18. Leaves glandular at base; inflorescences terminal
    18. sect. Mongua
19. Leaves eglandular at base; inflorescences axillary
    6. sect. Elteria
20. Petals present in staminate flowers
    12
21. Petals absent in staminate flowers
    40. sect. Drepandium
22. Staminate receptacle usually copiously villose (or else leaves copiously pubescent); seeds ellipsoid to globose
    13
23. Staminate receptacle glabrous to sparsely villose; indumentum stellate; seeds more or less tetragonal
    39. sect. Astraea
24. Sepals of pistillate flower valvate but not reduplicate
    14
25. Sepals of pistillate flower reduplicate-valvate (or with epicalyx); styles multifid
    43
26. Stipules and/or sepals not laciniate or glandular-toothed
    15
27. Stipules and/or sepals laciniate or glandular-toothed
    39
28. Indumentum stellate or denticrile
    16
29. Indumentum lepidote, at least in part
    15
30. Inflorescence without a distinct gap between pistillate and staminate flowers
    17
31. Inflorescence with a distinct gap between pistillate and staminate flowers; sepals of pistillate flower more or less unequal
    31
32. Leaves opposite or subopposite (at least in part); species mainly of Madagascar
    18
33. Leaves alternate (rarely opposite, in extra-Madagascar species
    19
34. Styles bifid
    35
35. Styles multifid
    35
36. Leaves ± entire
    27. sect. Argyrocroton
37. Leaves coarsely dentate, stellate-lepidote
    9. sect. Corylocrioton
38. Fruit dehiscent, ovary trilocular; shrubs, perennial or annual herbs
    37
39. Fruit indehiscent, ovary unicellular; annual herbs
    26. sect. Crotonopsis
37. Shrubs; indumentum definitely lepidote, at least on twigs and underside of leaves; pistillate flowers sessile or subsessile, never recurved. 28. sect. Lamprocoton
37. Subshrubs or herbs; indumentum stellate-lepidote or appressed-stellate; pistillate flowers long-pedicellate, often recurved. 25. sect. Gynambloss
38. Leaves glandular at base. 18. sect. Mongiua
38. Leaves eglandular at base. 19. sect. Decapetalon
39. Stamens 6-15. 40
40. Sepals of pistillate flowers not deeply laciniate nor strongly unequal. 41
40. Sepals of pistillate flowers deeply laciniate and strongly unequal. 29. sect. Julocrion
41. Racemes elongated; leaves large (over 1 cm long), palmately veined. 31. sect. Barhamia
41. Racemes abbreviated, or leaves less than 1 cm long. 42
42. Leaves rounded, less than 1 cm long; hairs appressed; stems erect to procumbent. 33. sect. Micranthus
42. Leaves elongated, pointed, mostly more than 1 cm long; pubescence loose; often tomentose; stems erect. 34. sect. Medea
43. Stipules and sepals of pistillate flower not laciniate or glandular-lobed. 44
43. Stipules and sepals of pistillate flower laciniate or glandular-toothed. 45
44. Indumentum stellate. 35. sect. Lasigynne
44. Indumentum lepidote. 36. sect. Argyroloosum
45. Epicarp absent in pistillate flower. 46
45. Epicarp of 5 small segments present in pistillate flower. 32. sect. Decalobium
46. Monoeious; indumentum appressed. 37. sect. Astroeopis
46. Dioecious; indumentum loose. 38. sect. Codonolacys


1. Croton sect. Cleodora (Klotzsch) Baill., Elute Euphorb.: 369. 1855 = Cleodora Klotzsch in Arch. Naturalgesch. 7: 196. 1841 = Croton subsect. Cleodora (Klotzsch) Müll. Arg. in Martius, Fl. Bras. 11(2): 133. 1873. - T: Cleodora selloviana Klotzsch [= Croton sphaerogynus Baill.]. (Some uncertainty remains as to the application of this name because no type material of Cleodora selloviana has been seen; the disposition of Müller (1866: 591) is being followed in the lack of contrary evidence.) = Croton sect. Stolidanthus Baill. in Adansonia 4: 323. 1864 - LT. (designated here): C. heterocalyx Baill. The lectotype species is chosen because it fits Baillon’s sectional description in having both distinctly unequal and broadly imbricate pistillate sepals.

Monoeious trees or shrubs; indumentum appressed-stellate; leaves alternate, pinnately or palmately veined, glandular at base; inflorescences terminal; basal cymes bisexual; petals present in staminate flowers, usually reduced in pistillate flowers; stamens 11-100 or more; pistillate flowers distinctly pedicellate; sepals entire, eglandular, valvate or reduplicate-valvate; styles bidentate.

As delimited here, sect. Cyclostigma includes 40-50 mainly neotropical species. The section is quite diverse, and tentatively may be divided into 3 subsections:


Leaves palmately or pinnately veined, subuplicate or denticulate, copiously stellate beneath; stamens 15-65; calyx of pistillate flower not reduplicate-valvate; styles bidentate. Mainly New World. Some species included by Müller (1866) probably do not belong here, including e.g. Croton suberosus Kunth with eglandular leaves.

biseexual or sometimes unisexual; petals present in staminate, reduced or absent in pistillate flowers; sepals of staminate flowers imbricate; stamens 15-20; pistillate flowers distinctly pedicellate, sepals 5, basally connate and/or distinctly imbricate, entire; styles multidentate.

This neotropical section of about 10 species (or less) has a curious disjunct distribution in Costa Rica, Amazonia, and eastern Brazil. The synonymy of Croton sect. Stolidanthus with C. sect. Cleodora seems secure, since these plants of eastern Brazil are closely related. The character of lower bisexual cymes appears to be inconsistent within the section. Müller (1866) at first listed C. sphaerogynus among species with unisexual lower cymes but subsequently (Müller, 1873) among those with bisexual lower cymes. In fact, most specimens of C. sphaerogynus have strictly unisexual cymes; in any event, it is clear that this character is not diagnostic for the section. Two additional species recorded by Müller (1873) as having slightly imbricate calyces, C. organensis Baill. and C. piptocalyx Müll. Arg., are of dubious affinity but perhaps are better placed in sect. Cyclostigma. The Central American species C. billbergianus Müll. Arg. strongly resembles C. hoffmannii Müll. Arg. in habit, but has distinctly nonimbricate pistillate sepals.


2. Croton sect. Cyclostigma Griseb., Fl. Brit. W. I.: 42. 1859 = Cyclostigma Klotzsch in Seemann, Bat. Voy. Herald: 104. 1853 (non Cyclostigma Hochst. ex Endl., 1842) = Croton subsect. Cyclostigma (Griseb.) Müll. Arg. in Linn. 80: 3. 1865 = Croton sect. Cyclostigma (Griseb.) Müll. Arg. in Martius, Fl. Bras. 11(2): 91. 1873. - T: Croton gosseiwalii Vahl. (Grisebach cited only one species and did not indicate the illegitimate basionym of Klotzsch; however, his intent seems clear; and C. gosseiwalii as treated by Müller (1866) includes C. hibiscifolius, which was enumerated by Klotzsch. There seems to be no reason to adopt the designation by Wheeler (1975) of Cyclostigma parviflora Klotzsch as lectotype.)

Monoeious trees or shrubs; indumentum stellate; stems often exuding reddish sap; leaves alternate, mostly palmately veined or lobed, bilocular at base; inflorescences terminal, basal cymes bisexual; petals present in staminate flowers, usually reduced in pistillate flowers; stamens 11-100 or more; pistillate flowers distinctly pedicellate, sepals entire, eglandular, valvate or reduplicate-valvate; styles bidentate.

As delimited here, sect. Cyclostigma includes 40-50 mainly neotropical species. The section is quite diverse, and tentatively may be divided into 3 subsections:


Leaves pinnately veined, crenate, sparsely appressed-stellate; stamens 10-20; pistillate flowers long-pedicellate; sepalis of pistillate flower not reduplicate-valvate; styles bifid. This new subsection is proposed to accommodate some South American species that differ from most other species of Croton sect. Cyclostigma in their elongated, nearly glabrous leaves and long inflorescences with unusually long-pedicellate pistillate flowers. The habit is reminiscent of some species in C. sect. Tiglium.

Representative species. – [Amazonian South America:] Croton sampatik Müll. Arg.; [Brazil:] C. cordifolius Baill., C. organensis Baill., C. pittocary Müll. Arg., C. priscus Croizat. (C. echiodes Baill., from Bahia, appears similar in habit but has subsessile pistillate flowers.)

2c. Croton subsect. Palanostigma Mart. ex Baill., Etude Euphorb.: 358. 1858. – T.: C. palanostigma Klotzsch (Klotzsch, 1843, cited “Palanostigma Mart.” in synonymy, but the name does not appear to have been validly published at the generic level.

Leaves mostly palmately veined and corymbose stellate beneath; stamens 10-100+; pistillate flowers distinctly pedicellate, sepalis ± reduplicate-valvate; styles multifid.

There are no typical species of Croton subsect. Palanostigma confined to North America, although species such as C. smithianus Croizat extend north to Costa Rica and Nicaragua. C. grewifolius Müll. Arg., although technically fitting into this subsection because of the quadripherial styles, differs in its nearly pinnately veined leaves. C. goudoti Baill. is exceptional in having both bisexual cymules and well-developed pistillate petals, as well as its striking geographical disjunction from its American relatives.

The only neotropical species of Croton known to be lianas, C. adscendens Secco & N. Rosa and C. pullei Lanj., are close relatives in the Amazon forest (Secco & Rosa, 1992). They appear to belong to C. subsect. Palanostigma because of their reproductive characters, although they differ in the climbing habit and short-pedicellate flowers. Possibly further study will show that these climbing species should be referred to a separate subsection.


Monoeccious trees or shrubs; indumentum of leaves depressed-stellate; leaves alternate, palmately veined, glandular at base; infructescences terminal, not bisexual below; petals present in staminate and pistillate flowers; stamens 20-60; pistillate flowers pedicellate, sepalis entire, valvate; styles bifid to multifid.

This section in the strict sense would include only Croton mauritianus Lam. and C. bontonianum Müll. Arg. of Mauritius and Reunion. Its status must be regarded as dubious, since it differs from C. sect. Andrichia only in the alternate leaves and larger stamen number.


Monoeccious trees or shrubs; indumentum lepidote or stellate-lepidote; leaves alternate or opposite, palmately or pinnately veined, biglandular at base; stipules entire; infructescences terminal, with bisexual cymules at base, bracts persistent; petals present in staminate flowers, reduced in pistillate flowers; sepalis of stamine flower imbricate; stamens 10-15; pistillate flowers sessile, sepalis entire, imbricate; styles bifid (style-branches at most emarginate).

As circumscribed here (as monotypic), Croton sect. Euporia is much smaller than in the treatments of Müller (1873, as subsection) and Pax & Hoffmann (1931), who included all of the species with bisexual lower cymules in the infrutescences. Even C. ser. Euporia of Müller (C. subsect. Euporia of Pax) is more inclusive, with all of the lepidote species of C. sect. Euporia. However, the type species of C. sect. Euporia, C. polyanthus, from coastal Brazil, differs from all the associated species in its pistillate flowers with discrete, distinctly imbricate sepalas. The species assigned to C. ser. Euporia by Müller (1873) seem better placed in either C. sect. Cleodora or sect. Lantia. There are a number of paleotropical species, such as C. argyrurus Blume, C. insularis Baill., and C. macrostachys Del., that share characters with C. sect. Euporia; however, until further studies can be made, it would be premature to include any of them in this section.

The relationships of Croton sect. Euporia may be closest with C. sect. Cleodora, in which the sepals of the pistillate flowers are also (usually) distinctly imbricate. At
present, it appears reasonable to maintain C. sect. Eutropia as distinct because its type, C. polyandra, differs from the species of C. sect. Cleodora in having dentate leaves, persistent bracts, choriasepalous calyces, and bifiid styles.


Monoeious trees or shrubs; indumentum lepidote; leaves alternate, pinnately veined, entire, biglandular at base, stipules entire, deciduous; inflorescences terminal, often clustered, unisexual or bisexual, the latter with or without bisexual cymes at base; stamens 10-15; pistillate flowers subsessile or pedicellate, sepal entire and eglindrical, valvate (or somewhat reduplicate); styles multiform.

This well-characterized section appears to be entirely neotropical, although there are some African species (e.g. Croton mbanga Müll. Arg.) that might prove to be related. Jablonski (1965) treated the South American taxa under an informal designation ("C. matourensis") group. Species of C. sect. Luntia are easily distinguished from C. sect. Eutropia by their entire leaves and valvate sepal. Species of C. sect. Argyrocroton that have bisexual cymes are distinguishable from C. sect. Luntia by their bifid styles.

The species of Croton sect. Luntia fall into two distinctive groups that merit recognition as subsections.


Leaves scattered-lepidote beneath; inflorescences staminate or bisexual, the latter (at least in part) usually with bisexual cymes at base; pistillate flowers subsessile (pedicels in flower shorter than calyx); sepal more or less free; capsules oblong (1 cm high or more).

Croton subsect. Cuneati includes about 10 species mainly of South America. Most of these were reviewed by Jablonski (1965), who proposed a number of very similar species that need to be critically evaluated.

Representative species. – [West Indies:] Croton poecilanthus Urb.; [Panama & Colombia:] C. pachypodus G. L. Webster; [Amazonia:] C. cuneatus Klotzsch, C. tessmannii Mansf.; [Guyana Highlands:] C. kaieteuri Jabl., C. monachinoensis Jabl., C. neblinae Jabl., C. subcoriaceus Jabl. From Jablonski’s descriptions, it seems doubtful that C. pakaraimae Jabl. belongs here because of the eglindrical leaves, and C. icaburae Jabl. is even more doubtful because of the imbricate sepal in the pistillate flower.


Inflorescencia glomeruliformis, bisexualibus destinatibus; floribus foemineorum longe pedicellatis, ± gamosepalis.

Leaves usually metallic-lepidote beneath; inflorescences staminate or bisexual, without bisexual cymes at base; pistillate flowers long-pedicellate, calyx ± gamosepalous; fruit oblate (less than 1 cm high).

This primarily South American subsection includes only 2 closely related species that were first clearly descriminated by Lanjouw (1931). None of the other species enumerated by Jablonski (1965) appear to be closely related; these are mostly referable to Croton subsect. Cuneati.

Species included. – [Panama & South America:] Croton lanjouwensis Jahl.; [Venezuela to Brazil:] C. matourensis Aubl.


Monoeious trees or shrubs; indumentum of foliage lepidote; leaves alternate, entire and unlobed, pinnately or palmately veined, without petiolate glands; stipules rudimentary or absent; inflorescences mostly axillary, without bisexual cymes; petals present in both staminate and pistillate flowers; stamens mostly 10-15; pistillate flowers pedicellate, sepal entire, valvate, eglindrical; ovary with stellate or lepidote trichomes; styles multiform.

As defined here, Croton sect. Eluteria is an entirely American group of about a dozen species. Old World species that were included in the section by Müller (1866) and by Pax & Hoffmann (1931), which differ in having leaves with laminar glands, are referable to C. sect. Andricnia, sect. Klotzschiphymum, and sect. Mongua.


Monoeious trees or shrubs; indumentum of foliage sessile; leaves alternate, unlobed, ± palmately veined, glandular at base; stipules entire; inflorescences terminal, without bisexual cymes; petals absent in pistillate flowers; stamens 15-35; pistillate flowers pedicellate, sepal entire, eglindrical, valvate; ovary with stellate trichomes; styles multifid.

As here interpreted, Croton sect. Croton includes about 10 Old World species of the Mascarene islands, tropical Asia, and northern Australia. A few American species such as C. astrogyros Baill. and C. billbergianus Müll. Arg. would be referable here on the basis of their characters but are probably not closely related.

absent in pistillate flowers; stamens 7-12(15); sepal of pistillate flower entire, eglandular, valvate; ovary with stellate trichomes; styles multiform.

This section includes about 10 species with a disjunct distribution between North America, the West Indies, and extra-African Brazil. Judging from the description (Léonard, 1962), *Croton lacinianthus* Léon., an African species from Katanga, may be related to the Brazilian species.


Monoeocious or dioecious shrubs; indumentum stellate-lipidate; leaves alternate, pinately veined, coarsely dentate, glandular at base; stipules entire; inflorescences terminal, with or without bisexual cymules; petals reduced in pistillate flowers; stamens 10-18; pistillate flowers subsessile or pedicellate, sepals entire, not glandular, valvate; styles bifid.

This small American section has a basically Caribbean distribution.


Monoeocious or dioecious shrubs; indumentum stellate; leaves alternate, pinately veined, entire, without basal glands; stipules entire; inflorescences terminal, without bisexual cymules; petals absent in pistillate flowers; stamens 11; pistillate flowers short-pedicellate, sepals entire, glandular, valvate; styles bifid.

The species of this section in some respects resemble *Croton* sect. *Vealaeae*, but differ in their multifid styles. *C. axillarsis* diverges from the other species in its dioecious, axillary inflorescence production, but is similar in other characters.


Monoeocious or dioecious shrubs or trees; indumentum sparse, appressed-stellate; leaves alternate, pinately or palmately veined, glandular at base; stipules entire; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamens 10-20; pistillate sepalis distinctly pedicellate, entire, eglandular, valvate, sometimes accrescent; style bifid.

This section, as here defined, includes about 20 species of America and the Old World. In the strict sense, as treated by Müller (1866), *Tigillum* is a group of species with trilobed leaves and inflated capsules. If the species with strictly pinnate venation were separated, they would fall into Baillon’s *Croton* sect. *Gymnocron*.

However, it seems preferable to adopt a broader definition to emphasize the overall similarities.


Monoeocious shrubs; indumentum sparse, appressed-stellate; leaves alternate, pinately veined, glandular at base; stipules rudimentary; inflorescences apparently terminal, without bisexual cymules; petals absent in pistillate flowers; stamens c. 11; pistillate flowers short-pedicellate, sepals entire, eglandular, valvate; styles bifid.

This monotypic section of Brazil scarcely differs from sect. *Tigillum* except in the tetramerous perianths. The single species, *Croton sapidifolius*, is still imperfectly known; when better studied, the section can perhaps be amalgamated with sect. *Tigillum*.


Monoeocious (or sometimes dioecious) shrubs or trees; indumentum stellate, often dense; leaves alternate, pinately veined, glandular at base; stipules entire; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamens 10-30; pistillate flowers mostly sessile or subsessile, sepals entire, eglandular, valvate; styles bifid (sometimes emarginate or lobed at tip).

As presently defined, this is the largest section of *Croton*, with over 100 species. In terms of the diagnostic characters used here, C. sect. *Cascara* only differs from C. sect. *Vealaeae* in having paired glands at the leaf base. The boundary between the two sections may be an artificial one, and both sections are probably unnatural.
However, there is a striking difference in geographic distribution, since C. sect. Cascarilla is present in the Old World as well as the New World. In contrast to C. sect. Velamea, the species in C. sect. Cascarilla are concentrated in the West Indies and South America, and are somewhat less well represented in mainland North America.

There are problems with discriminating Croton sect. Cascarilla from other sections. C. xalapensis Kunth resembles species of C. sect. Cyclostigma in leaf shape and stamen number. A number of neotropical species, such as C. jutairopis Croizat and C. repens Schltdl., resemble C. sect. Ocalia in leaf morphology but have bifid styles. The evident diversity among species of C. sect. Cascarilla suggests that subdivisions into subsections would be desirable, but that will require much more study.


Monoeous or dioecious shrubs, subshrubs, or herbs; indumentum appressed-stellate; leaves opposite or subopposite (at least above), pinnately veined, glandular at base but without laminar glands; inflorescences pseudo-terminal, not bisexual below; petals present in staminate, present or reduced in pistillate flowers; stamens 10–20; pistillate flowers pedicellate, sepals entire, valvate; styles bifid to multiform.

This Old World section remains ill-defined. The type species, Croton bracteatus Lam., is unusual in its accrescent bracts, but C. nudatus Bai., associated with it by Müller (1866), appears not to have such striking bracts. These two species have multifid styles, and it is not clear whether they belong in the same section with such species as C. monge Bai., with much denser and looser stellate pubescence and bifid styles. The common Madagascar species C. cassinoides Lam., although having glandular leaves, may belong in this section.


Monoeous trees or shrubs; indumentum appressed-stellate; leaves opposite or subopposite (at least above), pinnately veined, glandular at base but without laminar glands; inflorescences pseudo-terminal, not bisexual below; petals present in staminate, present or reduced in pistillate flowers; stamens 10–20; pistillate flowers pedicellate, sepals entire, valvate; styles bifid to multiform.

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Monoeous trees or shrubs; indumentum appressed-stellate, often dense and pale; leaves mostly opposite, subopposite, or subverticillate, pinnately veined, usually glandular at base and often on lamina beneath; inflorescences pseudoterminal, not bisexual below; petals reduced in pistillate flowers; stamens 15–20; pistillate flowers pedicellate, sepals entire, valvate; styles multifid.

Croton sect. Anisophyllum includes about 10-15 species of Madagascar. This section as defined by Bai. in Adansonia 1: 154, 1861. The section includes the species C. cassinoides Lam., although this species was referred to C. sect. Eluteria by Müller (1866). Leandri (1939) included most of the species in this "section Anisophyllum", and also treated C. payerianus as a synonym of C. adenophorus Bai. It is not clear whether a number of Asian species such as C. cascarilloides, that have pseudo-verticillate leaves, should be referred to this section.


Monoeious shrubs; indument of foliage pilose, apressed-stellate; leaves opposite or verticillate (at least distally), glandular or eglandular at base; stipules entire or reduced; inflorescences pseudoterminal, without bisexual cymes; petals reduced in pistillate flowers; stamens 6-12; pistillate flowers ± pedicellate, sepals entire, eglandular, valvate; styles bifid.

The type species of this section, *Croton bovinianus*, is aberrant in its nearly eglandular leaves and reduced stamen number. However, a number of other Old World species with apressed-stellate indumentum can tentatively be associated with it.


Monoeious trees or shrubs; indument lepidote; leaves opposite or subopposite (at least in part), pinnately veined, glandular at base; inflorescences pseudoterminal, not bisexual below; petals equaling sepals or reduced to obsolete pistillate flowers; stamens 10-35; pistillate flowers pedicellate, sepals entire, valvate; styles multifid or greatly dilated.

In the circumscription of Baillon, *Croton* sect. *Monguia* included 2 species, the lectotype plus *C. argyroderpha* Baill. However, Müller (1866) reported the pistillate petals of the latter species as reduced ("subulata, exigua") and Leandri (1939) described them as absent. It is clear that only *C. chrysodaphne* corresponds to the sectional diagnosis, and it is therefore chosen as lectotype. However, Leandri (1939) regarded the specimens of *C. chrysodaphne* as representing a possibly "abnormal" form of *C. argyroderpha*. Judging from other instances reported in the literature, it seems likely that development of pistillate petals is variable within *C. argyroderpha*.

As defined here, *Croton* sect. *Monguia* includes the Madagascar species with opposite, glandular, lepidote leaves and multifid styles. It is not clear whether there are any extra-Malagasy species, although *C. cascarilloides* Raescha. of southeast Asia is suggestively similar.

Representative species. – [Camarones Islands:] *C. humblotti* Baill.; [Madagascar:] *C. antanosiensis* Leandri, *C. argyroderpha* Baill., *C. bernieri* Baill., *C. bohimensis* Leandri, *C. bojierianus* Baill., *C. noronthae* Baill. Some Madagascar species, such as *C. nobilis* Baill., are similar but have alternate leaves.


Monoeious shrubs; indument of foliage pilose; leaves opposite or subopposite, entire, pinnately veined, glandular at base; stipules entire or obsolete; inflorescences pseudoterminal, without bisexual cymes; petals reduced in pistillate flowers; stamens 10-15; pistillate sepals equal, entire, valvate; styles bifid.

When it was first defined by Müller (1865), no species were enumerated in *Croton* sect. *Decapetalon*, but in Candolle’s *Prodromus* (Müller, 1866) he listed two: *C. squamigerus* and *C. laevigatus* Vahl. These are surely not related to one another and have in common only the unusual character of petaloid staminate glands. Leandri (1939) noted that the petaloid glands in *C. squamigerus* appear to be an abnormality and reduced the species to a synonym of *C. jennyanus*. However, Leandri (1939) also recognized *C. lepidotus* A. DC. as having petaloid glands, and used that feature as a key character for the species. It seems expedient to try to salvage Müller’s name by typifying the section with *C. squamigerus* so that it can accommodate those Madagascar species with lepidote indumentum, eglandular leaves, and bifid styles.


Monoeious shrubs; indument stellate; leaves alternate, ± palmately veined, dentate, glandular at base; stipules entire; inflorescences terminal, with a distinct gap between staminate and pistillate flowers, without bisexual cymes; petals reduced in pistillate flowers; stamens 5-12; pistillate sessile or pedicellate, sepals entire to lancinate, valvate; styles usually multifid.

This section of c. 10 American species appears to be unnatural as defined by Müller (1873); the species with bifid styles are here assigned to *Croton* sect. *Octolobium*. The section is close to C. sect. *Geiseleria*, and could perhaps be combined with it. In fact, Smith & al. (1988) have proposed treating *C. lundianus* as a variety of *C. glandulosus*, in C. sect. *Geiseleria*!


Monoeious shrubs or subshrubs; indument stellate; leaves alternate, palmately veined, glandular at base; stipules entire or nearly so; inflorescences terminal, with a distinct gap between staminate and pistillate flowers, without bisexual cymes; petals reduced in pistillate flowers; stamens 10-15; pistillate flowers sessile or subsessile, sepals 6-8, dentate, valvate; styles bifid to multifid.
It is rather doubtful that this section of 2 or 3 South American species can be maintained as distinct from Croton sect. Podostachys. It is possible that C. meniens is conspecific with C. aberans, although from descriptions they differ in stamen number and stylar configurations. Müller (1873) also included 2 other species, C. teueridium Baill. and C. subferrugineus Müll. Arg., in this affinity, but their relationships are doubtful.


Monoeocious herbs or small shrubs; indumentum stellate; leaves alternate, ± palmately veined, dentate, glandular at base; stipules entire; inflorescences terminal, without bisexual cymes; bracts ± glandular; petals reduced in pistillate flowers; stamens 8-11; pistillate flowers sessile or pedicellate, sepals distinctly unequal, entire, not glandular; styles bifid.

As delimited here, Croton sect. Geiseleria includes c. 10 species of the New World, with most of the diversity in Brazil. Species with multiflora styles, larger stamen number, or eglandular leaves are excluded, in contrast to the treatment of Müller (1873). The species show strong resemblances to those in sect. Podostachys.


Monoeocious annual herbs; indumentum of foliage stellate; leaves alternate, ± palmately veined, entire, eglandular at base; stipules entire; inflorescences terminal, contracted, without bisexual cymes; petals reduced in pistillate flowers; stamens 8-15; pistillate flowers subsessile, sepals mostly 7 or 8 (6-10), entire, not glandular; styles multifid.

This is one of the few sections of Croton that is mainly confined to the United States. The 3 species resemble North American species of C. sect. Gymnambrosis and sect. Velamea, such as C. leucophyllus and C. lindheimerianus, but differ in having quadrifid rather than bifid styles. C. coryi is very unusual in having stellate foliar indument but lepidote scales on the stamine petals. Although differing in its distinctive stellate-lepidote pedicellate trichomes, the South American species C. pycnocephalus Baill. may belong to this section.

Species included. — [North America:] Croton capitatus Michx., C. coryi Croizat, C. elliptici Chapm.


Monoeocious annual herbs; indumentum bristly-stellate; leaves mostly clustered at forks of dichotomizing stems, entire, palmately veined, eglandular; stipules obsolete; inflorescences pseudoterminal at dichotomies of stems, bisexual; pistillate perianth obsolete; staminate flowers apetalous; stamens 6-10; ovary 1-locular, style unlobed.

This monotypic section, confined to western North America, has been regarded as a distinct genus since after Hooker described it (with doubt) as a Croton. The flowers, which are possibly wind-pollinated, are more highly reduced than in any other group of Croton. However, the habit, including pubescence and leaf shape, is highly suggestive of species of C. sect. Pilinophyllum and related species of C. sect. Velamea. From an evolutionary point of view, it seems clear to me that Eremocarpus must be regarded as a highly specialized and flally reduced species of Croton.


Monoeocious annual or perennial herbs or subshrubs, ± dichotomously branching; indumentum of foliage appressed-stellate or stellate-lepidote; leaves alternate, entire, eglandular; stipules suppressed; inflorescences abbreviated, without bisexual cymes; petals rudimentary or absent in pistillate flowers; stamens 4-11; pistillate flowers distinctly pedicellate, ± reflexed in fruit; sepals narrow, entire, not glandular, valvate; styles bifid.

This American section of 5 species was recognized by Müller on the basis of the asymmetrical staminate flowers. The South American species have not previously been associated with the North American ones, but their resemblance is so close that there can be little doubt they belong here. The plants appear to be reduced forms perhaps derived from within Croton sect. Velamea, and could be accommodated as a subsection within that group.


Monoeocious annual herbs; indumentum appressed-stellate and stellate-lepidote; leaves mostly alternate, entire, pinnately veined, eglandular; stipules obsolete; inflorescences pseudoterminal, reduced, usually with a single pistillate flower below the stamine; petals reduced in pistillate flowers; stamens 5 or 6; pistillate flowers sessile, sepals sometimes unequal, entire, not glandular; ovary 1-locular, style multifid; fruit indehiscent, achene-like.

Although I earlier (Webster, 1967) followed tradition in recognizing *Crotonopsis* as a genus distinct from *Croton*, its close relationship has always been apparent, and it is significant that authors such as Correll & Johnston (1970) have suggested that it could easily be combined. The relationship to such groups as *Gynambrosis* is unmistakable, and it seems significant that there is a reduction series from 3 to 2 carpels within C. sect. *Gynambrosis*. On the other hand, the indumentum is quite different in the two groups, since the trichomes are distinctly lepidote in *Crotonopsis*; furthermore, the style in *Crotonopsis* is multifid, not bifid. The indehiscent fruit in *Crotonopsis* is rather similar in size and shape to the 2-locular capsule of *Croton monanthogynus*, and there does not appear to be a great morphological difference. Clearly, *Crotonopsis* is a highly specialized group derived from taxa within *Croton*, and it seems quite appropriate to treat it as a section of the latter rather than an independent genus.

Species included. – [North America:] *Croton michauxii* G. L. Webster, C. wildeiowii G. L. Webster.


Monoeocious or dioecious trees or shrubs; indumentum lepidote; leaves alternate, pinnately veined, glandular (rarely eglandular) at base; stipules entire; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamens 10-20; pistillate flowers ± pedicellulate, sepals entire, eglandular, valvate; styles bifid.

*Croton* sect. *Argyrocroton* is poorly represented in the New World, and the bulk of the species appear to be African and Madagascar.


Monoeocious or dioecious shrubs; indumentum of foliage lepidote at least in part, scales shallowly toothed; leaves alternate, entire, pinnately veined, eglandular; stipules absent or reduced; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamens 10-15; pistillate flowers mostly sessile or subsessile, sepals equal to distinctly unequal, entire, eglandular, valvate; styles bifid.

As defined here, *Croton* sect. *Lamprocroton* is a South American group of c. 20-30 species (boundaries between species are controversial). The redefined section includes not only the species with bifid styles placed in *C. ser. Lamprocroton* by Müller (1873), but also the species with bifid styles, eglandular leaves, and shallowly lobed scales in Müller’s *C. ser. Argyrocroton*.


Monoeocious shrubs or herbs; indumentum stellate; leaves alternate, pinnately or palmately veined, entire or dentate, eglandular; stipules entire to laciniate; inflorescences terminal, ± congested, without bisexual cymules; petals reduced in pistillate flowers; stamens mostly 11; pistillate flowers sessile or subsessile, sepals strongly unequal and ± deeply laciniate; styles bifid or more often multifid.

Although generally treated as a distinct genus, *Julocroton* does not appear to merit separation unless *Croton* is divided up into a large number of segregate genera, as Klotzsch attempted to do in the 19th century. Over 50 species of *Julocroton* have been described, the vast majority from South America, but despite the partial revision of Croizat (1943) the group remains very poorly understood. A general review of geographic distribution patterns in the group is given by Cordeiro (1990), and a provisional enumeration of species accepted by Webster (1992).


Monoeocious shrubs; indumentum stellate; leaves alternate, palmately veined or triplinerved, with stalked glands on margins; stipules lobed or dissected, ± glandular; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamina 10-18; pistillate sepals with stipitate-glandular margins, subtended by an epicalyx of 5 smaller segments; styles multifid.

This is an entirely American section of c. 10 closely related species; it is very similar to Croton sect. Barhamia except for the larger stamen number.


= Calyptrieripetalum Hassk. in Flora 40: 531. 1857. – T.: Calyptrieripetalum brasiliensis Hassk. [= Croton urticifolius Lam.].

Monoeocious shrubs, stems sometimes viscid; indumentum loosely or appressed-stellate, not woolly; leaves alternate, pinnately or palmately veined, usually dentate, without basal glands; stipules ± glandular-lobed or -dissected, inflorescences terminal, elongated, without bisexual cymules; petals reduced in pistillate flowers; stamina (5)-8-12; sepals of pistillate flowers often glandular on back or margins; styles multifid.

Croton sect. Barhamia is entirely American, but unlike C. sect. Adenophyllum it is well represented in South America. The section shows considerable variability; South American species such as C. betulaster Müll. Arg. and C. glutinosus Müll. Arg. are very distinctive in their nearly glabrous, extremely viscid foliage and probably should be segregated in a separate subsection or section. Two other Mesoamerican species, C. brevipes Pax and C. macropodius Müll. Arg., resemble species of C. sect. Barhamia in habit, but lack clearly glandular-lobed stipules and pistillate cymes; their affinity remains uncertain, but in this synopsis they are tentatively referred to C. sect. Ocula.


Monoeocious shrubs; indumentum stellate; leaves alternate, pinnately veined, eglandular at base; stipules glandular-lobed or sometimes nearly entire; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamina 10-18; pistillate sepals with stipitate-glandular margins, subtended by an epicalyx of 5 smaller segments; styles multifid.

This small section of 2 species is confined to southern Mexico and Central America. Although the stipules in some specimens of Croton decalobus have the glands highly reduced, the pistillate calyx with copious stalked glands is highly suggestive of that in C. sect. Barhamia. It is possible that a more accurate match of phylogeny to classification would result in demoting C. sect. Decalobium to a subsection of C. sect. Barhamia.

Species included. – [Mesoamer.:] Croton decalobatus Müll. Arg., C. pendens Lundell.


Monoeocious dwarf shrubs or perennials herbs; indumentum appressed-stellate; leaves alternate, small (less than 1 cm long), pinnately veined, crenulate, blunt, eglandular at base; stipules glandular-lobed; inflorescences terminal, without bisexual cymules; petals reduced in pistillate flowers; stamina 5-10; pistillate sepals valvate, ± entire or glandular; styles multifid.

The species of this small American section have a very characteristic habit, but species such as Croton escatosis Croat and C. ovalifolius Vahl represent forms transitional between C. sect. Barhamia and C. sect. Micranthis. It is possible that further study will show that C. sect. Micranthis should be treated as a subsection of C. sect. Barhamia. The distribution of C. sect. Micranthis is curious, with a disjunction between the Greater Antilles and Brazil. The position of C. nanus Urb. & Ekman from Hispaniola remains unsettled; it has the small leaves of C. sect. Micranthis but the woolly indumentum of C. sect. Medea.


Croton sect. Hersperidum Baill. in Adansonia 4: 306. 1864. – LT. (designated here): C. matronalis Baill. [= C. vestitus Spreng.]. (Since Baillon took the sectional name from the resemblance of the lectotypic species to Hesperis matronalis, this seems a logical choice.)

Monoecious shrubs or herbs, stems not viscid; indumentum stellate, often woolly; leaves alternate, pinnately or palmately veined, entire or dentate, without basal glands; stipules ± glabrous or dissected; inflorescences terminal, contracted, without bisexual cymes; petals reduced in pistillate flowers; stamens 10-12; pistillate flowers sessile or subsessile, sepalis linear or glandular; styles multifid. Müller (1873) applied the name Croton sect. Medea to such a large diverse residue of Brazilian species with stellate indumentum that his concept is essentially meaningless. However, in the concept of Baillon that is accepted here, C. sect. Medea is a reasonably well characterized temperate and subtropical South American group of c. 30 named species. The diversity among the species is suggested by the generic synonymy, and further study may result in a rational subdivision of C. sect. Medea into subsections. Some Brazilian species such as C. parvifolium Müll. Arg. and C. santolinus Baill. have the habit of C. sect. Medea but lack glandular stipules; they may nevertheless be related.


C. schultesii Müll. Arg. is aberrant in its shrubbier habit, subbicular leaves, and entire pistillate sepalas; but it has the glandular stipules and bracts of C. sect. Medea.


Monoecious trees or shrubs; indumentum stellate (or partly stellate-leepidote); leaves alternate, pinnately or palmately veined, minutely denticulate, glandular or eglandular at base; stipules usually entire, sometimes foliaceous; inflorescences terminal, without bisexual cymes; petals reduced in pistillate flowers; stamens 15-20;

pistillate flowers pedicellate, sepalas reduplicate-valvate, entire, not glandular; styles multifid.

In the sense of Müller (1866, 1873), Croton sect. Lasiogyne included all species of Croton with reduplicate-valvate calyces in the pistillate flowers. Here C. sect. Lasiogyne is construed more narrowly in the sense of Klotzsch and of Baillon, to include c. 25 species widely dispersed in the New World. Despite its lower stamen number and entire stipules, C. santariensis appears to belong here because of its resemblance to C. fragrans.


Monoecious trees or shrubs; indumentum lepidote; leaves alternate, pinnately or palmately veined, ± entire, not glandular at base; stipules not glandular; inflorescences terminal, without bisexual cymes; petals reduced in pistillate flowers; stamens 10-15; pistillate flowers pedicellate, sepalas reduplicate-valvate, entire, not glandular; styles multifid.

As defined here, Croton sect. Argyroglottos has a narrower circumscription than that of C. sect. Argyroglottos of Müller (1873), as it excludes species with glandular stipules or calyces. The section appears to be entirely American, with a total of c. 15 species. C. selloii Baill. is anomalous in having lepidote indumentum and reduplicate-valvate pistillate sepalas as in C. sect. Argyroglottos but glandular-dissected stamens as in C. sect. Codonocalyx; its position must be regarded as uncertain.


Monoecious shrubs; indumentum appressed-stellate, sparse; leaves alternate, pinnately veined, entire, eglandular at base; stipules glabrous or sessile; inflorescences terminal, without bisexual cymes; petals reduced in pistillate flowers; stamens 10-12; pistillate sepalas reduplicate-valvate, ± glandular-dentate; styles multifid.

Croton sect. Astrapoecis is confined to North America and is largely a Caribbean group, with less than 5 species. C. guyanensis Aubl., which was cited under C. sect. Astrapoecis by Müller (1866), differs in its glandular quinquilherved leaves and does not appear to be closely related to C. lucidus. Despite its non-reduce sepalas, it is possible that C. soliman Schltdl. & Cham. may be related to species in this section.
Representative species. — [Yucatan & West Indies:] Croton hujalmarsonii Griseb., C. lucidus L.


Monoecious or dioecious shrubs or perennial herbs; indumentum stellate or stellate-lepidote, densely tomentose or loosely stellate-lepidote; leaves alternate, pinnately veined, entire, eglandular at base; stipules ± glandular-lobed (sometimes ± obsolete); inflorescences terminal, without bisexual cymes; petals reduced in pistillate flowers; stamens 10-15; pistillate flowers pedicellate, sepals reduplicate-valvate, entire or dentate; styles multifid.

Croton sect. Codonocalyx, which is confined to temperate and subtropical South America, includes about 10-12 species. The section is variable, and the type of C. sect. Calycireductus differs from the type of C. sect. Codonocalyx in being dioecious rather than monoecious and in having dentate rather than entire pistillate sepals. However, there are transitional species such as C. helichrysum that are monoecious but have dentate pistillate sepals. Perhaps C. sect. Calycireductae can be retained at subsectional rank. Allem (1978) has reduced many of the proposed names to C. montevidensis. A species from Bolivia, C. avulsa Croizat, although lacking glandular stipules and reduplicate-valvate pistillate calyx, may represent a specialized member of this section.


Monoecious shrubs or herbs; indumentum stellate, often sparse; leaves alternate, mostly pinnately veined or lobed, glandular at base; stipules mostly entire, sometimes glandular or reduced; inflorescences terminal, with or without bisexual cymes; floral receptacle nearly or quite glabrous; petals reduced in pistillate flowers; stamens 12-15; pistillate flowers pedicellate, sepals entire or denticulate; styles mostly multifid; seeds cylindric-tetragonal.

This American section of c. 10 species is one of the more sharply defined within the genus. However, the status of the common weedy species Croton bonplandianus Baill. (treated as C. pauperus by Müller) is doubtful. It differs in its prominent basal foliar glands, bifid styles, and smooth seeds; possibly it has independently lost the receptacular indument characteristic of C. sect. Astrea.


= Pentæa Raf., Sylva Tellur.: 62. 1838. – T: P. tomentosa Raf. [= Croton dioicus Cav.].


Monoecious or dioecious shrubs or herbs; indumentum pressed-stellate or stellate-lepidote; leaves alternate, entire, pinnately veined, eglandular at base; stipules rudimentary or absent; inflorescences terminal, mostly unisexual; petals absent in both staminate and pistillate flowers; stamens 8-12; pistillate flowers ± pedicellate, sepals entire, eglandular, valvate; styles multifid.

All students of Croton have recognized this well-defined section that includes 5 or 6 species of North America and the Caribbean. The species recognized by Müller (1866) have not all been accepted by later workers.


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Literature cited


