

## CONSPECTUS OF A NEW CLASSIFICATION OF THE EUPHORBIACEAE\*

Grady L. Webster\*\*

### Summary

A new classification of the suprageneric taxa of Euphorbiaceae is presented in outline, including a key to the five subfamilies recognized. Latin descriptions are provided for seven new tribes and ten new subtribes.

Several years of study of the genera of Euphorbiaceae have now culminated in a new classification of the family which appears to better reflect phylogenetic relationships than the older systems of Mueller Argoviensis (1866), Pax and Hoffmann (1931), Hurusawa (1954), or Hutchinson (1969). Following the leads of Erdtman (1952), Punt (1962), and Köhler (1965), pollen morphology has proven to be especially useful in providing indications of affinity.

Since a detailed synopsis of the suprageneric taxa of Euphorbiaceae – with keys to the tribes and subtribes – is to be published separately, discussions and complete synonymy are not provided here. The purpose of the present paper is to enumerate the suprageneric taxa accepted in the revised classification and to provide the necessary validation of new names in order that they may be used in forthcoming studies on pollen morphology and anatomy. It will be obvious to those familiar with the older classifications that the most radical innovation proposed here is the primary subdivision of the family into five subfamilies (with dismemberment of the “Stenolobae”). As will be detailed in a later historical discussion, some of the changes proposed here are based on earlier suggestions of various workers, including Airy Shaw, Croizat, Leandri, Léonard, *et al.*

### Synoptic key to the subfamilies

- a) Locules of ovary each with two ovules; milky latex, intraxylary phloem, and stinging hairs absent; indumentum simple or rarely lepidote or dendritic; embedded foliar glands rare; pollen grains binucleate; basic chromosome numbers mostly 12 or 13.
- b) Leaves alternate (very rarely opposite), stipulate, blades simple (except in *Bischofia*); flowers petaliferous or apetalous; pollen grains tricolporate to porate (rarely inaperturate), sexine not spiny (irregularly so in some *Amanoeae*); seeds ecarunculate, endosperm copious to absent. I. PHYLLANTHOIDEAE
- b) Leaves alternate, opposite, or whorled; stipules often small or absent; blades simple to palmately compound; flowers apetalous; pollen grains colpoidorate to porate, sexine characteristically spiny (spines sometimes reduced); seeds often carunculate, endosperm mostly copious. II. OLDFIELDIOIDEAE
- a) Locules of ovary each with a single ovule; latex often present; leaves often with petiolar or laminar glands; indumentum various; pollen grains binucleate or trinucleate; seeds carunculate or ecarunculate, endosperm usually copious; basic chromosome numbers mostly 8, 9, 10, or 11.
- c) Milky latex absent; laticifers if present inarticulate; leaves simple to lobed, rarely

\* Financial assistance, including support towards publication, was provided by grant GB 25347 from the National Science Foundation.

\*\* Department of Botany, University of California, Davis, CA 95616, U.S.A.

compound; indumentum simple to stellate; petals present or absent; pollen grains binucleate, mostly tricolporate, sexine reticulate to rugulose-perforate.

III. ACALYPHOIDEAE

c) Latex reddish or yellowish to milky (rarely absent); laticifers usually present, articulate or inarticulate; leaves simple to palmately lobed or compound; pollen grains binucleate or trinucleate.

d) Latex clear to reddish or whitish, innocuous; laticifers articulate or inarticulate; leaves often palmately veined, lobed, or compound; indumentum simple or often stellate; inflorescence dichasial-paniculate to spicate, bracts usually not biglandular at base; sepals imbricate to valvate, usually completely covering anthers in bud; petals mostly present; floral disk often with staminodia; pollen grains mostly porate or inaperturate, with "crotonoid" pattern of polygonally arranged sexinous processes (tricolporate in *Micrandrea*).

IV. CROTONOIDEAE

d) Latex whitish, often caustic or poisonous; laticifers inarticulate (rarely absent); leaves simple (rarely lobed), pinnately veined or triplinerved; indumentum simple or often absent, never typically stellate (dendritic in *Mabea*); inflorescence racemose to spicate or capitular; bracts mostly biglandular at base; sepals imbricate to obsolete, anthers mostly not covered in bud; petals absent; floral disk usually without staminodia; pollen grains tricolporate, colpi usually marginate, sexine reticulate to more often perforate-tectate.

V. EUPHORBIOIDEAE

EUPHORBIACEAE A. L. de Jussieu, Gen. Pl. 384. 1789 ("Euphorbiae").

Subfamily I. PHYLLANTHOIDEAE Ascherson, Fl. Prov. Brandenburg 1: 59. 1864.

TRIBE 1. WIELANDIEAE Baill. ex Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 339. 1954.

Type: *Wielandia* Baill. Additional genera: *Astrocasia* Rob. & Greenm., *Chorisandrachne* Airy Shaw, *Discocarpus* Klotzsch, *Gonatogyne* Muell. Arg., *Heywoodia* Sim, *Lachnostylis* Turcz., *Pentabrachium* Muell. Arg., *Petalodiscus* Baill., *Savia* Willd.

TRIBE 2. AMANOEA (Pax & Hoffm.) Webster, stat. nov.

*Phyllanthae* subtribe *Amanoinae* Pax & Hoffm., Pflanzenr. 147. XV (Heft 81): 190. 1922. Type: *Amanoa* Aubl. Additional genus: *Actephila* Bl.

TRIBE 3. BRIDELIEAE Muell. Arg., Bot. Zeit. 22: 324. 1864.

Type: *Bridelia* Willd. Additional genus: *Cleistanthus* Hook. f. ex Planch.

TRIBE 4. DICOELIEAE Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 322. 1954. Type: *Dicoelia* Benth.

TRIBE 5. PORANTHEREAE (Muell. Arg.) Gruning, Pflanzenr. 147 (Heft 58): 13. 1913. *Caletieae* subtribe *Poranthereae* Muell. Arg., Linnaea 34: 55. 1865.

Type: *Poranthera* Rudge. Additional genera: *Andrachne* L., *Oreoporanthera* Hutch.

TRIBE 6. SPONDIANTHEAE Webster, trib. nov.

Arbores dioicae; folia alterna, integra, penninervia; stipulae caducae; inflorescentiae terminales paniculatae. Flos ♂ petaligerus; disci glandulae 5; stamina 5; antherae introrsae; pollinis grana subprolata tricolporata reticulata; ovarii rudimentum magnum. Flos ♀ petaligerus vel apetalus; disci glandulae 5; styli 3, bilobi. Fructus capsularis, loculicidus; semina nitida ecarunculata; albumen macrum.

Type: *Spondianthus* Engler.

TRIBE 7. ANTIDESMEAE (Endl.) Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 322. 1954.

Type: *Antidesma* L. Additional genera: *Apodiscus* Hutch., *Celianella* Jabl., *Hyeronima* Fr. Allem., *Leptonema* A. Juss., *Thecacoris* A. Juss.

TRIBE 8. APORUSEAE (Lindl. ex Miq.) Airy Shaw, Hook. Icon. Pl. 38: 3701. 1974.

Type: *Aporusa* Bl. Additional genera: *Ashtonia* Airy Shaw, *Baccaurea* Lour., *Didymocistus* Kuhl., *Maesobotrya* Benth., *Protomegalaria* Hutch., *Richeria* Vahl.

TRIBE 9. DRYPETEAE (Griseb.) Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 334. 1954.

Type: *Drypetes* Vahl. Additional genera: *Neowawurea* Rock, *Putranjiva* Wall.

TRIBE 10. PHYLLANTHEAE Dumort., Anal. Fam. Pl. 45. 1829 ("Phyllanthae").

Subtribe 10a. *Securineginae* Muell. Arg., DC., Prodr. 15(2): 446. 1866 ("Securinegeae").

Type: *Securinega* Comm. ex Juss. Additional genera: *Chascotheca* Urb., *Danguyodry-*

*petes* Leandri, *Keayodendron* Leandri, *Lingelsheimia* Pax, *Meineckia* Baill., *Pleistemon* Sond., *Pseudolachnostylis* Pax, *Zimmermannia* Pax.

Subtribe 10b. *Flueggeinae* Muell. Arg., *Linnaea* 34: 64. 1865 ('Flüggeae').

Type: *Flueggea* Willd. Additional genera: *Breynia* Forst., *Glochidion* Forst., *Margaritaria* L. f., *Phyllanthus* L., *Reverchonina* A. Gray, *Richeriella* Pax & Hoffm., *Sauropus* Bl., *Synostemon* F. Muell.

TRIBE 11. HYMENOCARDIEAE (Muell. Arg.) Hutch., *Amer. J. Bot.* 56: 746. 1969.

*Phyllanthae* subtribe *Hymenocardieae* Muell. Arg., *Linnaea* 34: 64. 1865. Type: *Hymenocardia* Wall. ex Lindl.

TRIBE 12. UAPACEAE (Muell. Arg.) Hutch., *Amer. J. Bot.* 56: 747. 1969.

*Phyllanthae* subtribe *Uapaceae* Muell. Arg., *Linnaea* 34: 64. 1865. Type: *Uapaca* Baill.

TRIBE 13. BISCHOFFIEAE (Muell. Arg.) Hurusawa, *J. Fac. Sci. Univ. Tokyo III.* 6: 339. 1954 ('Bischoffieae').

*Phyllanthae* subtribe *Bischoffieae* Muell. Arg., *Linnaea* 34: 64. 1865. Type: *Bischofia* Bl.

Subfamily II. OLDFIELDIOIDEAE Köhler & Webster, *J. Arnold Arb.* 48: 308. 1967.

TRIBE 14. HYAENANCHEAE (Baill. ex Muell. Arg.) Hutch., *Amer. J. Bot.* 56: 746. 1969.

Subtribe 14a. *Mischodontinae* Muell. Arg., *Linnaea* 34: 202. 1865 ('Mischodontae').

Type: *Mischodon* Thw. Additional genera: *Paragelonium* Leandri, *Parodiodendron* Hunziker, *Podocalyx* Kl., *Tetracoccus* Engelm. ex Parry.

Subtribe 14b. *Hyaenanchinae* Baill. ex Muell. Arg., *Linnaea* 34: 64. 1865 ('Hyaenancheae'). Type: *Hyaenanche* Lamb. & Vahl.

Subtribe 14c. *Paivaeusinae* Pax & Hoffm., *Pflanzenr.* 147. XV (Heft 81): 294. 1922.

Type: *Paivaeusa* Welw. ex Hook. (= *Oldfieldia* Benth.). Additional genera: *Aristogeitonia* Prain, *Celaenodendron* Standl., *Piranhea* Baill.

Subtribe 14d. *Dissiliariinae* Pax & Hoffm., *Pflanzenr.* 147. XV (Heft 81): 288. 1922.

Type: *Dissiliaria* F. Muell. Additional genera: *Austrobuxus* Miq., *Choriceras* Baill., *Longetia* Baill.

TRIBE 15. PETALOSTIGMATEAE (Pax & Hoffm.) Webster, stat. nov. *Phyllanthae* subtribe *Petalostigmatinae* Pax & Hoffm., *Pflanzenr.* 147. XV (Heft 81): 281. 1922.

*Androstachydeaceae* Airy Shaw, *Kew Bull.* 18: 250. 1965.

Type: *Petalostigma* F. Muell. Additional genus: *Androstachys* Prain.

TRIBE 16. CALETIEAE Muell. Arg., *Bot. Zeit.* 22: 324. 1865.

Type: *Caletia* Baill. (= *Micrantheum* Desf.). Additional genera: *Neoroepera* Muell. Arg., *Pseudanthus* Sieb. ex Spreng., *Stachystemon* Planch.

TRIBE 17. PICRODENDREAE (Small) Webster, stat. nov.

*Picrodendronaceae* Small, *J. New York Bot. Gard.* 18: 184. 1917. Type: *Picrodendron* Planch.

Subfamily III. ACALYPHOIDEAE Ascherson, *Fl. Prov. Brandenb.* 1: 58. 1864.

TRIBE 18. CLUTIEAE (Muell. Arg.) Pax, *Naturl. Pflanzenfam.* ed. 1, 3(5): 81. 1890 ('Cluytieae'). Type: *Clutia* L.

*Hippomaneae* subtribe *Cluytieae* Muell. Arg., *Linnaea* 34: 202. 1865; DC. *Prodr.* 15(2): 1043. 1866.

TRIBE 19. POGONOPHOREAE (Muell. Arg.) Webster, stat. nov.

*Hippomaneae* subtribe *Pogonophoreae* Muell. Arg., *Linnaea* 34: 202. 1865. Type: *Pogonophora* Miers.

TRIBE 20. CHAETOCARPEAE (Muell. Arg.) Webster, stat. nov.

*Hippomaneae* subtribe *Chaetocarpeae* Muell. Arg., *Linnaea* 34: 202. 1865. Type: *Chaetocarpus* Thw. Additional genus: *Trigonopleura* Hook. f.

TRIBE 21. CHEILOSEAE (Muell. Arg.) Airy Shaw & Webster, stat. nov.

*Hippomaneae* subtribe *Cheiloseae* Muell. Arg., *Linnaea* 34: 202. 1865.

Type: *Cheilosa* Bl. Additional genus: *Neoscortechinia* Pax.

TRIBE 22. ERISMANTHEAE Webster, trib. nov.

Arbores fruticesve monoicae; pili simplici; folia opposita, ad basin obliqua; inflorescentiae axillares, racemosae vel spicatae. Flos ♂ sepalis 4 vel 5 imbricatis, petalis 5, absque disco; stamina 5-15, libera; pollinis grana 3-colporata, inoperculata, reticulata; rudimentum ovarii evolutum. Flos ♀ sepalis 5 vel 6, imbricatis, petalis interdum evolutis, absque disco; ovarium 3-loculare; styli integri vel bifidi. Fructus capsularis; semina ecarunculata.

Type: *Erismanthus* Wall. ex Muell. Arg. Additional genera: *Moultonianthus* Merr., *Syndyophyllum* Lauterb. & Schum.

TRIBE 23. AMPEREAEE Muell. Arg., Bot. Zeit. 22: 324. 1864.

Type: *Amperea* A. Juss. Additional genus: *Monotaxis* Brongn.

TRIBE 24. CHROZOPHOREAE (Muell. Arg.) Pax & Hoffm., Pflanzenr. 147. XIV (Heft 68): 5. 1919.

Subtribe 24a. *Speranskiinae* Webster, subtrib. nov.

Herbae monoicae; pili simplici; inflorescentiae terminales, spicatae; stamina 10-15, libera; pollinis grana 3-colporata reticulata; discus floris ♀ urceolaris; ovarium tuberculatum; semina foveolato-aspera.

Type: *Speranskia* Baill.

Subtribe 24b. *Ditaxinae* Griseb., Fl. Br. W. Ind. 43. 1859. ('Ditaxideae').

Type: *Ditaxis* Vahl. Additional genera: *Argythamnia* P. Browne, *Caperonia* St.-Hil., *Chiropetalum* A. Juss., *Philyra* Kl.

Subtribe 24c. *Doryxylinae* Webster, subtrib. nov.

Arbores fruticesve monoicae; pili stellati; inflorescentiae terminales vel axillares, racemosae vel paniculatae; stamina 30-250, libera vel connata; pollinis grana 3-colporata reticulata heterobrochata; styli integri vel bifidi; semina carnosae.

Type: *Doryxylon* Zoll. Additional genera: *Melanolepis* Reichb. f. & Zoll., *Sumbaviopsis* J. J. Sm., *Thyrsanthera* Pierre ex Gagnep.

Subtribe 24d. *Chrozophorinae* Muell. Arg., Linnaea 34: 143. 1865 ('Croizophoreae').

Type: *Chrozophora* Necker ex Juss.

TRIBE 25. AGROSTISTACHYDEAE (Muell. Arg.) Webster, stat. nov.

*Acalyphae* subtribe *Agrostistachydeae* Muell. Arg., Linnaea 34: 143. 1865.

Type: *Agrostistachys* Dalz. Additional genera: *Chondrostylis* Boerl., *Cyttaranthus* Leonard, *Pseudagrostistachys* Pax & Hoffm.

TRIBE 26. CARYODENDREAE Webster, trib. nov.

Arbores vel frutices dioicae; pili simplici; folia alterna, ad basin glanduligera; inflorescentiae spicatae, terminales vel axillares. Flos ♂ sepalis 3-5 valvatis; petala nulla; discus intrastaminalis, hirsutulus; stamina 4-15, libera; antherae introrsae, loculis non pendulis, connectivo lato vel glandulosa; pollinis grana oblata, 3-colporata, grosse reticulata; rudimentum ovarii trifidum vel nullum. Flos ♀ sepalis 4-6, imbricatis vel valvatis; discus annularis, hirsutulus; ovarium 3-loculare; styli liberi, indivisi. Fructus capsularis; semina ecarunculata, testa sicca vel carnosae.

Type: *Caryodendron* Karst. Additional genera: *Alchorneopsis* Muell. Arg., *Discoglypemma* Prain.

TRIBE 27. PYCNOCOMEAE Hutch., Amer. J. Bot. 56: 753. 1969.

Subtribe 27a. *Pycnocominae* (Hutch.) Webster, stat. nov. (based on *Pycnomeae* Hutch., supra).

Type: *Pycnocomma* Benth. Additional genera: *Argomuelleria* Pax (position doubtful), *Droceloncia* Leonard.

Subtribe 27b. *Blumeodendrinae* Webster, subtrib. nov.

Arbores dioicae; stamina 15-numerosa; antherarum connectivum ± incrassatum; pollinis grana 3-colporata vel -colpoidorata, sexino subtiliter vel grosse perforato-tectato; styli non dilatati; semina ± carnosae.

Type: *Blumeodendron* (Muell. Arg.) Kurz. Additional genera: *Botryophora* Hook. f., *Ptychopyxis* Miq.

TRIBE 28. BERNARDIEAE Webster, trib. nov.

*Acalyphae* subtribe *Mercurialinae* ser. *Bernardiiformes* Pax & Hoffm., Pflanzenr. 147. VII (Heft 63): 13. 1914.

Arbores, frutices, vel herbae monoicae vel dioicae; pili simplici vel stellati; folia

alterna, saepe glandulosa; inflorescentiae axillares vel terminales, racemosae vel spicatae (interdum contractae). Flos ♂ apetalus; calyx in alabastro clausus, per anthesin valvatum 3-4-fidus; discus intrastaminalis, pulviniformis vel dissectus (interdum obsoletus); stamina 3-6o, libera; pollinis grana 3-lobata, 3-colporata, colpis evidenter marginatis inoperculatis, tecto perforato; ovarii rudimentum obsoletum vel nullum. Flos ♀ apetalus; sepala 4-6, imbricata; discus annularis vel dissectus; ovarium 3-loculare; styli bifidi, interdum lacerati. Fructus capsularis; semina ecarunculata.

Type: *Bernardia* Houst. ex P. Browne. Additional genera: *Discocleidion* (Muell. Arg.) Pax & Hoffm., *Necepsia* Prain, *Neopalissya* Pax & Hoffm.

TRIBE 29. EPIPRINEAE (Muell. Arg.) Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 309. 1954.

Subtribe 29a. Epiprininae Muell. Arg., *Linnaea* 34: 144. 1865. ('Epiprineae').

Type: *Epiprinus* Griff. Additional genera: *Cephalocroton* Hochst., *Cladogynos* Zipp. ex Span., *Koilodepas* Hassk., *Sinopimelodendron* Tsiang, *Symphyllia* Baill.

Subtribe 29b. Cephalomappinae Webster, subtrib. nov.

Arbores monoicae; pili stellati vel fasciculati; folia alterna, integra; inflorescentiae axillares, racemosae; flores ♂ in capitula globosa; calyx gamophyllus, obsolete lobatus; stamina 2-4, filamentis connatis; pollinis grana globosa grosse reticulata manifeste spinulosa; flores ♀ solitarii vel pauci; calyx laciniis 4-6, imbricatis, deciduis; ovarium 3-loculare; styli subintegri (dilatati) ad multifidi; fructus capsularis, verrucosus; semina ecarunculata.

Type: *Cephalomappa* Baill.

TRIBE 30. ADELIEAE Webster, trib. nov.

Arbores vel frutices dioicae (raro monoicae); pili simplici vel stellati; folia alterna, penninervia vel triplinervia, eglandulosa; inflorescentiae axillares, racemosae vel glomerulatae; flores apetalae. Flos ♂ sepalis 4 vel 5, valvatis; discus extrastaminalis vel obsoletus; stamina 8-18; filamentis subliferis vel connatis; antherae introrsae, connectivo angusto; pollinis grana 3-colporata operculata, subtiliter punctata; ovarii rudimentum partitum vel obsoletum. Flos ♀ sepalis 4 vel 5 valvatis; discus annularis vel lobatus, glabrus vel pilosus; ovarium 3-loculare; styli subintegri ad multifid. Fructus capsularis; semina ecarunculata.

Type: *Adelia* L. Additional genera: *Lasiocroton* Griseb., *Leucocroton* Griseb. Doubtfully included genus: *Crotonogynopsis* Pax.

TRIBE 31. ALCHORNEAE (Hurus.) Hutch., Amer. J. Bot. 56: 752. 1969.

Subtribe 31a. Alchorneinae Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 1954.

Type: *Alchornea* Sw. Additional genera: *Aparisthium* Endl., *Bocquillonia* Baill., *Coelebogyne* J. Sm., *Lautenbergia* Baill.

Subtribe 31b. Conceveibinae Webster, subtrib. nov.

Arbores dioicae; pili stellati; inflorescentiae terminales vel axillares; stamina 15-60, libera; calyx ♀ saepe glandulosus; ovarium 2- vel 3-loculare; styli bifidi; semina carunculata vel ecarunculata.

Type: *Conceveiba* Aubl. Additional genera: *Gavarretia* Baill., *Polyandra* Leal.

TRIBE 32. ACALYPHEAE Dumort., Anal. Fam. Pl. 45. 1829.

Subtribe 32a. Ricininae Griseb., Fl. Br. W. Ind. 37. 1859 ('Ricineae').

Type: *Ricinus* L.

Subtribe 32b. Adrianinae Benth., Gen. Pl. 3: 250. 1880 ('Adrianeae').

Type: *Adriana* Gaud.

Subtribe 32c. Lasiococcinae Webster, subtrib. nov.

Arbores vel frutices monoicae vel dioicae; pili simplici vel lepidoti; folia alterna, penninervia, eglandulosa; stipulis caducis; inflorescentiae axillares, racemosae vel spicatae; flos ♂ calyce 3-partito; discus nullus; stamina numerosissima, polyadelphia; pollinis grana 3-colporata, colpis longis angustis; ovarii rudimentum nullum; flos ♀ sepalis 5-8, imbricatis; discus nullus; ovarium 3-loculare; styli indivisi vel bifidi; fructus capsularis, interdum echinatus; semina ecarunculata.

Type: *Lasiococca* Hook. f. Additional genera: *Homonoia* Lour., *Spathiostemon* Bl.

Subtribe 32d. Mercurialinae Pax, Naturl. Pflanzenfam. ed. 1, 3(5): 46. 1890.

*Mercurialideae* (Pax) Hutch., Amer. J. Bot. 56: 753. 1969.

Type: *Mercurialis* L. Additional genera: *Leidesia* Muell. Arg., *Seidelia* Baill.

Subtribe 32e. Dysopsidinae Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 302. 1954.

- Type: *Dysopsis* Baill.  
 Subtribe 32f. *Macarangiinae* (Hutch.) Webster, stat. nov.  
*Macarangeae* Hutch., Amer. J. Bot. 56: 755. 1969.  
 Type: *Macaranga* Pet.-Thou.  
 Subtribe 32g. *Cleidiinae* Webster, subtrib. nov.  
 Arborea vel frutices monoicae vel dioicae, pili simplici; folia alterna, penninervia, glandulosa, stipulata; inflorescentiae axillares vel terminales; flos ♂ disco nullo; stamina 25-80, libera vel basaliter connata; pollinis grana 3-colporata inoperculata ruguloso-vermiculata; flos ♀ disco nullo; ovarium (2-) 3-loculare; styli bifidi; fructus capsularis; semina ecarunculata.  
 Type: *Cleidion* Bl. Additional genera: *Rockinghamia* Airy Shaw, *Sampantaea* Airy Shaw, *Wetria* Baill.  
 Subtribe 32h. *Claoxylinae* Hurusawa, J. Fac. Sci. Univ. Tokyo III. 6: 301. 1954.  
*Claoxyleae*, *Mareyeae* Hutch., Amer. J. Bot. 56: 752, 751. 1969.  
 Type: *Claoxylon* A. Juss. Additional genera: *Athroandra* (Hook. f.) Pax & Hoffm., *Discoclaoxylon* (Muell. Arg.) Pax & Hoffm., *Erythrococca* Benth., *Mareya* Baill., *Mareyopsis* Pax & Hoffm., *Micrococca* Benth. Doubtfully included genera: *Amyrea* Leandri, *Claoxylopsis* Leandri.  
 Subtribe 32i. *Acalyphinae* Griseb., Fl. Br. W. Ind. 45. 1859 ('Acalyphae').  
 Type: *Acalypha* L.  
 Subtribe 32j. *Rottlerinae* Meisner, Pl. Vasc. Gen. 1: 339. 1841 ('Rottlereae').  
*Malloteae* Hutch., Amer. J. Bot. 56: 752. 1969.  
 Type: *Rottleria* Willd. (= *Trewia* L.). Additional genera: *Coccoceras* Miq., *Cordemoya* Baill., *Deuteromallotus* Pax & Hoffm., *Mallotus* Lour., *Neotrewia* Pax & Hoffm., *Octospermum* Airy Shaw, *Trewia* L.  
 TRIBE 33. *PLUKENETIEAE* (Benth.) Hutch., Amer. J. Bot. 56: 753. 1969.  
 Subtribe 33a. *Plukenetiinae* Benth., Gen. Pl. 3: 253. 1880 ('Plukenetiae').  
 Type: *Plukenetia* L. Additional genera: *Anabaena* A. Juss., *Angostyles* Benth., *Astrococcus* Benth., *Eleutherostigma* Pax & Hoffm., *Fragariopsis* St.-Hil., *Haematostemon* (Muell. Arg.) Pax & Hoffm.  
 Subtribe 33b. *Tragiinae* Webster, subtrib. nov.  
 Arborea, frutices, vel herbae (interdum scandentes), monoicae; pili stimulosi; folia eglandulosa; inflorescentiae axillares, terminales, vel oppositifoliae; pollinis grana 3-colporata vel inaperturata, rugulosa; ovarium 3-loculare, saepissime inappendiculatum.  
 Type: *Tragia* L. Additional genera: *Acidoton* Sw., *Cnesmone* Bl., *Megistostigma* Hook. f., *Platygyne* Mercier, *Sphaerostylis* Baill.  
 TRIBE 34. *DALECHAMPIAE* Muell. Arg., Bot. Zeit. 22: 324. 1864.  
 Type: *Dalechampia* L.  
 TRIBE 35. *OMPHALEAE* (Pax & Hoffm.) Webster, stat. nov.  
*Hippomaneae* subtribe *Omphaleinae* Pax & Hoffm., Pflanzenr. 147. IV (Heft 52): 14. 1912. Type: *Omphalea* L.  
 TRIBE 36. *PEREAE* (Kl. & Gcke.) Pax & Hoffm., Pflanzenr. 147. XIII (Heft 68): 1. 1919.  
*Peraceae* Kl. & Gcke., Monatsber. Konigl. Preuss. Akad. Wiss. Berlin 1859: 246. 1859.  
 Type: *Pera* Mutis.
- Subfamily IV. CROTONOIDEAE** Pax, Naturl. Pflanzenfam. ed. 1, 3(5): 14. 1890.
- TRIBE 37. *MICRANDREAE* (Muell. Arg.) Webster, stat. nov. (based on subtribe *Micrandrinae* Muell. Arg., infra).  
 Subtribe 37a. *Micrandrinae* Muell. Arg., DC. Prodr. 15(2): 709. 1866 ('Micrandreae').  
 Type: *Micrandra* Benth. Additional genera: *Cunuria* Baill., *Micrandropsis* Rodrigues.  
 Subtribe 37b. *Heveinae* Muell. Arg., Linnaea 34: 202. 1865 ('Heveae'). Type: *Hevea* Aubl.
- TRIBE 38. *MANIHOTEAE* (Muell. Arg.) Pax, Naturl. Pflanzenfam. ed. 1, 3(5): 77. 1890.  
*Hippomaneae* subtribe *Manihoteae* Muell. Arg., DC. Prodr. 15(2): 1056. 1866.  
 Type: *Manihot* Miller. Additional genera: *Cnidoscopus* Pohl, *Manihotoides* Rogers & Appan, *Victorinia* León.
- TRIBE 39. *ADENOCLINEAE* (Muell. Arg.) Webster, stat. nov. (based on subtribe *Aden-*

oclineae Muell. Arg., infra).

Subtribe 39a. *Adenoclineae* Muell. Arg., *Linnaea* 34: 203. 1865. ('Adenoclineae').

Type genus: *Adenocline* Turcz. Additional genera: *Ditta* Griseb., *Glycydendron* Ducke, *Klaineanthus* Pierre ex Prain, *Tetrorchidium* Poepp. & Endl.

Subtribe 39b. *Endosperminae* Pax & Hoffm., *Pflanzenr.* 147. XIV (Heft 68): 53. 1919 (nomen); *Naturl. Pflanzenfam.* ed. 2, 19c: 42. 1931 (in clavi).

Type: *Endospermum* Benth.

TRIBE 40. GELONIEAE (Muell. Arg.) Pax, *Naturl. Pflanzenfam.* ed. 1, 3(5): 88. 1890.

*Hippomaneae* subtribe *Gelonieae* Muell. Arg., *Linnaea* 34: 202. 1865. Type: *Gelonium* Roxb. ex Willd. (= *Suregada* Roxb. ex Willd.).

TRIBE 41. ELATERIOSPERMEAE Webster, trib. nov.

Arbores monoicae, latice albedo; pili simplici; folia alterna, integerrima, petiolis biglandulosi, stipulis caducis; inflorescentiae terminales vel axillares, cymosae, bisexuales. Flos ♂: sepala plerumque 5, imbricata; discus receptacularis, villosus; petala nulla; stamina c. 10-20, libera, antheris glanduloso-apiculatis; pollinis grana globosa, inaperturata, clavata; ovarii rudimentum minutum vel obsoletum. Flos ♀: sepala plerumque 5, imbricata, caduca; discus cupularis, pubescens, staminodiis numerosis subulatis; petala nulla; ovarium 3-loculare; styli indivisi, dilatati. Fructus capsularis, magnus; semina carnosula, ecarunculata; albumen parcum; cotyledones incrassati.

Type: *Elateriospermum* Bl.

TRIBE 42. JOANNESIAE (Muell. Arg.) Pax, *Bot. Jahrb.* 59: 142. 1924.

Subtribe 42a. *Jatrophiinae* Meisn., *Pl. Vasc. Gen.* 1: 341. 1841. ('Jatropheae').

*Jatropheae* Hutch., *Amer. J. Bot.* 56: 751. 1969.

Type: *Jatropha* L. Additional genera: *Chlamydojatropha* Pax & Hoffm., *Loerzingia* Airy Shaw, *Vaupesia* Schultes.

Subtribe 42b. *Ricinodendrinae* Pax, *Naturl. Pflanzenfam.* ed. 1, 3(5): 87. 1890.

*Ricinodendreae* (Pax) Hutch., *Amer. J. Bot.* 56: 749. 1969.

Type: *Ricinodendron* Muell. Arg. Additional genus: *Givotia* Griff.

Subtribe 42c. *Joannesinae* Muell. Arg., *Linnaea* 34: 201. 1865. ('Johanneseae').

Type: *Joannesia* Vell. Additional genera: *Annesijoa* Pax & Hoffm., *Deutzianthus* Gagnep., *Leuwenbergia* Letouzey & Hallé.

TRIBE 43. CODIAEAE (Pax) Hutch., *Amer. J. Bot.* 56: 747. 1969.

*Cluytieae* subtribe *Codiaeinae* Pax, *Pflanzenr.* 147. III (Heft 47): 10. 1911.

Type: *Codiaeum* A. Juss. Additional genera: *Acidocroton* Griseb., *Baliospermum* Bl., *Baloghia* Endl., *Blachia* Baill., *Dimorphocalyx* Thw., *Dodecastigma* Ducke, *Fahrenheitia* Reichb. f. & Zoll., *Fontainea* Heckel, *Hylandia* Airy Shaw, *Mildbraedia* Pax, *Moacroton* Croizat, *Opbellantha* Standl., *Ostodes* Bl., *Pantadenia* Gagnep., *Parapantadenia* Capuron, *Pausandra* Radlk., *Sagotia* Baill., *Strophoblachia* Boerl.

TRIBE 44. RICINOCARPEAE Muell. Arg., *Bot. Zeit.* 22: 324. 1864.

Subtribe 44a. *Ricinocarpinae* Webster, nom. nov.

*Ricinocarpeae* subtribe *Euricinocarpeae* Muell. Arg., *Linnaea* 34: 56. 1865 (nom. inval.).

Type: *Ricinocarpus* Desf. Additional genera: *Alphandia* Baill., *Beyeria* Miq.

Subtribe 44b. *Bertyinae* Muell. Arg., *Linnaea* 34: 56. 1865 ('Bertyeae').

Type: *Bertya* Planch. Additional genera: *Borneodendron* Airy Shaw (affinity questionable), *Cocconerion* Baill.

TRIBE 45. TRIGONOSTEMONAE Webster, trib. nov.

Frutices vel arbores monoicae; pili simplici; folia alterna ± glandulosa; inflorescentiae axillares vel terminales saepe racemosae, unisexuales. Flos ♂ sepala 5, imbricata; petala 5, calyce longiora; discus glabrus, dissectus vel urceolaris; stamina 3-5, filamentis omnino coalitis, antheris extrorsis connectivo dilatato; pollinis grana globosa, inaperturata, gemmata vel microtuberculata; ovarii rudimentum nullum. Flos ♀: perianthium maris; discus dissectus vel annularis; ovarium 3-loculare; styli ± liberi, bifidi (rarius indivisi). Fructus capsularis; semina ecarunculata.

Type: *Trigonostemon* Bl. Additional genera: *Oligoceras* Gagnep., *Poilaniella* Gagnep.

TRIBE 46. ALEURITIDEAE Hurusawa, *J. Fac. Sci. Univ. Tokyo* III. 6: 309. 1954.

Subtribe 46a. *Aleuritinae* (Hurusawa) Webster, stat. nov. (based on *Aleuritideae* Hurusawa, supra).

Type: *Aleurites* G. Forster. Additional genera: *Reutealis* Airy Shaw, *Vernicia* Lour.  
Subtribe 46b. *Grosserinae* Webster, subtrib. nov.

Arbores vel frutices dioicae; pili simplici vel nulli; folia triplinervia vel penninervia, glandulosa vel eglandulosa; stipulae deciduae vel nullae; inflorescentiae terminales, racemosae vel paniculatae; flos ♂ petalis 4 vel 5, liberis; stamina 6-40, libera vel connata; flos ♀ petalis 4 vel 5, liberis; styli bifidi; semina ecarunculata.

Type: *Grossera* Pax. Additional genera: *Anomalocalyx* Ducke, *Cavacoa* Leonard, *Sandwithia* Lanj., *Tapoides* Airy Shaw. Doubtfully included genera: *Domobinea* Leandri, *Tannodia* Baill.

Subtribe 46c. *Crotonogyninae* Webster, subtrib. nov.

Arbores vel frutices, interdum scandentes, dioicae; pili stellati vel lepidoti; folia alterna, penninervia vel palmatinervia, glandulosa, stipulata; inflorescentiae spicatae, racemosae, vel paniculatae; cayx ♂ 2-4-valvata; petala 4 vel 5, saepe cohaerentia vel coalita; glandulae disci 5-8, liberae vel connatae; stamina 7-40, libera vel connata; antherae saepe apiculatae; flos ♀ sepalis 4 vel 5, imbricatis vel valvatis; discus cupularis; ovarium 3-loculare; stylis bifidis vel multifidis; semina ecarunculata.

Type: *Crotonogyne* Muell. Arg. Additional genera: *Cyrtogonone* Prain, *Manniophyton* Muell. Arg.

Subtribe 46d. *Garciainae* Muell. Arg., *Linnaea* 34: 143. 1865 ('Garcieae'). Type: *Garcia* Vahl ex Rohr.

Subtribe 46e. *Neoboutoninae* (Hutch.) Webster, stat. nov.

*Neoboutoniae* Hutch., *Amer. J. Bot.* 56: 752. 1969.

Type: *Neoboutonia* Muell. Arg. Additional genus: *Benoistia* Perrier & Leandri.

TRIBE 47. CROTONEAE Dumort., *Anal. Fam. Pl.* 45. 1829 ('Crotonieae').

Type: *Croton* L. Additional genera: *Crotonopsis* Michx., *Eremocarpus* Benth.

**Subfamily V. EUPHORBIOIDEAE** [Boiss., *DC. Prodr.* 15(2): 3. 1862].

TRIBE 48. STOMATOCALYCEAE (Muell. Arg.) Webster, stat. nov. (based on subtribe *Stomatocalycinae* Muell. Arg., *infra*).

Subtribe 48a. *Stomatocalycinae* Muell. Arg., *Linnaea* 34: 202. 1865 ('Stomatocalyceae').

Type: *Stomatocalyx* Muell. Arg. (= *Pimelodendron* Hassk.). Additional genus: *Plagiostyles* Pierre.

Subtribe 48b. *Hamilcoinae* Pax & Hoffm., *Pflanzenr.* 147. VII (Heft 63): 419. 1914.

Type: *Hamilcoa* Prain. Additional genus: *Nealchornea* Huber.

TRIBE 49. HIPPOMANEAE A. Juss. ex Spach, *Hist. Nat. Veg.* 2: 522. 1834.

Subtribe 49a. *Mabeinae* Pax & Hoffm., *Pflanzenr.* 147. V (Heft 52): 22. 1912.

Type: *Mabea* Aubl. Additional genera: *Senefeldera* Mart., *Senefelderospis* Steyermark.

Subtribe 49b. *Carumbiinae* Muell. Arg., *Linnaea* 34: 203. 1865. ('Carumbieae').

Type: *Carumbium* Reinw. (= *Omalanthus* A. Juss.).

Subtribe 49c. *Hippomaninae* Griseb., *Fl. Br. W. Ind.* 49. 1859 ('Hippomaneae').

Type: *Hippomane* L. Additional genera: *Actinostemon* Mart. ex Kl., *Adenopeltis* Bert. ex A. Juss., *Bonania* A. Rich., *Colliguaja* Mol., *Dalembertia* Baill., *Duvigneaudia* Leonard, *Excoecaria* L., *Glyphostylus* Gagnep., *Grimmeodendron* Urb., *Gymnanthes* Sw., *Maprounea* Aubl., *Sapium* P. Br., *Sebastiania* Spreng., *Spirostachys* Sond., *Stillingia* Gard. ex L.

TRIBE 50. PACHYSTROMATEAE (Pax & Hoffm.) Pax, *Bot. Jahrb.* 59: 145. 1924.

*Acalypheae* subtribe *Pachystromatinae* Pax & Hoffm., *Pflanzenr.* 147. XIV (Heft 68): 3. 1919. Type: *Pachystroma* Muell. Arg.

TRIBE 51. HUREAE Dumort., *Anal. Fam. Pl.* 45. 1829 ('Huraceae').

Type: *Hura* L. Additional genera: *Algermonia* Baill., *Ophthalmoblapton* Allem., *Tetrapandra* Baill.

TRIBE 52. EUPHORBIEAE [Dumort., *Anal. Fam. Pl.* 45. 1829.]

Subtribe 52a. *Anthosteminae* (Kl. & Gcke.) Webster, stat. nov.

*Anthostemeae* Kl. & Gcke., *Monatsber. Konigl. Preuss. Akad. Wiss. Berlin* 1859: 247. 1859.

Type: *Anthostema* A. Juss. Additional genus: *Dichostemma* Pierre.



Subtribe 52b. *Neoguillaumininae* Croiz., *Phil. J. Sci.* 64: 408. 1938.

Type: *Neoguillauminia* Croiz. Additional genus: *Calycopeplus* Planch.

Subtribe 52c. *Euphorbiinae* [Hurusawa, *J. Fac. Sci. Univ. Tokyo III.* 6: 226. 1954.]

Type: *Euphorbia* L. Additional genera: *Chamaesyce* S. F. Gray, *Cubanthus* (Boiss.) Millsp., *Endadenium* Leach, *Monadenium* Pax, *Pedilanthus* Neck. ex Poit., *Synadenium* Boiss.

#### *Acknowledgement*

I wish to thank Dr. A. M. W. Mennega and Dr. W. Punt (Utrecht) for a critical review of the first two subfamilies in the manuscript.

#### *References*

- ERDTMAN, G. 1952. – Pollen morphology and plant taxonomy: angiosperms. Stockholm.  
HURUSAWA, I. 1954. – Eine nochmalige Durchsicht des herkömmlichen Systems der Euphorbiaceen im weiteren Sinne. *J. Fac. Sci. Univ. Tokyo III.* 6: 209-342.  
HUTCHINSON, J. 1969. – Tribalism in the family Euphorbiaceae. *Amer. J. Bot.* 56: 738-758.  
KÖHLER, E. 1965. – Die Pollenmorphologie der biovulaten Euphorbiaceae und ihre Bedeutung für die Taxonomie. *Grana Palynol.* 6: 26-120.  
MUELLER, J. 1866. – Euphorbiaceae. *DC. Prodr.* 15(2): 189-1261.  
PAX, F., & K. HOFFMAN 1931. – Euphorbiaceae. *Natürl. Pflanzenfam.* ed. 2, 19c: 11-233.  
PUNT, W. 1962. – Pollen morphology of the Euphorbiaceae with special reference to taxonomy. *Wentia* 7: 1-116.

### NEWS AND NOTES

#### INTERNATIONAL ORGANIZATION OF PALAEOBOTANY

*Council 1975-1981.*

*President:* J. M. SCHOPF.

*Vice-President:* E. BOUREAU.

*Secretary:* H. TRALAU.

*Members:* S. ARCHANGELSKY; D. C. DILCHER; D. DOUGLAS; S. MEYEN; D. D. PANT; R. WEBER; S. G. ZHILIN.

#### A SUMMER COURSE IN NUMERICAL TAXONOMY

A four week course including lectures and laboratory is tentatively planned at the Estudos Avançados de Oeiras of the Gulbenkian Foundation in Oeiras, Portugal, to start 19 July 1976.

The course by Professors Robert R. Sokal and F. J. Rohlf of the State University of New York at Stony Brook, conducted in English, is intended for post-graduate students and post doctoral researchers in biology, geology and related fields. The class is limited to 25 students. Participants must have a knowledge of elementary statistics (at the level of Sokal and Rohlf: *Introduction to Biostatistics*. W. H. Freeman & Co., S. Francisco).

Tuition is free and subsidized housing (single rooms) and lunches are furnished. A few scholarships for living (but not for travel) expenses might be available and participants should plan on obtaining support from their home institutions.

Portuguese, Spanish, Armenian and Brazilian applicants should write to Dr. N. van Uden, Executive Secretary, Estudos Avançados de Oeiras, Oeiras, Portugal.

All others should write to Prof. F. J. Rohlf, Dept. of Ecology and Evolution, State University of New York at Stony Brook, Stony Brook, NY 11794, U.S.A.