Acta Botanica Neerlandica **14** (1965) 323–365

A REVISION OF THE GENUS MEINECKIA (EUPHORBIACEAE)

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(received April 22nd, 1965)

ABSTRACT

A revision of the Euphorbiaceous genus *Meineckia* has resulted in the recognition of 19 species, with 7 subspecies and 2 varieties (for a total of 25 distinct taxa). Proposed as new are 5 species and 1 subspecies, while new combinations are necessary for 14 species and 6 subspecific taxa. The extraordinary confusion in the taxonomic history of the genus is illustrated by the fact that the 14 previously recognized species have been classified under 6 different generic names: *Cluytiandra, Flueggea, Neopeltandra, Peltandra, Phyllanthus*, and *Securinega*. As revised, the number of species represented in the different regions is as follows: America, 3; Africa and Arabia, 4; Madagascar, 8; India and Ceylon, 4. The genus appears to be of African origin and is probably most closely related to *Zimmermannia*.

INTRODUCTION

At this point in the Twentieth Century, botanical exploration has reached the stage where few really distinct new genera of angiosperms await discovery outside such exotic places as New Guinea and Madagascar. However, there is still a considerable amount of exploration to be done among the mountains of literature and herbarium collections amassed during the past two centuries. Some perfectly distinctive genera of flowering plants are about as effectively hidden in this systematic labyrinth as if they were growing atop the sandstone peaks of he Guiana Highlands. Such, at least, has been the fate of the Euphorbiaceous genus *Meineckia*, which until now has never been recognized in its entirety.

Most representatives of *Meineckia* are inconspicuous or rare, and none appear to have been described prior to 1852, when Wight established the genus *Peltandra* on the basis of two Indian species. The taxonomic history of the genus since then has been one of wholesale confusion and obscurity. BAILLON (1858), only six years after Wight, proposed a new genus *Meineckia* on the basis of an Arabian plant collected by Botta, but incorrectly described the flowers as petaliferous. MUELLER (1865), noting that the flowers were in fact apetalous, reduced *Meineckia* to a synonym of *Flueggea*, and in his treatment in the "Prodromus" (1866) transferred the single Arabian species to *Securinega*.

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Meanwhile, MUELLER (1863) had demoted Wight's *Peltandra* to the rank of a section of *Phyllanthus*, while a year later (1864) he created a new genus *Cluytiandra* for an Angolan species collected by Welwitsch, apparently without suspecting any relationship between the Indian and African plants. In Mueller's revision in the "Prodromus" (1866) the known species of *Meineckia* were thus disposed under four different taxa: *Cluytiandra*, *Phyllanthus* sect. *Peltandra*, *Securinega* sect. *Flueggea*, and *Securinega* sect. *Gelfuga*. Part of the reason for this taxonomic malpractice may lie in the fact that Wight had failed to observe the pistillode in the male flowers of the Indian species, and omitted it from his illustrations. Although Mueller detected the pistillode in the male flower of *Phyllanthus neogranatensis*, he did not appear to notice it in the Indian species, nor did HOOKER (1887) or GAMBLE (1925). PAX and HOFFMANN (1922), in a treatment supposedly of the entire genus *Cluytiandra*, actually discussed only the African species.

GAMBLE (1925) realized that the Indian species assigned by Mueller and by Hooker to *Phyllanthus* sect. *Peltandra* did not really belong in *Phyllanthus*. Knowing that the generic name *Peltandra* Wight was preoccupied by *Peltandra* Raf., he proposed a new generic name, *Neopeltandra*. During the past 40 years, as a result of these breakdowns in taxonomic communication, the taxa of *Meineckia* have masqueraded under entirely different names on the various continents: as *Phyllanthus* in North America, *Phyllanthus* and *Securinega* in South America, *Phyllanthus* and *Cluytiandra* in Africa and Madagascar, and *Neopeltandra* in India and Ceylon. This thoroughgoing parochialism in treatment has effectively obscured the geographical range of the genus, its coherence as a phyletic unity, and its relationship to other taxa in the Euphorbiaceae.

Examination of the herbarium material of the taxa discussed below clearly indicates that they all belong together in a single genus distinct from *Phyllanthus* because of the annular disk and pistillode of the male flower, and from *Securinega* by virtue of the fused filaments and characteristic pitted seeds. At the generic level, Baillon's name *Meineckia* clearly has priority over *Cluytiandra*; even though he later (1874) followed Mueller in reducing *Meineckia* to a synonym of *Securinega*, it must be adopted. Conservation of the name *Cluytiandra* does not appear warranted, since (1) only 5 of the 19 species herein accepted have heretofore received the proper combinations under that name; (2) the genus is not economically important; and (3) the generic name has scarcely been used except in certain African and Malagasian floristic manuals.

MORPHOLOGY

The species of *Meineckia* are shrubby plants which rarely exceed 4 or 5 m in height; some forms of *M. phyllanthoides* and *M. parvifolia* are very nearly herbaceous. The stems are usually slender and often zig-zag, with strictly distichous phyllotaxy. The foliage may be either deciduous or evergreen, but except in the aberrant Madagascar species

M. orientalis, the leaves are thin and even membranous. Most of the taxa are monoecious, except for the Central American *M. bartlettii* and some of the Madagascar species. It is not always easy to determine whether a species is monoecious or dioecious, since sometimes the male flowers appear first and may have mostly fallen off by the time fruits are maturing. Fortunately, the female pedicel leaves a distinct basal stump in many species, so that it is sometimes possible to determine the monoecious or dioecious condition even from barren specimens.

Flowers of *Meineckia* are typically produced in axillary clusters which represent reduced cymules, the first (basal or central) flower being female and all the others male. Only very rarely are female flowers found paired at the axils; isolated instances have been found in *M. phyllanthoides*, *M. parvifolia*, and *M. trichogynis*. The pentamerous calyx is monotonously similar in nearly all species, the calyx-lobes having a single usually unbranched midvein. The annular floral disk, which is at least partially adnate to the calyx, is thin and shallowly cupuliform in most species, although in *M. calycina* it is thickened and fleshy. The androecium is very characteristic, as in all species the filaments are united for at least ¼ or ⅓ their lengths into a staminal column. This column is adnate to the pistillode, so that only the upper part of the pistillode is visible above the end of the column; in descriptions, measurements of the pistillode refer only to this free portion. In flowers in which the filaments are fused only about halfway, they project above the pistillode, and it may then be easily overlooked (especially where it is minute, as in some of the Indian taxa). The anthers are attached above the base and are thus nearly versatile, with a more or less extrorsely lateral dehiscence. The pollen grains are not exceptional, much resembling those in various unspecialized genera of Phyllantheae, as indicated by PUNT (1962). In all taxa examined, the grains are tricolporate, rather finely reticulate, with a fairly conspicuous costate colpus transversalis. There is not much difference in size, the mean length in the species with the largest grains (*M. neogranatensis*) being 39.7 μ compared to 32.4μ for the grains of *M. calycina*.

The female flower of *Meineckia* is outstanding chiefly because of its elongated, slender, often channelled, stramineous pedicel which is usually articulated somewhat above the base. This basal portion, here designated as the *podium*, is about 0.5–3.5 mm long and usually darker than the pedicel proper; it may persist as a noticeable stump after dehiscence of the fruiting pedicel. The ovary is invariably glabrous, 3-carpellate, each carpel with 2 anatropous ovules. The styles in most taxa are bipartite or at least deeply bifid, and the slender terete style-branches are usually capitate.

The capsular fruit of *Meineckia* ordinarily contains only 3 seeds at maturity, one ovule in each locule aborting during development. However, fruits with 2 seeds per locule occasionally occur on the same plant as capsules with solitary seeds; this has been observed in *M. fruticans* and *M. humbertii*, and may be found in some of the other species as well. The seeds of *Meineckia* are especially characteristic and in fact

present the best single diagnostic feature for the genus. Due to unequal growth—the abaxial side of the ovule far outstripping the adaxial (funicular) side—the seed assumes a distinctly reniform outline at maturity. The micropylar and chalazal ends are both beaked and convergent over the raphe, which lies in a semicircular recess on the ventral side of the seed. The seed-coat is deeply and rather evenly pitted (shallowly pitted only in 2 Indian species), with the pits making deep indentations into the endosperm. When the seed is soaked in water the beaks straighten out and the pits become shallower, but the general configuration remains unchanged. One might suppose that the pitting represents an adaptation for rapid penetration of water, but in fact the seeds of *Meineckia* do not appear to take in water noticeably faster than the unpitted seeds of other Phyllantheae. The embryo is typical for many Phyllantheae, with thin cotyledons considerably broader and somewhat longer than the radicle.

Relationships

Among the poorly understood welter of taxa in the Phyllantheae, *Meineckia* stands out as a comparatively well-defined genus; its recognition appears justified regardless of future taxonomic changes with regard to the circumscription of such genera as *Andrachne*, *Flueggea*, *Savia*, and *Securinega*. Most of the speculations of earlier authors about the relationship of *Meineckia* with other genera are rather wide of the mark. Mueller (1866) listed *Cluytiandra* adjacent to *Lachnostylis*, a genus very different in its petaliferous flowers, pubescent disk and pistillode, thick-walled capsule, and plicate cotyledons. Bentham (1878, 1880) went a very far afield by postulating a relationship with *Sauropus*, because of a fancied resemblance in the "squamules" of the calyx. Pax (1890) followed Bentham's unfortunate suggestion, and finally Pax and Hoffmann (1922) placed *Cluytiandra* in the same subtribe with *Pseudolachnostylis*, a tropical African genus said to differ in its habit and thick-walled tardily dehiscent fruits. However, as shown by Punt (1962), the pollen grains of *Pseudolachnostylis* are very coarsely reticulate as in *Amanoa* and do not resemble those of *Meineckia*. The extra-African species of *Meineckia*, as pointed out earlier, have been referred to either *Phyllanthus* or *Securinega*, depending on whether or not the observer detected the pistillode in the male flower.

A better suggestion of relationship was made by Baillon (1874), when he united *Cluytiandra* with *Andrachne*. Although it differs in its petaliferous flowers and paired, non-pitted seeds, *Andrachne* includes a number of species which show some habital resemblance to *Meineckia*, and it would be easy to derive the characters of the latter genus by loss of petals and specialization of the seeds. The South African *Andrachne ovalis*, which was placed in a special section (*Pseudo-Phyllanthus*) by Mueller and transferred to *Savia* by Pax and Hoffmann, shows an especially close resemblance in aspect and has solitary seeds which are distinctly roughened and somewhat beaked, although they are not foveately pitted as in *Meineckia*. The West Indian genus *Chascotheca* has

solitary seeds resembling those of *Andrachne ovalis*, and is closer to *Meineckia* in being apetalous. However, it differs in having subsessile male flowers and the stamens free from the pistillode, as well as in its peculiarly modified seeds.

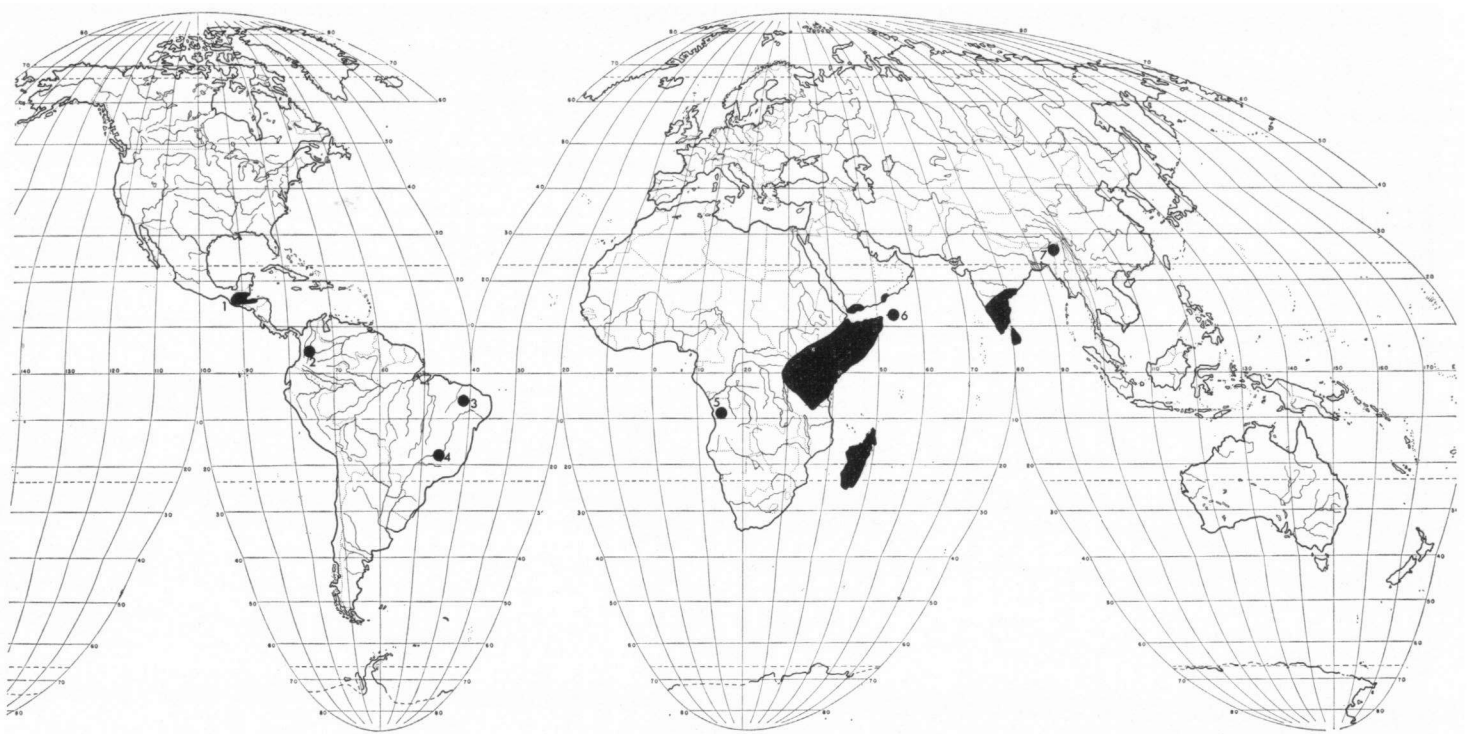
Undoubtedly the closest taxon to *Meineckia* is *Zimmermannia*, which was placed adjacent to *Cluytiandra* by HUTCHINSON (1912). The African species of *Zimmermannia*, recently revised by VERDCOURT (1954), mostly differ from *Meineckia* in their foliaceous stipules, calyx lobes with several parallel veins, stamens free from the pistillode, and rugose rather than pitted seeds. However, the seeds of *Z. ovata* are pitted; and the Madagascar species described by Leandri as *Cluytiandra decaryi* proves to be intermediate in several respects, having the small stipules and connate filaments of *Meineckia* but the multiveined calyces and rugose seeds of *Zimmermannia*. Although the species seems best placed in *Zimmermannia*, it bridges the gap to such an extent that it raises the question of whether the two genera should be kept distinct. At present the two taxa may tentatively be maintained as separate genera, but it must be admitted that the discovery of additional transitional species may force a reappraisal of the situation.

GEOGRAPHICAL DISTRIBUTION

The circumtropical and at the same time highly disjunct range of *Meineckia* (Map 1) suggests that the group may be an ancient assemblage of relict populations. The species ranges may be grouped into eight major areas: three New World (Central America, Colombia, Brazil) and five Old World (Angola, Madagascar, northeastern Africa and adjacent Arabia, southern India and Ceylon, and Assam). Ecological data for many of the taxa are very scanty, but most appear to grow as shade-loving understory shrubs in lower montane rain forest or semi-deciduous forest. Some forms of *M. phyllanthoides*, and the endemic *M. filipes* on Socotra, are on the other hand xerophytic undershrubs of open scrub formations. The rather common *M. fruticans* of eastern Africa occurs both in the coastal scrub woodland and the better developed woodland inland.

Although no sections have been recognized in *Meineckia*, the degree of affinity between taxa appears to be somewhat correlated with the eight geographical regions. The Madagascar species, which form a distinctive and somewhat isolated group, seem to show a somewhat greater degree of adaptation to rain-forest habitat than do species in other regions. However, they can be related to the eastern African species via the resemblances between *M. madagascariensis* and *M.*

Map. 1. Generalized distribution of the genus *Meineckia*. The numbers indicate the following taxa: 1) *M. bartlettii* and *M. capillipes*; 2) *M. neogranatensis* ssp. *neogranatensis*; 3) *M. neogranatensis* ssp. *gardneri*; 4) *M. neogranatensis* ssp. *hilariana*; 5) *M. phyllanthoides* ssp. *trichopoda*; 6) *M. filipes*; 7) *M. macropus*. The range in Africa, Madagascar, and India has many local discontinuities but these cannot be indicated on a map of this scale. (Base map by Ronald Goode, University of Chicago Press.)

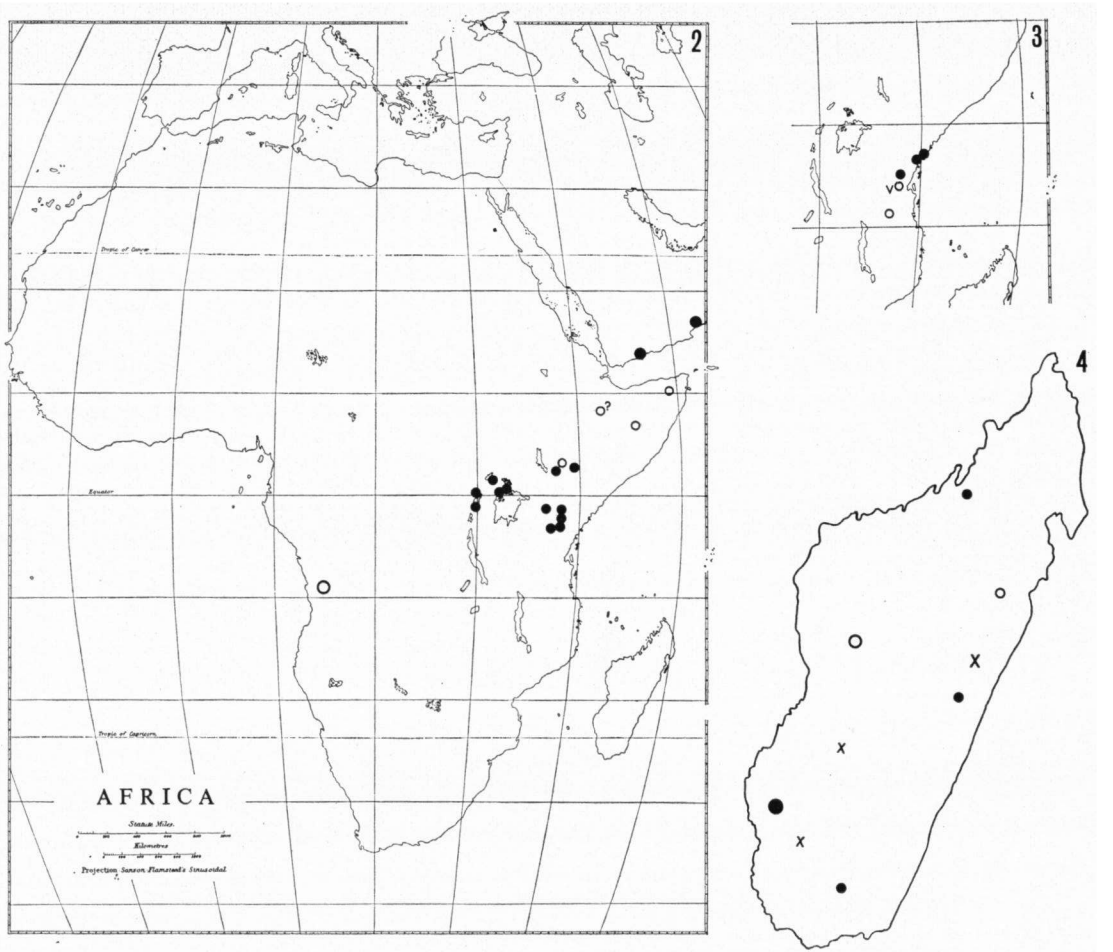


Map 1
(For legend see bottom of page 327)

Map 2. Distribution of the taxa of *Meineckia phyllanthoides*: ssp. *phyllanthoides*, large dots; ssp. *somalensis*, small circles (question mark indicates the unconfirmed report from Dagaga); ssp. *capillariformis*, small dots; ssp. *trichopoda*, large circle. (Base map by George Philip & Son)

Map 3. Distribution of the other east African taxa of *Meineckia: M. vestita*, V; *M fruticans* var. *fruticans*, circles; *M. fruticans* var. *engleri*, dots.

Map 4. Distribution of the Madagascar taxa of *Meineckia: M. peltata*, small circle; *M. leandrii*, large circle; *M. madagascariensis*, small dots; *M. humbertii*, large dot; *M. pubiflora*, small X; *M. orientalis*, large X.



fruticans. The Angolan, east African, and Indian regions are interconnected by the evident close resemblance between *M. phyllanthoides* and *M. parvifolia;* these two allopatric species appear to be the descendants of an earlier more widespread and continuous population. Two Indian species, *M. calycina* and *M. macropus*, are divergent in their large pointed leaves and shallowly pitted seeds. However, the androecium in *M. calycina* resembles that in *M. fruticans*, and in several respects *M. longipes* from extreme southern peninsular India bridges to some extent the gap between *M. parvifolia* and *M. calycina*.

The New World species of *Meineckia* also show resemblances to the African taxa. The three South American taxa, here treated as subspecies of *M. neogranatensis*, are very similar to each other and furthermore show an approach in vegetative characters to the African *M. phyllanthoides*. The two Central American species, with their acuminate leaves, are more sharply set off, and show as much or more similarity to various Old World taxa than they do to their South American congeners.

Because of the relatively close resemblance of all species of *Meineckia* and our imperfect knowledge of a large proportion of them, construction of a phylogenetic tree is unwarranted at the present time. However, the overall distribution patterns may at least be related to the probable history of the genus as a whole. The diversity of taxa there, and the evident resemblances with *Andrachne ovalis* and *Zimmermannia*, suggest that the African region was the probable center of origin of the genus, as BENTHAM (1878) had suggested for the entire *Phyllanthus* complex. Since the vicariant-pair *M. phyllanthoides-M. parvifolia* spans most of the Old World range of the genus, it seems not unlikely that this complex may to some extent represent the descendants of the original dispersion of the genus, which thus stretched from the Atlantic coast of southwest Africa to southern India and Ceylon. However, *M. fruticans*, with its more specialized androecium, must have arisen early and it or some allied population may have furnished the ancestral immigrant form of the Madagascar species. The New World taxa cannot be definitely related to either *M. fruticans* or *M. phyllanthoides*, but it is not clear whether this is because the immigration to America occurred before the original African population had speciated, or because the local changes undergone since immigration have obscured the matter. It is striking that the 3 South American taxa are much more similar to one another than are the Central American pair, despite their much greater geographical isolation. Although spatial isolation has doubtless affected the genesis of species in an important manner, the relationship is not a simple one, and until the living plants become better known, the other important factors in the evolution and survival of the species will remain unfathomable.

MATERIALS

The inadequacy of sampling of *Meineckia* populations is indicated by the fact that a total of only about 100 collections (ca. 150 herbarium sheets) of the 25 taxa have been examined. Certain of the African and

Indian taxa may be better represented by collections in other herbaria, but probably the total number of collections of *Meineckia* deposited at all scientific institutions is not over 200. In view of this fact, any treatment of *Meineckia* at the present time must be considered provisional.

The writer wishes to thank the directors and curators of all the herbaria listed below, who loaned specimens for study. The collections from the Royal Botanic Gardens, Kew, and the Laboratoire de Phanérogamie, Paris, were particularly important in the number of taxa represented.

BLAT	Blatter Herbarium, St. Xavier's College, Bombay
BM	British Museum (Natural History), London
BR	Jardin Botanique de l'Etat, Bruxelles
COI	Botanical Institute, University of Coimbra, Coimbra
F	Chicago Natural History Museum, Chicago
G	Conservatoire et Jardin botaniques, Geneva
K	Herbarium, Royal Botanic Gardens, Kew
M	Botanische Staatssammlung, Munich
MO	Missouri Botanical Garden, St. Louis
P	Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris
S	Naturhistoriska Riksmuseum, Stockholm
US	United States National Museum, Washington

The measurements of vegetative parts, fruits, and fruiting pedicels are based on dried specimens, those of the floral organs on boiled flowers. The length quoted for the fruiting pedicel is that exclusive of the podium, which is given separately. For critical examination of the male flowers, magnification of at least X40 will usually be necessary.

Key to the taxa related to Meineckia

1. Petals present; stamens free from pistillode . . . *Andrachne ovalis*
1. Petals absent
   2. Pistillode present
      3. Disk segmented or absent; seeds paired in each locule, smooth . . . . . *Flueggea*
      3. Disk annular; seeds solitary in each locule, not smooth.
         4. Filaments free from the pistillode; seeds rugose or corrugated.
            5. Chalaza with dorsal pit; stipules not foliose; male flowers subsessile . . . . . *Chascotheca*
            5. Chalaza ventral; stipules usually foliose; male flowers pedicellate . . . . . *Zimmermannia*
         4. Filaments connate, adnate to the pistillode; seeds foveolately pitted; male flowers pedicellate *Meineckia*
   2. Pistillode absent
      6. Disk annular; seed coat with bony inner layer, fleshy outer layer . . . . . *Margaritaria*
      6. Disk usually not annular in male flowers; seed coat, if bony, not with fleshy outer layer . . . . . *Phyllanthus*

Meineckia Baill. Etud. Gen. Euphorb. 587. 1858.

Type: *Meineckia phyllanthoides* Baill.

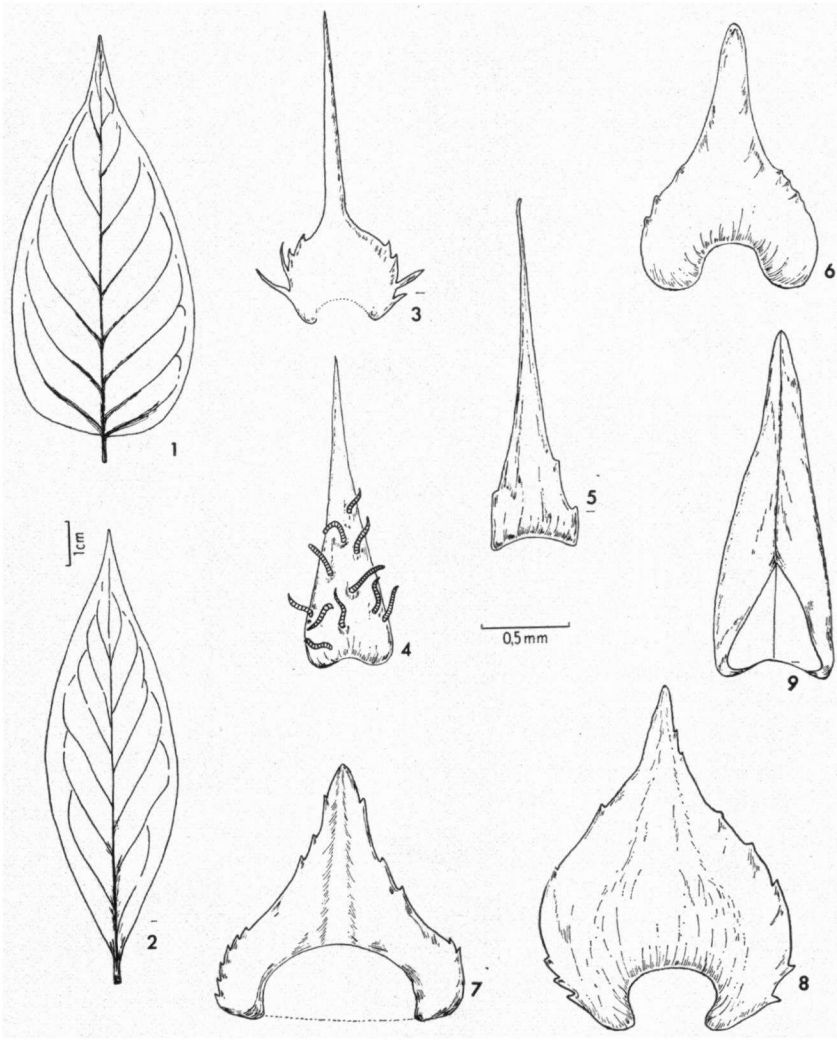
Heterotypic synonyms: *Peltandra* Wight, Icon. Pl. Ind. Or. 5: (24), t. 1891, 1892. 1852 (non *Peltandra* Raf.); *Phyllanthus* sect. *Peltandra* Muell. Arg. Linnaea 32: 10. 1863; *Neopeltandra* Gamble, Fl. Madras 1285, 1925. Lectotype: *Peltandra parvifolia* Wight.

Flueggea sect. *Gelfuga* Baill. Etud. Gen. Euphorb. 593. 1858; *Securinega* sect. *Gelfuga* (Baill.) Muell. Arg. in DC. Prodr. 15 (2): 447. 1866. Type: *Flueggea trichogynis* Baill.

Cluytiandra Muell. Arg. Jour. Bot. 2: 328. 1864. Type: *Cluytiandra trichopoda* Muell. Arg.

Shrubs or undershrubs, sometimes nearly herbaceous; phyllotaxy distichous; leaves deciduous or evergreen, stipulate (stipules not foliaceous), mostly distinctly petiolate. Monoecious or dioecious; cymules axillary unisexual or bisexual, female flowers solitary (very rarely paired), male several to many per cymule; flowers apetalous, usually greenish and inconspicious. Male flower: pedicel slender, basally but inconspicuously articulate; calyx-lobes 5 (very rarely 6), with a single midvein; disk annular or patelliform, adnate (at least partially) to the calyx; stamens 5, filaments united $^1/_4$ to $^9/_{10}$ their lengths into a slender or stout column; anthers dehiscing laterally or extrorsely; pollen grains tricolporate, finely reticulate, colpus transversalis elliptic and costate; free part of pistillode inserted atop the staminal column, trifid to lobed or subentire. Female flower: pedicel long and slender, terete, stramineous, usually distinctly articulated above the base (the persistent subarticular part then differentiated as a podium); calyx-lobes 5, with a single midvein, generally herbaceous with paler margins, becoming more or less scarious in fruit; disk annular, as in the male flower; ovary smooth and glabrous, carpels 3, ovules anatropous, 2 in each cell; styles 3, bipartite or bifid, the style-branches capitate or less commonly clavate. Fruit capsular, cocci thin and veiny; columella persistent, slender; seeds solitary (rarely paired) in each locule, not carunculate, strongly curved into a reniform outline, the micropylar and chalazal beaks adaxially convergent over a distinct raphe, deeply or shallowly foveolate-pitted on the sides and back; embryo embedded in copious endosperm, cotyledons flat and thin, much broader than the radicle; radicle over half the length of the cotyledons, bent at a distinct angle.

The species of *Meineckia* are so closely interrelated that it is impracticable to attempt to recognize any formal subgeneric taxa. Because of the incompleteness of the material of many species and the lack of sufficient clear-cut diagnostic chacters, it is impossible to construct a key which will quickly and easily identify all specimens. To remedy this unfortunate situation, the general synoptic key to all the species is followed by four regional keys which will be found the most useful for practical indentification.

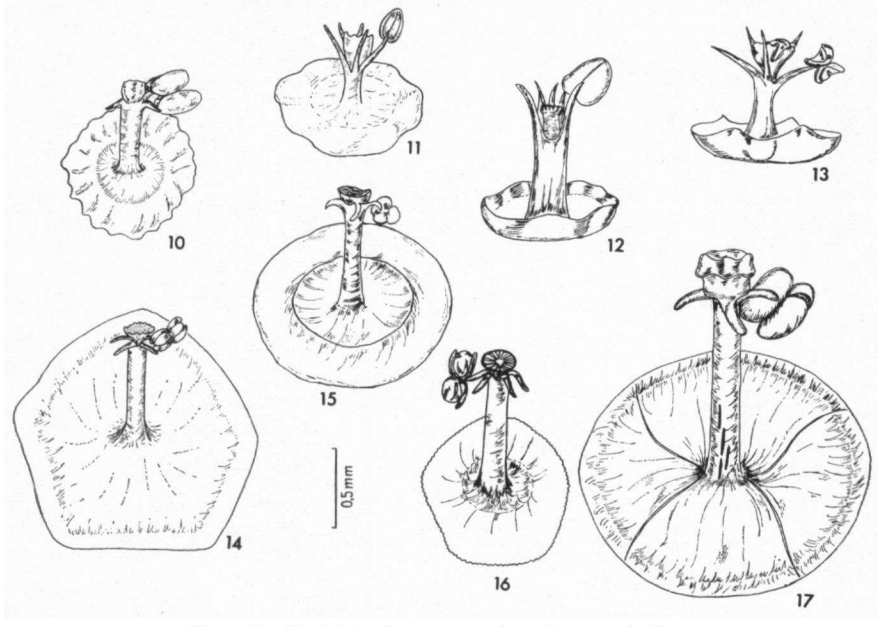


Figs. 1–2. Leaves:

1. *Meineckia longipes* (Beddome s.n.). 2. *M. trichogynis* (Petit-Thouars).

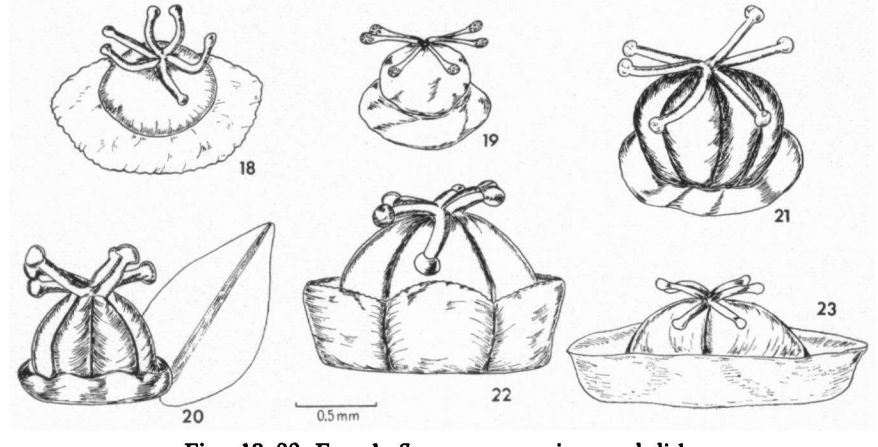
Figs. 3–9. Stipules:

3. *M. phyllanthoides* ssp. *trichopoda* (Welwitsch 327).
4. *M. vestita* (Hornby 2055).
5. *M. parvifolia* (Wight 7910).
6. *M. longipes* (Beddome s.n.).
7. *M. calycina* (Fischer 3594).
8. *M. trichogynis* (Petit-Thouars).
9. *M. peltata* (Cours 1202).



Figs. 10–17. Male flowers: androecium and disk:

10. *Meineckia phyllanthoides* ssp. *trichopoda* (Welwitsch 327).
11. *M. parvifolia* (Barber 3639).
12. *M. vestita* (Hornby 2055).
13. *M. capillipes* (Pittier 8614).
14. *M. bartlettii* (Lundell 6137).
15. *M. longipes* (Beddome s.n.).
16. *M. leandrii* (Decary 7985).
17. *M. pubiflora* (Humbert 19644).



Figs. 18–23. Female flowers: gynoecium and disk:

18. *Meineckia phyllanthoides* ssp. *somalensis* (Collenette 121).
19. *M. parvifolia* (Barber 3639).
20. *M. vestita* (Hornby 2055).
21. *M. bartlettii* (Lundell 6137).
22. *M. fruticans* var. *fruticans* (Semsei 1162).
23. *M. longipes* (Beddome s.n.).

KEY TO THE SPECIES

1. Stems not sharply angled, or if so then leaves thin (membranous or thinly chartaceous, not subcoriaceous); seeds mostly under 3.5 mm long.
   2. Filaments united only in the lower ¼ to ⅔, the free filament tips usually erect or ascending, projecting well above the pistillode, often longer than the anthers; monoecious; leaves rounded to obtuse or acute at the tip (not acuminate).
      3. Fruiting pedicels mostly 10 mm long or more (rarely only 7 mm); male pedicel over 2 mm long, male calyx-lobes mostly over 0.8 mm long.
         4. Stems and leaves glabrous or scabridulous, not hirsutulous; leaves usually distinctly pointed at the tip.
            5. Fruiting calyx-lobes (1.0–) 1.2–2.0 mm long; filaments united more than halfway . . . . . 1. *M. phyllanthoides*
            5. Fruiting calyx-lobes 0.8–1.0 mm long; filaments united halfway or less . . . . . 2. *M. parvifolia*
         4. Stems and leaves distinctly hirsutulous; leaves obtuse or broadly rounded at the tip . . . . . 3. *M. vestita*
      3. Fruiting pedicels only 6–9 mm long; male pedicel less than 2 mm long; male calyx-lobes only 0.7–0.8 mm long; staminal column deeply divided (filaments connate about halfway) . . . . . 4. *M. filipes*
   2. Filaments united mostly for ca. ¾ their lengths (at least more than ⅔), the filament tips spreading or recurving and not projecting above the pistillode; or else leaves acuminate.
      6. Leaves and flowers completely glabrous or nearly so; male flowers usually several per axil.
         7. Seeds over 4 mm long, shallowly pitted; female calyx-lobes at least 2.5 mm long; fruiting pedicel 45 mm long or more; leaves acuminate . . . . 11. *M. calycina*
         7. Seeds less than 4 mm long; female calyx-lobes smaller.
            8. Flowers and leaves without dark-pigmented cells; monoecious or dioecious.
               9. Petioles mostly 15–45 mm long; seeds with broad shallow pits; fruiting pedicel ca. 20 mm long . . . . . 9. *M. macropus*
               9. Petioles mostly 1–10 (rarely 15) mm long; seeds with smaller deeper pits.
                  10. Leaves rounded to obtuse or subacute at tip, not acuminate; fruiting pedicel (12) 16–36 mm long . . . . . 7. *M. neogranatensis*
                  10. Leaves acuminate.
                     11. Filaments unequally connate, the longer filament tips over half as long as the

column; monoecious; fruiting pedicel 16–28 mm long . . . 5. *M. capillipes*

11. Filaments not unequally connate, no more than half as long as the column, often recurving; monoecious or dioecious.
    12. Monoecious; fruiting pedicel ca. 40–65 mm long; stipules deltoid.
        13. Leaves thin, rounded at base, almost membranous; stipules lanceolate, definitely longer than broad . . . . . 10. *M. longipes*
        13. Leaves chartaceous, acute at base, veinlets prominulous; stipules ovate, about as broad as long . . . . . 12. *M. trichogynis*
    12. Dioecious; fruiting pedicel 20–45 mm long; stipules lanceolate.
        14. Leaves acute at base; fruiting pedicel 19–26 mm long; stems usually scabridulous. . . . . 6. *M. bartlettii*
        14. Leaves rounded at base, fruiting pedicel 40–45 mm long; stems smooth . . . . . 15. *M. leandrii*

8. At least the flowers with some dark-pigmented cells.
    15. Leaves mottled beneath; fruiting pedicel 23–60 mm long; seeds mostly 2.3–2.6 mm long . . . . . 8. *M. fruticans*
    15. Leaves not purplish-mottled beneath.
        16. Leaves not peltate; dioecious; leaves mostly elliptic, 5–9 cm long . . . . 13. *M. baronii*
        16. Leaves peltate or subpeltate at base; monoecious; leaves mostly ovate, 2–6 cm long. . . . . 14. *M. peltata*

6. Leaves, and sometimes flowers, hirsutulous; male flowers usually solitary.
    17. Flowers glabrous, with dark-pigmented spots; fruiting pedicel 13–18 mm long; seeds ca. 2.4 mm long. . . . . 16. *M. madagascariensis*
    17. Flowers without dark-pigmented spots.
        18. Calyx glabrous; fruiting pedicel 27–36 mm long; seeds 2.5–2.9 mm long . . . . . 17. *M. humbertii*
        18. Calyx hirtellous; fruiting pedicel 10–21 mm long; seeds 1.8–2.0 mm long. . . . . 18. *M. pubiflora*

1. Stems very sharply angled; leaves subcoriaceous; seeds over 4 mm long . . . . . 19. *M. orientalis*

KEY TO THE AFRICAN AND ARABIAN SPECIES

1. Stems and leaves hirsutulous; leaves rounded at the tip . . . . . 3. *M. vestita* (Tanganyika)
1. Stems glabrous or scabridulous; leaves more or less pointed at the tip 2
2. Fruiting pedicels only 6–9 mm long; male flowers small (calyx-lobes ca. 0.7–0.8 mm long), with pedicel less than 2 mm long and with deeply divided staminal column. . . . . 4. *M. filipes* (Socotra)
2. Fruiting pedicels mostly 10 mm long or more (occasional pedicels only 7 mm); male flower larger, with longer pedicel and less deeply divided staminal column 3
3. Male flower dark-pigmented with bullate cells; fruiting pedicels 23–60 mm long; stems not sharply angled; leaves usually chartaceous . . . . . 8. *M. fruticans* (Kenya and Tanganyika)
3. Male flower not dark-pigmented (except sometimes for a narrow herbaceous strip along the midrib); fruiting pedicels 10–25 mm long; stems distinctly angular; leaves usually thinly chartaceous or membranous, not mottled . . . . . 1. *M. phyllanthoides* (Angola, Congo, Uganda, Tanganyika, Kenya, Somalia, and Arabia)

KEY TO THE ASIAN SPECIES

1. Leaves acuminate, mostly 5–10 cm long or more. 2
1. Leaves obtuse or acute, 2–6 cm long; fruiting pedicel 10–25 mm long . . . . . 2. *M. parvifolia* (India and Ceylon)
2. Petioles 10–45 mm long; fruiting pedicel ca. 2 cm long. . . . . 9. *M. macropus* (Assam)
2. Petioles less than 10 mm long; fruiting pedicel 5 cm long or more 3
3. Female calyx-lobes at least 2.5 mm long; leaves narrowed at base; veinlets prominulous beneath. . . . . 11. *M. calycina* (s. India)
3. Female calyx-lobes not over 2.0 mm long; leaves rounded at base, veinlets not prominulous beneath. . . . . 10. *M. longipes* (s. India)

KEY TO THE AMERICAN SPECIES

1. Leaves acuminate; style-branches 0.5–0.6 mm long. 2
1. Leaves obtuse or rounded at tip; style-branches 0.25–0.4 mm long . . . . . 3. *M. neogranatensis* (s. Amer.)
2. Monoecious; petioles and branches usually smooth; leaves rounded or obtuse at base; some of the free filament tips longer than anthers . . . 5. *M. capillipes* (Guatemala and Honduras)

2. Dioecious; petioles and branches scabridulous; leaves acute at base; free filament tips shorter than anthers. . . . . 6. *M. bartlettii* (Mexico and British Honduras)

1. **Meineckia phyllanthoides** Baillon, Etud. Gen. Euphorb. 587. 1858. Type: Botta s.n., from Yemen (P).

Homotypic synonyms: *Flüggea Meineckia* Muell. Arg. Linnaea 34: 76. 1865; *Securinega phyllanthoides* (Baill.) Muell. Arg. in DC. Prodr. 15 (2): 448. 1866; O. Schwartz, Fl. Trop. Arab. (Mitt. Inst. Allg. Bot. Hamburg 10) 133. 1939.

Small shrub or undershrub up to 1 or 1.5 m high; older stems subterete; younger branches usually strongly angled (often sharply so), channelled, greenish, smooth (not scabridulous except sometimes on the angles). Leaves: stipules lanceolate, acuminate (the acumen often distinctly attenuate), denticulate, slightly carinate, becoming stramineous and scarious, 0.7—3.3 mm long; leaf-blades membranous to chartaceous, ovate or elliptic, 1–4 cm long, 0.7–2.5 cm broad, acute at the tip, obtuse to rounded at the base; midrib and major laterals (ca. 4–7 on a side) slightly prominulous above, distinctly raised beneath; veinlet reticulum obscure above, distinctly visible but scarcely raised beneath; petiole 1–8 (–13) mm long. Monoecious; cymules bisexual, female flower solitary (very rarely 2 or 3), male several. Male flower: pedicel capillary, 3–8 (–13) mm long; calyx-lobes suborbicular to obovate, thin, whitish, 1.0–1.8 mm long; disk 0.8–1.2 mm in diameter, thin, the margin entire or erose, adnate to the calyx for ca. ½ its diameter; stamens with filaments united for ca. ⅔ their lengths (at least more than ½); staminal column 0.35–0.8 mm long, filament tips 0.2–0.45 mm long; anthers ca. 0.25–0.35 mm wide; pistillode 3-lobed or subentire, 0.1–0.2 mm high. Female flower: pedicel becoming (7–) 10–25 mm long, stramineous, channelled; podium always distinct, 0.5–3.5 mm long; calyx-lobes ovate, elliptic, or obovate, slightly carinate dorsally, with narrow to broad whitish margins, becoming 1.0–2.0 mm long; style-branches with capitate tips, 0.3–0.5 mm long. Capsule ca. 3.5 mm in diameter, valves greenish; columella 1.5–2 mm long; seeds brownish, with deep pits in ca. 4 or 5 rows along the back (each row ca. 15 pits long), 1.5–1.9 mm long.

This species, as here interpreted, is the most widespread and variable in the genus, with populations in Angola, northeast Africa, and southern Arabia (Map 2). Four subspecies are recognized, but due to the inadequacy of sampling it is impossible to be confident that the arrangement here presented is the best. The common Indian species, *M. parvifolia*, is very similar and forms a cognate unit ("superspecies") with *M. phyllanthoides*. On the basis of the rather small amount of material studied, the Indian plant appears to differ in its smaller fruiting calyx-lobes and in its shorter staminal column: the filaments are fused only about halfway and the free filament tips are about as long as the anthers. Further studies may yet show that the Indian populations should be regarded as one or more additional subspecies, in which case the collective species would take the earliest epithet, *parvifolia*.

Also rather closely related to *M. phyllanthoides* is *M. filipes* of Socotra, whose distinguishing characters are discussed under the latter name. Over a considerable region in Kenya and Tanganyika *M. phyllanthoides* ssp. *capillariformis* is sympatric with *M. fruticans* (although the two have not been collected together at any one locality), and may occasionally be confused with it. However, *M. fruticans* is easily distinguishable by its longer fruiting pedicels, dark-pigmented calyx, nearly terete stems, and different androecium (filaments not projecting above the pistillode).

KEY TO THE SUBSPECIES

1. Stipules mostly 1.5–3.3 mm long.
   2. Calyx-lobes of male flower 1.0–1.5 mm long.
      3. Leaves chartaceous, more or less rounded at the tip; fruiting pedicel (7–) 10–14 (–16) mm long; female calyx-lobes becoming 1.4–1.7 mm long . . a. ssp. *phyllanthoides*
      3. Leaves membranous to thinly chartaceous, more or less pointed at the tip; fruiting pedicel (16–) 19–25 mm long; female calyx-lobes becoming 1.0–1.5 mm long. . . . . c. ssp. *capillariformis*
   2. Calyx-lobes of male flower 1.7–1.8 mm long; fruiting pedicel (7–) 12–21 mm long; leaves more or less rounded at the tip . . . . . b. ssp. *somalensis*
1. Stipules only 0.7–1.3 mm long; fruiting pedicel (10–) 16–21 mm long; male calyx-lobes 1.0–1.3 mm long, female 1.1–1.3 mm long . . . . . d. ssp. *trichopoda*

1a. **Meineckia phyllanthoides** ssp. **phyllanthoides**

Stipules flecked with reddish-brown, 1.5–2.7 mm long; leaf-blades chartaceous, obtuse or rounded at the tip, mostly 1.5–3.5 cm long; petioles 1.5–4.0 mm long. Male flower: pedicel 2.5–5 mm long; calyx-lobes 1.1–1.5 mm long; staminal column 0.35–0.5 mm high, filament tips 0.25–0.3 mm long. Female flower: pedicel becoming (7–) 10–16 mm long, podium 0.7–2 mm; fruiting calyx-lobes 1.3–1.7 mm long.

Distribution: ravines and hills, Yemen and the south coast of Arabia (Map 2).

ARABIA. ADEN PROTECTORATE: Bilad Fodhli, ad fauces australis montis el'Areys (al'Urus), propre Serrya (Suriya), Deflers 1047 (P). DHUFAR: riverbed, Rigout (Rakhyut?), Bent 133 (K).

SCHWARTZ (1939: 133, 135) cited ssp. *phyllanthoides* from Arabia under two different names (*Securinega phyllanthoides* and *Cluytiandra somalensis*); he recorded from the "westlichen Randgebirge Jemens" two Schweinfurth collections (1971, 1972) which have not been examined. Evidently ssp. *phyllanthoides*, in Yemen as well as in Aden and Dhufar, is restricted to the coastal ranges and slopes, and does not penetrate very far into the interior.

Because of the small numbers of specimens examined, it is not certain that ssp. *phyllanthoides* really differs significantly from ssp. *somalensis*. In both of these taxa the fruiting pedicels tend to be shorter, and the leaves thicker and less ovate, than in plants from other African localities.

1b. **Meineckia phyllanthoides** ssp. **somalensis** (Pax) Webster, stat. nov. **Fig. 18**

Basionym: *Cluytiandra somalensis* Pax, Bot. Jahrb. 33: 277. 1903.

Type: "Somaliland und Harar", Ellenbeck (n.v.)

Stipules whitish, scarious, 2.4–3.3 mm long; leaf-blades chartaceous, obtuse, mostly 1.5–2.7 cm long; petioles 1.0–2.5 mm long. Male flower: pedicel ca. 5 mm long; calyx-lobes 1.7–1.8 mm long; staminal column ca. 0.5 mm high, free filament tips ca. 0.3–0.35 mm long (about as long as anthers). Female flower: pedicel becoming (7.0–) 12.0–21.5 mm long, podium ca. 1.0–1.5 mm; fruiting calyx-lobes 1.3–2.0 mm long.

Distribution: Somalia, northern Kenya, and probably eastern Abyssinia (Map 2).

Somali Republic: Buran (Sorl), alt. 2350 ft, Collenette 121 (K); between Walwal and Sirauw, Glover & Gilliland 432 (K). Kenya: Northern Province, Furroli, alt. 3200 ft, Gillett 13871 (K).

There is unfortunately considerable confusion surrounding the typification of this taxon. Hutchinson (Fl. Trop. Afr. 6 (1): 710. 1912) removed Ellenbeck 2193, the first collection cited by Pax, as the type element of *Phyllanthus somalensis* Hutch. In effect, this left as lectotype the other specimen cited rather vaguely by Pax as Ellenbeck, "Somaliland und Harar"; another citation of Hutchinson (op. cit. 729) suggests that this specimen may be Ellenbeck 1026 A from Dagaga, which I have not seen. For the time being, this Dagaga collection may be regarded as probably the typical element.

1c. **Meineckia phyllanthoides** ssp. **capillariformis** (Vatke & Pax) Webster, stat. nov.

Basionym: *Phyllanthus capillariformis* Vatke & Pax, Bot. Jahrb. 15:523. 1893.

Type: Hildebrandt 2696, from Ukamba, Kitui (K, M, syntypes).

Homotypic synonym: *Cluytiandra capillariformis* (Vatke & Pax) Pax & Hoffm. Pflanzenr. IV. 147, XV (Heft 81): 210. 1922.

Stipules pale, scarious, attenuately acuminate, (1.3–) 1.5–3 mm long; leaf-blades thinly chartaceous or membranous, acute, (1–) 1.5–4 cm long, 0.8–2.5 cm broad; petioles 1.5–8 (–13) mm long. Male flower: pedicel 3–6.2 mm long; calyx-lobes 1.0–1.25 mm long; staminal column 0.5–0.8 mm high, free filament tips ca. 0.4 mm long. Female flower: pedicel becoming 18–26 mm long, podium 0.5–1.8 mm; fruiting calyx-lobes 1.0–1.3 mm long.

Distribution: upland regions, northeastern Africa, in the ground story of mesophytic woods or mist forest, alt. 700–2000 m (Map 2).

CONGO: KIVU: Lesse, Bequaert 3251 (BR); Irumu, Bequaert 2722 (BR); plaine au sud du lac Edouart, Humbert 8214 (BR, P); Rutshuru, Ghesquière 3951 (BR), de Witte 1664 (BR).
KENYA: Kibwezi Plains, Bally 752 (K); Langata (Nairobi Distr.), Bally B7799 (K); Dandu, Gillett 13087 (S); Chania R. (Thika Distr.), Greenway 8781 (MO, K); Nairobi, Verdcourt 528 (K); Marsabit, Verdcourt 2225 (BR, K).
TANGANYIKA: NORTHERN: Mashati, Kilimanjaro, Haarer 1734 (K). TANGA: Ngulu, Pare Distr., Haarer 1382 (K).
UGANDA: Sissa, Kisubi Road, Chandler 1916 (K); Victoria Islands, Mengo, Dawkins 407 (K); Mulange, Dummer 4005 (K); Lake Victoria region, Maitland 89 (K); east side Lake Albert Nyanza, Scott Elliot 8063 (K).

This population, which has a roughly semicircular range in the highlands around Lake Victoria, is very similar to the Angolan plants referred to ssp. *trichopoda*. It agrees with that subspecies in having thin, pointed leaves, small male flowers, and fruiting pedicels somewhat longer than those of the Somalian and Arabian plants. If it were not for the smaller stipules and the geographic disjunction, the Angolan and East African plants could be treated as a single subspecies. It is not certain that the line between ssp. *somalensis* and ssp. *capillariformis* has been correctly drawn; some collections from Kenya referred to the latter have thickish and blunt leaves suggestive of ssp. *somalensis*. Additional collections from northern Kenya may provide the data to settle the matter.

1d. **Meineckia phyllanthoides** ssp. **trichopoda** (Muell. Arg.) Webster, stat. nov. **Fig. 3, 10**

Basionym: *Cluytiandra trichopoda* Muell. Arg. Jour. Bot. 2: 328. 1864; DC. Prodr. 15 (2): 225. 1866; Hutchinson, Fl. Trop. Afr. 6 (1): 738. 1912; Pax & Hoffmann, Pflanzenr. IV, 147. XV (Heft 81): 210. 1922.

Type: Welwitsch 327, from Golungo Alto, Angola (DC).

Stipules pale, scarious, abruptly acuminate, 0.7–1.3 mm long; leaf-blades membranous, acute, 1.3–2.5 cm long, 0.6–1.6 cm broad; petioles 1.5–4 mm long. Male flower: pedicel 3.0–3.5 mm long; calyx-lobes 1.0–1.3 mm long; staminal column 0.4–0.6 mm high, free filament tips 0.2–0.4 mm long. Female flower: pedicel becoming (10–) 13–21 mm long, podium ca. 0.8–3.5 mm long; fruiting calyx-lobes 1.1–1.3 mm long.

Distribution: northwestern Angola (Map 1, 2).

ANGOLA: Golungo Alto, between Calolo and Muria, Welwitsch 327 (DC, holo type; COI, K, P, isotypes); Loanda, Gossweiler 377 (COI, K, P).

As noted above, ssp. *trichopoda* is extremely similar to ssp. *capillariformis* of the Lake Victoria region, and most of the distinctions reported in the literature do not hold. Hutchinson, followed by Pax and Hoffmann, attempted to separate the eastern population on the basis of

habit; Hutchinson described *Cluytiandra trichopoda* as having numerous stems "arising from a many-headed rhizome", and contrasted this with his *C. somalensis*, described as "a small undershrub". However, Mueller in his original description was careful to state merely "caules herbacei, inferne lignescentes". Examination of the Welwitsch specimens from Angola shows that they seem to represent sprout-shoots from a cut-off stem, and the Gossweiler collection is from a normally branching plant quite similar to the Kenya and Uganda ones. As far as can be determined, therefore, there is no difference in habit between ssp. *trichopoda* and ssp. *capillariformis*.

Hutchinson also attempted to separate the Angolan plant from other African ones on the basis of its tripartite rather than entire pistillode. However, although the pistillode appears to be at least somewhat 3-lobed in ssp. *trichopoda* and often entire in ssp. *capillariformis*, it is difficult to verify this character even under high magnification; even if the difference could be demonstrated a constant one, it would be of little systematic utility. It is possible that floral differences may be discovered when more material is available for comparison, but at present the smaller stipules appear to be the only consistent differential character of ssp. *trichopoda*.

2. **Meineckia parvifolia** (Wight) Webster, comb. nov.
Fig. 5, 11, 19

Basionym: *Peltandra parvifolia* Wight, Icon. Pl. Ind. Or. 5: t. 1892. 1852.

Type: The species is probably to be typified by Wight's plate.

Homotypic synonyms: *Phyllanthus peltandra* Muell. Arg. Linnaea 32: 11. 1863; DC. Prodr. 15 (2): 341. 1866. *Neopeltandra parvifolia* (Wight) Alston, Handb. Fl. Ceylon 6: 256. 1931.

Heterotypic synonyms: *Peltandra flexuosa* Thwaites, Enum. Pl. Zeyl. 281. 1861; *Phyllanthus thwaitesianus* Muell. Arg. Linnaea 32: 11. 1863; DC. Prodr. 15 (2): 341. 1866; Hook. f. Fl. Br. Ind. 5: 287. 1887; Trimen, Handb. Fl. Ceylon 4: 18. 1898. Type: Thwaites C.P. 3571, from Minnery, Ceylon (K).

Low glabrous shrub, sometimes nearly herbaceous; branches bluntly to sharply angled, pale, lenticels inconspicuous. Stipules lanceolate, rather abruptly long-acuminate, denticulate or subentire, rather pale and scarious, 1.0–2.2 mm long. Leaf-blades membranous, elliptic or ovate, ca. 2–6 cm long, 1–5 cm broad, obtuse to acute at the tip, obtuse to rounded or subtruncate at the base; midrib and lateral veins (ca. 4–7 on a side) slightly prominulous above, distinctly raised beneath, veinlet reticulum delicate, obscure above, distinct beneath; margins plane, sometimes upturned slightly near petiole; petioles 1.5–12.5 (–24.0) mm long. Monoecious; cymules bisexual, female flowers solitary (rarely paired), male flowers clustered. Male flower: pedicel 3–8 mm long; calyx-lobes elliptic to obovate, thin, pale, carinate on back, 0.8–1.2 mm long, 0.8–1.1 mm broad; disk 0.7–1.1 mm broad, partially adnate; stamens with filaments connate ca. ⅓ to ½ their lengths; staminal column 0.2–0.35 mm high, free fila-

ment tips upright, 0.3–0.5 mm long; anthers ca. 0.2 mm wide; pistillode angled, ca. 0.15–0.2 mm high. Female flower: pedicel becoming (10–) 12–25 mm long, podium ca. 1.0–2.5 mm long; calyx-lobes ovate or elliptic, thin, with rather broad pale margins, ca. 0.8–1.0 mm long; disk ca. 0.8 mm in diameter, partially adnate; style-branches capitate, 0.35–0.5 mm long. Seeds brownish, with deep round pits (as in *M. phyllanthoides*), 1.4–1.8 mm long.

Distribution: montane thicket or woodland, Ceylon and southern India.

CEYLON: Damboul (Dambulla), Thwaites C.P. 3571 (K, W); Minnery, Thwaites C.P. 3571 (K).
INDIA: ANDHRA PRADESH: Godavari, Mantur, Barber 4954 (K); Godavari, Samelcottah (Samalkot), Heyne (K); Godavari, Sirivaki, Bourne 3446 (K);Guntur, Mellavagu, Wagh 3695 (BLAT); Vishakhapatnam, Krishnapuram, Barber 1930 (K). MADRAS: Madurai, Palni Hills, Kodaikanal Ghat, Bourne 1772, 1773, 2130, 2142 (K); Tinnevelly, Mundanthorai, Barber 3174 (K).

This species is distinct from the other Indian taxa, but there is a problem in distinguishing it from the Afro-Arabian *M. phyllanthoides*. That plant, especially the subsp. *capillariformis*, is very similar to *M. parvifolia* in leaves, flowers, and fruit. However, in *M. parvifolia* the fruiting calyx-lobes are always somewhat smaller, and the staminal column is more deeply divided than it is in *M. phyllanthoides*.

There has been considerable confusion regarding this species in the systematic literature. Mueller distinguished three species: *Phyllanthus peltandra* (= *Meineckia parvifolia*), *P. thwaitesianus*, and *P. suberosus*, the first species supposedly differing from the other two in its more deeply divided staminal column. However, examination of available specimens of the 3 taxa has failed to confirm this; all of the Indian specimens with short pedicels and small blunt leaves have flowers with a deeply divided staminal column. GAMBLE (1925) referred most of the populations of this species under the name *Neopeltandra suberosa*, but the basionym of that name (*Phyllanthus suberosus*) is of dubious status (cf. list of dubious and excluded taxa at the end of this paper).

3. **Meineckia vestita** Webster, sp. nov.

Fig. 4, 12, 20

Type: Hornby 2055, from Mpwapwa, Tanganyika (K).

Suffrutex monoicus, ramulis foliisque hirsutulis, ramulis angulatis, foliis ellipticis obtusis, pedicellis fructiferis 18–26 mm longis.

Undershrub ca. 5 dm high; twigs mostly erect or ascending, greenish, 0.5–1 mm thick and rather sharply angled distally, hirsutulous with pointed septate hairs ca. 0.25–0.5 mm long; leaves copiously hirsutulous on petiole and dorsal surface of blade, nearly glabrous above. Stipules lanceolate, attentate-acuminate, hirsutulous, pale and scarious, ca. 1.8–2.2 mm long. Leaf-blades thinly chartaceous,

elliptic, ca. 2–4 cm long, 1–2.5 cm broad, rounded or broadly obtuse at the tip, obtuse to rounded at the base; midrib plane to somewhat raised above, prominently raised beneath, lateral veins (ca. 6–9 on a side) and veinlet reticulum rather obscure above, prominent and slightly raised beneath; petiole 1–3 mm long. Monoecious; cymules generally bisexual, of one female and several male flowers. Male flower: pedicel glabrous, 2.5–3.5 mm long; calyx glabrous, pale, calyx-lobes narrowly elliptic to obovate, ca. 1.1–1.3 mm long, 0.75–1 mm broad, midrib dorsally carinate; disk shallowly cupuliform, ca. 0.8 mm in diameter, partially adnate to the calyx; stamens with filaments united over halfway; staminal column rather stout, ca. 0.5 mm high; free filament tips ca. 0.3 mm long, erect-ascending, projecting beyond the pistillode; anthers ca. 0.2–0.25 mm wide; pistillode unlobed, nearly 0.2 mm long. Female flower: pedicel hirsutulous, becoming 18–26 mm long, with a distinct basal podium 0.5–1.5 mm long; calyx-lobes glabrous, ovate-elliptic, ca. 1.1–1.3 mm long, becoming more or less scarious in fruit; styles clavate-thickened, ca. 0.35 mm long. Capsule (immature) ca. 4 mm long; mature seeds not seen.

Distribution: known only from the type collection in the central highlands of Tanganyika (Map 3).

TANGANYIKA: CENTRAL: Mpwapwa, rocky hills, growing with *Brachystegia microphylla*, alt. 4500 ft, 3 Mar 1941, Hornby 2055 (K).

This species, although growing in an area adjacent to a population of *M. fruticans* (in the Morogoro District), shows a greater resemblance to *M. phyllanthoides;* this is particularly indicated by its angled twigs, pale flowers, and moderately long filament-tips. However, it differs from *M. phyllanthoides* in its hirsutulous indumentum, rounded leaf-tips, and clavate rather than capitate style-branches.

4. **Meineckia filipes** (Balf. f.) Webster, comb. nov.

Basionym: *Phyllanthus filipes* Balf. f., Proc. Roy. Soc. Edinb. 12: 94. 1884.

Type: Balfour 332, from Socotra (K).

A low intricately branched glabrous subshrub (0.5 m high or less); branches smooth and glabrous, sharply angled, with cartilaginous ridges along the angles. Stipules lanceolate, denticulate, 1.2–1.5 mm long. Leaf-blades chartaceous, elliptic, 0.5–1.3 cm long, 0.3–0.8 cm broad, obtuse or subacute at the tip, narrowed at base; margins plane; midrib and major lateral veins (4 or 5 on a side) raised beneath, veinlets obscure; petiole 0.5–1.8 mm long. Monoecious; cymules bisexual, of one female and several male flowers. Male flower: pedicel 0.7–1.1 mm long; calyx-lobes obovate or suborbicular, very thin and pale (subhyaline) except for the green dorsally carinate midrib, 0.7–0.8 mm long, 0.7–0.75 mm broad; disk ca. 0.8 mm in diameter, adnate, the free rims ca. 0.15 mm high; stamens with filaments united about halfway into a staminal column ca. 0.35 mm high; free filament tips

ascending, about as long as the column, projecting above the pistillode; anthers 0.2–0.25 mm wide; pistillode very small, obscurely lobed, ca. 0.1 mm high. Female flower: pedicel becoming 6.0–8.7 mm long, podium obscure or 0.7–1.3 mm; calyx-lobes ovate or elliptic, 1.1–1.4 mm long; columella 1.3–1.6 mm long; seeds 1.6–1.8 mm long, blackish, pitted on sides and back.

Distribution: endemic to Socotra (Map 1).

SOCOTRA: Balfour 332, Schweinfurth 615 B (K).

This dwarfed microphyllous plant, which appears to be the most xeromorphic of all the species of *Meineckia*, has apparently not been recollected since the original gatherings by Balfour and Schweinfurth. It can be immediately distinguished from its African congeners by a number of characters: very short pedicels (both the male and female being the most abbreviated in the genus), small male flowers with a deeply divided staminal column (filament tips as long as the column, projecting far above the pistillode). In overall aspect, and in such details as its angled twigs, *M. filipes* shows a considerable resemblance to *M. phyllanthoides*, of which it may be a specialized insular derivative.

5. **Meineckia capillipes** (Blake) Webster, comb. nov. **Fig. 13**

Basionym: *Phyllanthus capillipes* Blake, Contr. U. S. Nat. Herb. 24: 10. 1922; Standley & Steyermark, Fieldiana 24 (6): 146. 1949.

Type: Pittier 8614, from Izabal, Guatemala (US 989594).

A low glabrous shrub less than 1 m high; branches smooth, subterete. Stipules long-acuminate, lanceolate, becoming pale and scarious, 1.5–2.2 mm long. Leaf-blades thinly chartaceous, lanceolate, 3.5–7.1 cm long, 1.0–2.8 cm broad, acuminate, rounded at the base; margins plane; midrib and major laterals (ca. 5–7 on a side) somewhat raised on the paler lower surface; veinlet reticulum not very prominent; petioles 3.0–15.0 mm long, smooth. Monoecious; female flowers solitary, male in clusters. Male flower: pedicel ca. 3–6 mm long; calyx-lobes suborbicular, thin and pale, 0.9–1.1 mm long, 0.9–1.25 mm broad; disk flat, very thin, ca. 0,8 mm in diameter; stamens 5 (sometimes 4?), filaments united for variable lengths into a staminal column 0.4–0.45 mm high, the free filament tips 0.15–0.3 mm long, at least the longer ones surpassing the pistillode; anthers 0.2–0.25 mm wide; pistillode subentire (somewhat fimbriate?), 0.2–0.25 mm high. Female flower: pedicel becoming 16–28 mm long, podium usually distinct, 0.7–2.5 mm long; calyx-lobes ovate-elliptic, ca. 1.3 mm long, with fairly broad pale margins; style-branches capitate, ca. 0.5 mm long. Seeds 1.9 mm long, distinctly and deeply pitted.

Distribution: thickets, Guatemala and Honduras, at low elevations.

GUATEMALA: IZABAL: Quirigua, Pittier 384 (US); Quebradas, Pittier 8614 (US).
HONDURAS: ATLANTIDA: lower slopes of Mt. Cangrejal, back of Ceiba, Yunker, Koepper, & Wagner 8296 (F).

This species, although at present known from only three localities, will probably be found at other places along the mountain ranges paralleling the Caribbean in northern Guatemala and Honduras. Standley and Steyermark separated this species from *M. bartlettii* on the basis of its rounded leaf-base and "papillose-puberulent" (i.e. scabridulous) petioles. These characters hold for the specimens from the type localities, but the Matuda collection from Chiapas (referred to *M. bartlettii* in this study) combines the smooth petioles of *M. capillipes* with the dioecious inflorescence of *M. bartlettii*. Study of additional collections of these Central American taxa may necessitate some modification of the diagnostic characters of the two species, but in any event it seems likely that they will be maintained as distinct.

Blake, in the original description of his *Phyllanthus capillipes*, noted that the filaments of the androecium were unequally united, so that the filament tips were of different lengths. Examination of flowers of the type collection confirms this, but it is difficult to say if this is a differential character or merely an individual variation. In any event, the androecium of *M. capillipes* is different from that of *M. bartlettii*, in which the filaments are united for a much greater percentage of their lengths and do not project beyond the pistillode.

6. **Meineckia bartlettii** (Standl.) Webster, comb. nov. **Fig. 14, 21**

Basionym: *Phyllanthus bartlettii* Standl. Publ. Carnegie Inst. 461: 68. 1935; Standley & Steyermark, Fieldiana 24 (6): 147. 1949.

Type: Bartlett 11441, from El Cayo, British Honduras (F 661817).

Low shrub up to ca. 1 m high; branches nearly terete, the older reddish-brown, the younger greenish, smooth or usually scabridulous. Stipules lanceolate, long-acuminate, usually denticulate at the base, 1.0–2.2 mm long. Leaf-blades thinly chartaceous, lanceolate, 3.5–7.5 cm long, 1.2–2.8 cm broad, acuminate (more or less attenuate), cuneately narrowed at the base; midrib and the lateral veins (ca. 4–6 on a side) plane above, pale and distinctly raised beneath, veinlets visible beneath but tenuous, margins plane; petioles (1.5–) 3.0–7.5 mm long, scabridulous or rarely smooth. Dioecious; female flowers solitary, male in abbreviated cymules. Male flower: pedicel 3.0–5.0 mm long; calyx-lobes suborbicular, elliptic or obovate, thin, pale whitish, 1.1–1.5 mm long, 0.7–1.6 mm broad; disk 0.9–1.5 mm in diameter, thin, margin entire or crenulate; stamens with filaments connate for most of their lengths into a column 0.4–0.6 mm high, the free filament tips only 0.1–0.2 mm long, recurving, not projecting above the pistillode; anthers 0.25–0.3 mm wide; pistillode rounded or angled, entire or crenulate, ca. 0.1–0.2 mm high and 0.2–0.25 mm broad. Female flower: pedicel becoming 19–26 mm long; podium variable, 0.5–3.5 mm long; calyx-lobes ovate–elliptic, with green midstrip and pale scarious margins, 1.0–1.3 mm long; style-branches capitate, 0.5–0.55 mm long. Seeds brownish, evenly pitted, 1.9–2.3 mm long.

Distribution: forest, often on limestone, Chiapas and British Honduras, from near sea level to 650 m.

MEXICO: CHIAPAS: Chicomuselo, Matuda 15643 (F).
BRITISH HONDURAS: El Cayo, river bluffs, Bartlett 11441 (F, US); El Cayo Distr., San Antonio, Bartlett 13037 (F, US); El Cayo, limestone hill, Lundell 6127 (F), 6137 (F, US).

This species is distinctive in being the only dioecious population of *Meineckia* outside of Madagascar. It is very similar to *M. capillipes* of Guatemala and Honduras, but has shorter petioles (on the average), somewhat larger male flowers, and a different androecium. The collection of Matuda, which is considerably disjunct from the localities in British Honduras, is referred here with some hesitation. The specimen has unexpanded foliage and mostly immature capsules; but since it agrees with the British Honduran specimens in being dioecious and having rather narrow leaf-bases, it is provisionally placed here.

Both *M. bartlettii* and *M. capillipes* superficially resemble *M. longipes* and *M. macropus* of India in their rather large acuminate leaves, but the resemblance is probably fortuitous, since the seeds of the Indian species are quite different (larger and more shallowly pitted). The two Central American species differ even more strongly from the South American taxa, which have elongated filament tips, shorter styles, smaller blunt leaves, and longer petioles. In some ways (e.g., its androecium and scabridulous stems) *M. fruticans* of eastern Africa is similar to *M. bartlettii*, and thus may be the closest of the gerontogean species.

7. **Meineckia neogranatensis** (Muell. Arg.) Webster, comb. nov.
Basionym: *Phyllanthus neogranatensis* Muell. Arg. Linnaea 32: 10. 1863: DC. Prodr. 15 (2): 340. 1866.
Type: Holton 874, from "America Neogranatensi" (DC).

Shrub ca. 1 m high or less; young branches subterete to angled, greenish, smooth or hirtellous; older branches more or less terete, brownish or greyish. Stipules narrowly lanceolate, long-acuminate, persistent, 0.9–2.6 mm long. Leaf-blades membranous to thinly chartaceous, ovate to elliptic, 1.0–3.5 cm long, 0.6–2.0 cm broad, rounded to obtuse or subacute and sometimes minutely apiculate at the tip, obtuse to rounded, truncate, or subcordate at the base; margins plane or somewhat recurved basally; midrib and major lateral veins (ca. 4–7 on a side) plane above, slightly to prominently raised beneath, veinlet reticulum obscure to prominulous; petioles 2.0–8.0 (–13.0) mm long, glabrous or hirtellous. Monoecious; cymules bisexual, female flowers solitary, male several. Male flower: pedicel ca. 2.0–5.0 mm long; calyx-lobes ovate or suborbicular, thin and pale, 0.8–1.2 mm long, 0.8–1.3 mm broad; staminal column 0.35–0.4 mm high, the free filament tips ca. 0.1–0.15 mm long; anthers ca. 0.25 mm broad; pistillode 2–3-lobed, inconspicuous, 0.1–0.2 mm high. Female flower: pedicel becoming (12–) 16–36 mm long, podium obscure or up to 1.6 mm long; calyx-lobes ovate-elliptic, with narrow scarious margins in fruit, 0.8–1.5 mm long; style-branches capitate, 0.25–0.4 mm long. Capsule 2.8–3.1 mm long; columella ca. 2.0 mm long; seeds brownish, foveolate-pitted, 1.8–2.1 mm long.

All of the South American taxa of *Meineckia* have been referred to this rather polymorphic species. Despite the wide geographical disjunction between the three populations, the plants are all very similar and certainly do not seem to represent distinct species. It is characteristic of the confusion surrounding the systematics of *Meineckia* that Mueller referred ssp. *neogranatensis* to *Phyllanthus* sect. *Peltandra* but placed ssp. *hilariana* in *Securinega* sect. *Gelfuga*!

KEY TO THE SUBSPECIES

1. Fruiting calyx-lobes 0.8–1.2 mm long; leaves often subacute at the tip.
   2. Juvenile twigs smooth and glabrous; leaves glabrous, thin, veinlets at most very slightly prominulous beneath. . . . . a. ssp. *neogranatensis*
   2. Juvenile twigs scabridulous or hirsutulous; leaves hirsutulous, veinlets somewhat promunulous beneath. . b. ssp. *gardneri*
1. Fruiting calyx-lobes 1.3–1.5 mm long; leaves mostly obtuse or rounded at the tip, glabrous (or petioles only hirsutulous) . . . . . c. ssp. *hilariana*

7a. **Meineckia neogranatensis** ssp. **neogranatensis**

Branches smooth and glabrous; stipules becoming scarious, whitish, reddish only at base, 0.9–1.8 mm long; leaf-blades glabrous, membranous, (1–) 1.5–3.5 cm long, (0.6–) 1.2–2.0 cm broad, rounded or obtuse to subacute at the tip, sometimes mucronulate, rounded at the base; midrib and major veins slightly prominulous beneath; petioles glabrous, 2.5–8.0 (–13.0) mm long. Fruiting pedicel 16–36 mm long, podium 0.7–1.6 mm; calyx-lobes in fruit 0.8–1.1 mm long.

Distribution: central Colombia, alt. 450–1400 m (Map 1).

COLOMBIA: New Granada, Holton 874 (G-DC. K) CUNDINAMARCA: Quebrada Camargo, north of Apulo, Killip, Dugand, & Jaramillo 38244 (US); Rio Apulo, Triana 3657 (K, P); La Mesa, Triana 3658 (P).

As far as one can tell from the known localities, ssp. *neogranatensis* is restricted to a small area in central Colombia west of Bogotá. The Holton and Triana specimens appear quite different from those of central Brazil (Minas Geraes) due to their thinner more pointed leaves, but the collection of Killip *et al.* virtually effaces any foliar distinctions, as it has broadly ovate leaves which are obtuse or rounded at the tip and truncate to subcordate at the base, very much as in the Glaziou collection of ssp. *hilariana*. When the intermediate nature of the plant from northeastern Brazil (ssp. *gardneri*) is taken into account, it seems quite impracticable to distinguish two or more distinct species from South America.

7b. **Meineckia neogranatensis** ssp. **gardneri** Webster, ssp. nov.

Type: Gardner 2437 bis, from Piauhy, Brazil (BM, holotype; K, isotype).

Ramulis foliisque hirtellis; calycis ♀ laciniis 0.9–1.2 mm longis.

Young twigs angled, scabridulous or hirsutulous; stipules narrowly lanceolate, becoming scarious and reddish at the tip, 1.3–1.8 mm long; leaf-blades thinly chartaceous, elliptic-ovate, ca. 1.5–2.5 cm long, 0.7–1.1 cm broad, blunt to acute at the tip, obtuse to rounded at the base, hirtellous or scabridulous beneath along veins and midrib; veinlets somewhat prominulous beneath; petioles hirsutulous, 2.0–4.0 mm long. Fruiting pedicels 20–32 mm long, podium obscure; calyx-lobes in fruit 0.9–1.2 mm long.

Distribution: known only from the type collection in northeastern Brazil (Map 1).

BRAZIL: PIAUHY: Brejo Grande, between Crato and Barra da Vaca, Gardner 2437 bis (BM, K).

This plant, which is geographically disjunct from the two previously known South American taxa of *Meineckia*, combines their characters in such a manner that amalgamation of all three taxa into a single species seems the only reasonable disposition. The plant from Piauhy here recognized as a distinct subspecies has the pointed leaf apices and small female calyx-lobes of ssp. *neogranatensis*, but the chartaceous texture and somewhat prominulous veinlets of the leaf-blade, as well as the reddish-tipped stipules, suggest ssp. *hilariana*. From both of the other subspecies it differs in its distinctly pubescent young stems and leaves.

7c. **Meineckia neogranatensis** ssp. **hilariana** (Baill.) Webster, stat. nov.

Basionym: *Flueggea hilariana* Baill. Adansonia 5: 346. 1865.

Type: St. Hilaire 1488, from San Miguel, Minas Geraes, Brazil (P).

Homotypic synonym: *Securinega hilariana* (Baill.) Muell. Arg. in DC. Prodr. 15 (2): 1273. 1866; in Martius, Fl. Brasil. 11 (2): 77. 1873.

Twigs smooth, glabrous, terete or nearly so; stipules lanceolate, attenuately long-acuminate, subentire, becoming dark reddish-brown and persistent, scarious, 1.4–2.6 mm long; leaf-blades glabrous, membranous or thinly chartaceous, ovate, 1.0–2.6 cm long, 0.7–1.9 cm broad, rounded to obtuse at the tip, truncate to subcordate at the base, veinlet reticulum distinctly raised beneath; petioles smooth or hirsutulous, 2.0–5.0 mm long. Fruiting pedicels (12–) 17–27 mm long, podium up to 1.2 mm; calyx-lobes in fruit 1.3–1.5 mm long.

Distribution: Minas Geraes, Brazil (Map 1).

BRAZIL: MINAS GERAES: San Miguel, St. Hilaire 1488 (P); Minas Novas, in woods, Glaziou 13193 (K, P).

The two collections of this plant differ in a number of respects: the type specimen has hirsutulous petioles and longer fruiting pedicels (21–27 mm), and thus approaches ssp. *gardneri* more closely than does the Glaziou collection. However, the overall agreement in leaf shape and stipules is so striking that Glaziou's plant, although designated by an unpublished manuscript name, seems best referred to ssp. *hilariana*. Both collections of ssp. *hilariana* have larger female calyx-lobes than the other South American taxa, but it is doubtful if this difference can be considered significant, in view of the very inadequate sampling of the South American populations.

8. **Meineckia fruticans** (Pax) Webster, comb. nov.

Basionym: *Cluytiandra fruticans* Pax, Bot. Jahrb. 33: 276. 1903; Hutchinson, Fl. Trop. Afr. 6 (1): 739. 1912; Pax and Hoffmann, Pflanzenr. IV. 147. XV (Heft 81): 210. 1922.

Type: Scheffler 139, from Usambara, Tanganyika (n.v.).

Shrub ca. 1–3 m high; branches subterete (never sharply angled), the older ones reddish-brown and rather prominently lenticellate, younger branchlets more or less scabridulous. Stipules lanceolate, at most slightly auriculate at the base, denticulate or subentire, persistent, 0.9–2.0 mm long. Leaf-blades chartaceous, elliptic or obovate, 2–9 cm long, 1–4.5 cm broad, blunt at the obtuse or contracted tip, acute to obtuse or rounded at base; midrib and major lateral veins (ca. 4–6 on a side) raised on both sides, veinlet reticulum obscure above but fairly prominent beneath; lamina closely speckled with very fine purplish dots above (sometimes appearing glandular-punctate), coarsely purplish-mottled beneath (occasionally obscurely so); margins plane; petioles 1.5–5.0 mm long. Monoecious; cymules bisexual, female flower solitary, males usually several. Male flower: pedicel 3.5–13.0 mm long; calyx-lobes elliptic to obovate, thin or somewhat fleshy, usually dark-pigmented with rather narrow pale subhyaline margins, 0.9–2.0 mm long, 0.7–1.7 mm broad; disk 0.8–1.8 mm in diameter, thin or somewhat fleshy, usually dark purplish, margin entire or crenulate, adnate to the calyx for ca. ½ its diameter or more; stamens with filaments usually united for ¾ their lengths or more; staminal column 0.5–1.0 mm high, often rather stout; free filament tips only 0.1–0.2 mm long, becoming deflexed below the projecting pistillode; anthers 0.25–0.35 mm broad; pistillode massive, entire or somewhat 3-lobed, often stipitate, dark-pigmented, ca. 0.25–0.4 mm high. Female flower: pedicel becoming 23–60 mm long, podium very short (not over ca. 0.5 mm long); calyx-lobes ovate or elliptic (or sometimes obovate), dark-pigmented with rather narrow pale scarious margins, becoming 1.2–1.7 mm long; ovary sometimes stipitate; style-branches capitate, 0.25–0.5 mm long. Capsule valves purplish-mottled; columella ca. 2 mm long; seeds 1 or 2 per locule, dark chestnut brown, with round pits on sides and in rows on back (each row ca. 12–15 pits long), (2.1–) 2.3–2.6 (–2.8) mm long.

This rather common species of eastern Tanganyika and southern Kenya may be divided into two rather poorly distinguished varieties:

Fruiting pedicels 2.3–3.5 cm long; leaves mostly 2–5 cm long . . . . . a. var. *fruticans*
Fruiting pedicels over 3.5 cm long; leaves mostly 5–9 cm long . . . . . b. var. *engleri*

8a. **Meineckia fruticans** var. **fruticans** **Fig. 22**

Leaf-blades narrowly elliptic to obovate, mostly 2–5 cm long, 0.7–2.7 cm broad, petioles 1.5–3.5 mm long; fruiting pedicels 23–34 mm long.

Distribution: forest understory or open rocky places, eastern Tanganyika, alt. 120–1000 m (Map 3).

TANGANYIKA: EASTERN: Mahenge District, Mahenge, Schlieben 2137 (BR, G, M, P); Morogoro District, Turiani, Drummond & Hemsley 1914, Semsei 1162 (K). TANGA: Pongwe Forest, Faulkner 1807 (BR, K, P); Tanga, Holst 2108 (K, M, P).

8b. **Meineckia fruticans** var. **engleri** (Pax) Webster, stat. nov.

Basionym: *Cluytiandra engleri* Pax, Bot. Jahrb. 34: 368. 1904.

Type: Engler 353, from between Muhesa and Lungusa, Ost-Usambara, Tanganyika (n.v.).

Leaf-blades broadly elliptic or somewhat obovate, (3–) 5–9 cm long, (1.5–) 2–4.5 cm broad; petioles 2.3–5.0 mm long; fruiting pedicels 40–63 mm long.

Distribution: coastal or lowland forest or scrub, Tanganyika and southeastern Kenya, alt. ca. 50–200 m (Map 3).

KENYA: coastal woodland, 20 mi. north of Mombasa, Verdcourt 1078 (K); Kilifi Distr., Sabaki, 4 mi. north of Malindi, Polhil & Paulo 740 (S).
TANGANYIKA: TANGA: Lushoto Distr., 1 mi. north of Handeni, Drummond & Hemsley 3483 (K).

Meineckia fruticans is one of the most distinctive of the African species due to its nearly terete twigs, long-pedicellate flowers, shallowly lobed staminal column, and especially the characteristic purplish mottling of leaves, floral parts, and fruits. Hutchinson noted that the type collection of *Cluytiandra engleri* is monoecious (not dioecious, as tentatively suggested by Pax), and he thereby reduced it to synonymy under *C. fruticans*. Since this disposition was accepted by PAX and HOFFMANN in 1922, and since it has not been possible to examine either of the types involved, Hutchinson's interpretation is accepted here. Although *engleri* is maintained as a variety because of its long pedicels and large leaves, it is not at all certain that there are really two distinct taxa within *M. fruticans*. While it is possible that var. *engleri* may represent a coastal ecotype and var. *fruticans* a primarily upland one, even the few available collections suggest that there is some overlap in altitudinal range; it would not be surprising, therefore, if further collecting were to show that any varietal distinctions should be abandoned.

As noted by Leandri, *M. fruticans* resembles *M. madagascariensis* and the several related Malagasian species which have purplish spots on the flowers (though not on the leaves). This resemblance is probably indicative of a fairly close relationship and thus suggests an African origin for the Madagascar species.

9. **Meineckia macropus** (Hook. f.) Webster, comb. nov.
Basionym: *Phyllanthus macropus* Hook. f. Fl. Br. Ind. 5: 287. 1887.
Type: Griffith 4811, from the Mishmi Hills, Assam (K).

Homotypic synonym: *Neopeltandra macropus* (Hook. f.) Das, Fl. Assam 4: 150. 1940.

Presumably shrubby; stems smooth and glabrous; branches angled distally, terete proximally, lenticels inconspicuous; stipules not seen entire. Leaf-blades chartaceous, elliptic, 5–9 cm long, 2–5 cm broad, acuminate, narrowed or obtuse at the base; midrib raised on both sides (but more prominently beneath); major lateral veins (ca. 6–9 on a side) arching, raised beneath; veinlets nearly at right angles to midrib or lateral veins, raised beneath; margins plane (appearing wrinkled in drying); petioles (10–) 15–45 mm long. Probably monoecious [male flowers fallen]. Female flower: pedicel in fruit 19–20 mm long, podium indistinct; styles not seen. Seed ca. 2.5 mm long, apparently shallowly pitted.

Distribution: known only from the type collection. (Map 1).

It is impossible to gave a satisfactory description of this species on the basis of the imperfect type specimen, which lacks male flowers and has only a single battered fruit. However, as Hooker pointed out, it appears distinct by virtue of its long petioles, and the fruiting pedicels are apparently considerably shorter than those of *M. longipes* and *M. calycina*. The disjunct geographical position of this Assam plant seems remarkable, since the closest known *Meineckia* population (in Andra Pradesh) is over 1000 miles away. Were it not for the obvious resemblance of *M. macropus* to *M. calycina*, the generic position of the species might be doubtful. However, the single seed on the specimen, so far as it can be observed, is typical of *Meineckia* except for the shallow pitting (which appears to be like that found in *M. calycina*).

10. **Meineckia longipes** (Wight) Webster, comb. nov.
Fig. 6, 15, 23
Basionym: *Peltandra longipes* Wight, Icon. Pl. Ind. Or. 5 (2): 25, t. 1891. 1852.
Type: Wight 2652, from Quilon, India (K).

Homotypic synonyms: *Phyllanthus longipes* (Wight) Muell. Arg. Linnaea 32: 11. 1863: DC. Prodr. 15 (2): 341. 1866; Hook. f. Fl. Br. Ind. 5: 287. 1887. *Neopeltandra longipes* (Wight) Gamble, Fl. Madras 2 (7): 1286. 1925.

Glabrous shrub: branches nearly terete, pale, smooth, with rather inconspicuous lenticels, ca. 1.0–1.5 mm thick. Stipules deltoid-lanc-

eolate, acuminate, margins finely denticulate, thin, pale and scarious, 1.0–1.5 mm long, 0.7–1.1 mm broad. Leaf-blades membranous, ovate or ovate-elliptic, 5.0–9.5 cm long, 2.0–4.0 cm broad, rather abruptly acuminate, rounded at the base; midrib and major lateral veins (ca. 7–9 on a side) prominulous above, raised beneath; veinlet reticulum delicate, rather obscure above, distinct but not raised beneath; margins plane; petioles adaxially grooved, smooth, 5–8 mm long. Monoecious; cymules bisexual, female flowers solitary, males numerous in clustered racemiform bracteate axes 2–4 mm long. Male flower: pedicel 2.5–4 mm long; calyx-lobes obovate, thin and pale, 1.0–1.3 mm long; disk thin, adnate about half its width, 1.1–1.3 mm in diameter; filaments united for most of their lengths into a column 0.3–0.5 mm high, the free filament tips only 0.1 mm long, not projecting beyond the pistillode; anthers ca. 0.2 mm broad; pistillode obscurely lobed, ca. 0.15 mm high. Female flower: pedicel becoming 50–70 mm long, podium 0.5–1.0 mm; calyx-lobes broadly ovate, thin, herbaceous with narrow to broad pale margins, becoming 1.3–2.0 mm long in fruit; disk thin, as in male flower; styles bipartite, style-branches 0.3–0.4 mm long, capitate. Fruit not seen; seeds [ex icon. Wight] evidently finely pitted.

Distribution: Western Ghats, southern peninsular India.

INDIA: Quilon, Wight 2652 (K); Mameltori, Rottler (K). MADRAS: Tinnevelly (Tirunelveli) Hills, "subalpine", Beddome (K); Singampatty Hills, Tinnevelly, Beddome (BM).

Under the name *Neopeltandra longipes*, GAMBLE (1925) appears to have confounded this species together with the following one, and it is possible that Wight included the same two plants in his original description. However, the characteristic elongated bracteate inflorescences, shown on the plate illustrating *Peltandra longipes*, match the specimen Wight 2652 so well that the identity of the species may be considered fixed with reasonable certainty. Wight's illustration is misleading in several respects, as it suggests that the leaves are not entire, and the pistillode has been omitted from the male flower.

Due to the scanty material available of both species, it is rather difficult to compare *M. longipes* with *M. calycina*. The latter appears to differ in its much larger female flowers with a thicker disk, larger thicker leaves with prominulous veinlets beneath, wider stipules, and probably larger male flowers. If Wight's illustration of the seed of *Peltandra longipes* is correct, then the seeds of *M. calycina* would seem to differ in having larger shallower pits (as well as probably larger overall dimensions). The rather obscure *M. trichogynis*, thought to come from Madagascar, has long-pedicellate female flowers similar to those of *M. longipes*, but its leaf-blades and stipules are much more like those of *M. calycina*. The other *Meineckia* from southern India, *M. parvifolia*, is sympatric with *M. longipes* and resembles it in size of flowers, but clearly differs in its more deeply lobed staminal column, shorter fruiting pedicel, and usually smaller leaves.

11. **Meineckia calycina** Webster, sp. nov. **Fig. 7**

Type: Fisher 3594, from Anamalai Hills, India (K).

Frutex glaber monoica; foliis lanceolatis acuminatis, stipulis deltoidis; floris ♂ laciniis calycis ad 2.2 mm longis filamentis alte connatis; floris ♀ pedicellis fructiferis 4.5–9 cm longis, laciniis calycis ovatis ellipticisve crassis ad 2.7–3 mm longis; disco carnoso; seminibus 4.3 mm longis.

Presumably a shrub, glabrous; branches compressed or somewhat angled, greenish or stramineous and somewhat lucent, ca. 1.5–2.5 mm thick, lenticels rather obscure. Stipules broadly deltoid (often broader than long), scarcely acuminate, margins finely denticulate or ciliate (appearing entire in age), becoming pale and scarious, ca. 1.0–1.5 mm long, 1.2–1.7 mm broad. Leaf-blades membranous or thinly chartaceous, elliptic-lanceolate, 5–14 cm long, 2–5 cm broad, distinctly and somewhat abruptly acuminate, cuneate at base; midrib and the slightly curving major lateral veins (ca. 7–10 on a side) slightly prominulous above, very prominently raised beneath (the midrib almost terete), veinlet reticulum rather obscure above, distinctly visible and slightly prominulous beneath; margins somewhat revolute; petioles adaxially grooved, smooth, 4–13 mm long. Monoecious; cymules bisexual, female flowers solitary, male flowers several per cluster. Male flower: pedicel 3.0–3.5 mm long; calyx-lobes broadly elliptic, acute, yellowish-white, ca. 2.2 mm long, 2.0 mm broad; disk at least 2.5 mm in diameter (when spread out); filaments united for most of their lengths into a staminal column ca. 0.9 mm high, the free filament tips shorter than the anthers; anthers ca. 0.4 mm broad; pistillode ca. 0.2 mm high. Female flower: pedicel at anthesis 35–50 mm long, becoming 45–90 mm in fruit, podium obscure; calyx-lobes ovate or elliptic, rather thick and foliaceous, in fruit becoming scarious and ca. 2.7–3.0 mm long; disk massive and fleshy; styles ca. 0.5–0.7 mm long, not parted to the base, the slender capitate branches ca. 0.3–0.4 mm long. Fruit not seen entire; columella slender, ca. 5 mm long; seeds [immature] dark brownish, plump, apparently with rather broad shallow pits, ca. 4.3 mm long.

Distribution: Western Ghats, southern peninsular India, in montane forests up to 1800 m.

India: Kerala or Madras: Anamallago, 5500 ft, Beddome (BM); Anamalais, Paralai, 4100 ft. Fischer 3594 (K).

This species is so similar in aspect to *M. longipes* that its confusion with it is not surprising. However, the large calyx and very thick disk of the female flower of *M. calycina* set it apart not only from *M. longipes* but from all other taxa in the genus as well. The female calyx, in fact, suggests a relationship to the genus *Zimmermannia;* but the calyces are not multiveined, the stipules are non-foliaceous, and the seeds do not appear to be rugose as in that African genus.

Perhaps the closest species in Meineckia is *M. macropus*, but that species is still too poorly known to make detailed comparisons. The

equally imperfectly known *M. trichogynis* has deltoid stipules and similar leaves, but its small female flowers would seem to preclude a very close relationship with *M. calycina*.

12. **Meineckia trichogynis** (Baill.) Webster, comb. nov. **Fig. 2,8**
Basionym: *Fluggea trichogynis* Baill. Etud. Gen. Euphorb. 593. 1858.
Type: Petit-Thouars s.n., presumably from Madagascar (P).

Homotypic synonym: *Securinega trichogynis* (Baill.) Muell. Arg. DC. Prodr. 15 (2): 447. 1866; Leandri in Humbert, Fl. Madag. 111 (1): 115. 1958.

Shrub (ex Baill.), glabrous, with apparently evergreen foliage; younger branches somewhat compressed, grooved, olivaceous or stramineous; older branches more or less terete, finely purplish-speckled, with obscure lenticels. Stipules ovate, briefly acuminate, auriculate at the base, dentate along the margins, soon becoming scarious-indurate, 1.5–2.1 mm long. Leaf-blades chartaceous, elliptic-lanceolate, 5.5–11 cm long, 1.5–4.5 cm broad, acuminate (obscurely mucronulate at the tip), narrowly cuneate at the base, lucent and olivaceous on both sides, margins plane; midrib incised above, raised beneath but scarcely massive (less than 0.5 mm thick); major lateral veins (ca. 8–12 on a side) slanting, with the veinlet reticulum prominulous on both sides (somewhat more so beneath); petiole deeply grooved adaxially, 4–10 mm long. Apparently monoecious; female flowers solitary or paired, male flowers several to many in bracteate clusters up to 2 mm long. Male flowers not seen mature; buds lacking dark-pigmented spots. Female flower: pedicel becoming 40–60 mm long, grooved, without a distinct podium; calyx-lobes elliptic or obovate, pale, slightly carinate, ca. 1.5–1.7 mm long; disk thin, ca. 1.5 mm in diameter; ovary greenish; style-branches ca. 0.5 mm long, capitate. Fruits and seeds not seen.

Distribution: known only from the type collection.

This enigmatic species is still poorly known, but the characteristic flowers leave no doubt that it belongs in *Meineckia*. The 3 sheets in the Paris Herbarium have no indication of locality, and Baillon merely cited the origin of the plant as "Madagascar". The acuminate leaves with broad deltoid stipules suggest a relationship with the Indian *M. calycina*, but that plant has considerably larger female flowers. The other Indian species with long fruiting pedicels, *M. longipes*, has more similar female flowers, but its leaves are rather dissimilar (thinner, without prominulous veinlets, rounded at the base). Among the Madagascar species, the greatest resemblance seems to be with *M. baronii* and *M. leandrii*, but both of those plants are dioecious and have leaves rounded at the base and without prominulous veinlets. Until better material of *M. trichogynis* is obtained, further speculation about its relationships would seem to be pointless, and even its geographical origin must remain in doubt.

13. **Meineckia baronii** (Hutch.) Webster, comb. nov.

Basionym: *Cluytiandra baronii* Hutch. Kew Bull. 1918: 205. 1918; Leandri in Humbert, Fl. Madag. 111 (1): 143. 1958.

Type: Baron 5606, from northwestern Madagascar (K.)

Evidently shrubby, glabrous; branches subterete or obscurely angled, smooth, pale greenish or stramineous, lenticels inconspicuous. Stipules narrowly lanceolate, acuminate, entire, pale and indurate, subpersistent, 2.8–3.0 mm long. Leaf-blades thinly chartaceous, elliptic, 4.5–9 cm long, 2–5 cm broad, obtuse to acute and mucronulate at the tip, rounded at the base, margins plane or slightly recurved; midrib thin and prominulous above, prominently raised beneath; lateral veins (ca. 8–10 on a side) nearly at right angles, slightly raised beneath; veinlet recticulum obscure (the lamina beneath glaucous or minutely alveolate); petioles 5–13.5 mm long. Dioecious; male flowers in abbreviated bracteate racemiform cymules. Male flower: pedicel glabrous, 2.0–2.5 mm long (–10 mm long fide Hutchinson); calyx-lobes broadly ovate or obovate, thin, purplish-stained or flecked except at the pale tip and margins, 1.3–1.75 mm long; disk thin, entire, ca. 1.2 mm in diameter; filaments united into a rather slender column ca. 1 mm high, the free filament tips recurving, ca. 0.2 mm long; pistillode subentire or angled, 0.2 mm high. Female flowers and fruits not observed.

Distribution: Madagascar.

MADAGASCAR: northwestern Madagascar, Baron 5606, 5630 (K); without locality, Humblot 566 (P).

According to LEANDRI (1958), the Baron collections were probably made in the region of Ambongo-Boina; the range of the species may therefore be adjacent to but allopatric with that of the closely related *M. leandrii*. Among the evergreen species of *Meineckia*, *M. baronii* stands out (along with *M. peltata*) because of its dark-pigmented male flowers; in this respect it shows a resemblance to the *M. madagascariensis* complex. In most characters *M. baronii* rather closely resembles both *M. peltata* and *M. leandrii*, and these three taxa may eventually prove to be subspecies of a single polytypic species.

14. **Meineckia peltata** (Hutch.) Webster, comb. nov. **Fig. 9**

Basionym: *Cluytiandra peltata* Hutch. Kew Bull. 1918: 204. 1918; Leandri in Humbert, Fl. Madag. 111 (1): 140. 1958.

Type: Baron 4198, from central Madagascar (K).

Glabrous shrub 1.5–5 m high; older branches terete, smooth, somewhat ridged, reddish-brown or greyish; branchlets obscurely angled, pale brown. Stipules lanceolate, accuminate, entire, reddish-brown or partly stramineous, scarious, 1.1–2.2 mm long. Leaf-blades chartaceous, ovate to ovate-lanceolate, 2–6 cm long, 1–3.5 cm broad, obtuse to acute and mucronulate at the tip, broadly obtuse to rounded or truncate at the base, margins more or less recurved, distinctly

paler beneath (and minutely alveolate); midrib plane or excised above, thick and prominently raised beneath; lateral veins (ca. 6–8 on a side) slanting or nearly perpendicular, thin above, thicker and distinctly prominulous beneath; veinlet recticulum obscure above, distinct but not raised beneath, the meshes open; petioles (5–) 10–21 mm long, peltately or subpeltately inserted on the lamina. Monoecious; flowers solitary (or males sometimes more than 1 per axil?). Male flower: pedicel glabrous, ca. 4–7 mm long; calyx-lobes broadly elliptic, purplish-stained with pale yellowish-white margins, 1.0–1.1 mm long (in bud); filaments nearly free, pistillode minute, 3-lobed (ex Hutchinson). Female flower: pedicel 13–35 mm long, podium short, up to 0.5 mm long; calyx-lobes broadly ovate, densely flecked with dark pigment, ca. 1.4 mm long; style-branches capitate, 0.4 mm long. Capsule veiny, obscurely mottled with dark spots, ca. 5 mm in diameter; seeds brownish, 2.3–2.4 mm long [slightly immature], distinctly pitted.

Distribution: central and northeastern Madagascar, 900–1200 m (Map 4).

MADAGASCAR: Central districts, Baron 4198, 4231 (K, P). CENTRE: Distr. d'Ambatondrazaka, Sahamalaza, Cours 1202 (P); de Manakamtahiny à Nonokambo, Cours 2354 (P); Lac Alaotra, Herb. Jard. Bot. Tananarive 4356D (P).

The peltate leaf-base, a feature unique in the genus, is the most striking character of this species. In the Cours collections the leaves are often merely "subpeltate", with the petiole inserted at the base of the blade but the laminar margins continuous across its insertion on the ventral side of the leaf. Both in its leaves and its dark-pigmented flowers, *M. peltata* resembles *M. baronii*, which is doubtless its closest congener, and the two taxa might well be regarded as allopatric subspecies. However, in addition to its characteristic leaf-base, *M. peltata* also differs in its more ovate leaf shape, smaller stipules, and monoecious inflorescence. For the time being, therefore, it seems best not to combine the two species. *Meineckia peltata* is also related to *M. leandrii*, but differs from that plant in its less pointed leaves, dark-pigmented flowers, monoecious inflorescence, shorter fruiting pedicels, and smaller seeds.

15. **Meineckia leandrii** Webster, sp. nov. **Fig. 16**

Type: Decary 7980, from Bongo Lava, Madagascar (P).

Frutex dioicus glaber, rami annotini subteretibus; foliis chartaceis lanceolatis breviter acuminatis, non peltatis; floris ♂ laciniis calycis 1.1–1.3 mm longis; floris ♀ pedicello fructifero 40–45 mm longo, lobis calycis 1.5–1.8 mm longis; seminibus 2.9–3.4 mm longis.

Glabrous shrub; younger branches subterete, striate, lucent, olivaceous-plumbeous; older branches terete, dark reddish-brown, with prominent lenticels. Stipules lanceolate, acuminate, becoming indurate-scarious, pale, 1.0–1.8 mm long. Leaf-blades chartaceous, lanceo-

late to ovate-lanceolate, 3–8 cm long, 1–3.5 cm broad, short-acuminate, the midrib prolonged as a cartilaginous mucro 0.4–0.6 mm long, rounded to truncate or subcordate at base, lucent and olivaceous above, pale but not glaucous beneath, margins plane or slightly recurved near the base; midrib incised above, very prominently salient beneath (0.5 mm thick or more in larger leaves); major lateral veins (ca. 10–13 on a side) slightly raised above, distinctly raised beneath; reticulum of tertiary veinlets visible above, prominent beneath. Evidently dioecious; female flowers solitary, males several per cluster. Male flower: pedicel 2.5–5 mm long; calyx-lobes elliptic to obovate, thin or somewhat fleshy, darker in center but not flecked with purplish cells, margins pale, 1.1–1.3 mm long; disk 0.8–1.0 mm across, partially adnate, forming an angular cup with a rim ca. 0.2 mm high; filaments united into a slender column 0.6–0.8 mm high, free filament tips shorter than the anthers, recurving; anthers ca. 0.25 mm broad; pistillode peltate, scarcely lobed, somewhat stipitate, ca. 0.2–0.3 mm high. Female flower: pedicel becoming 40–45 mm long in fruit, podium obsolete; styles not seen. Capsule oblate-spheroidal, veiny, ca. 5.8 mm in diameter [immature?]; columella slender, apically dilated, 3.7–3.8 mm high; seeds [slightly immature?] brownish, 2.9–3.4 mm long, asymmetrically trigonous, foveolate on all sides.

Distribution: montane forest, west central Madagascar. (Map 4).

MADAGASCAR: OUEST: Bongo Lava, east of Ankavandra, quartzites, Decary 7980, 7982, 7985 (P). A collection from Mt. Morahariva (Humbert 13268) may belong here but diverges in its small leaves and short fruiting pedicels.

This distinctive species is named for Mr. Jacques Leandri, the leading student of Malagasian Euphorbiaceae, who has described more species of *Meineckia* than any other worker. LEANDRI (1939, 1958) included the Decary specimens from Bongo-Lava within *M. peltata*. However, that species, although obviously similar, is different not only in its peltate leaves but in several other respects (as discussed above under that species). Perhaps somewhat closer to *M. leandrii* is *M. baronii*, which has similar leaves with a midrib very prominently raised on the dorsal side; but on the other hand, the leaves of that species are not acuminate, and the flowers are dark-pigmented.

16. **Meineckia madagascariensis** (Leandri) Webster, comb. nov.

Basionym: *Cluytiandra madagascariensis* Leandri, Not. Syst. Paris 7: 193. 1939; Fl. Madag. 111 (1): 141. 1958.

Type: Perrier de la Bâthie 9895, from Mangoro, Madagascar (P).

Shrub 2–3 m high; older stems greyish or brownish, smooth, terete or obscurely angled; younger branches slender, greenish, hirtellous; foliage apparently deciduous, flowers appearing with the expanding leaves. Stipules deltoid or lanceolate, usually blunt, obscurely denti-

culate or entire, 1.3–3.3 mm long, becoming indurate, greyish, and persistent. Leaf-blades membranous, elliptic to obovate, 1.0–5.2 cm long, 0.8–2.2 cm broad, obtuse at the tip, cuneate to rounded at the base, at first hirsutulous on the midrib above, on midrib and veins beneath, becoming glabrate with age; midrib and lateral veins (ca. 5–7 on a side) plane above, slightly raised beneath; veinlet reticulum prominent beneath; petioles hirsutulous when young, 2.0–6.0 mm long. Monoecious or dioecious; flowers apparently solitary. Male flower: pedicel glabrous, 3.0–7.0 mm long; calyx-lobes glabrous, broadly ovate or obovate, dark-pigmented with narrow pale margins, 1.5–2.0 mm long, 0.7–2.0 mm broad; disk dark-pigmented, 1.4–1.8 mm in diameter, adnate to the calyx ca. ½ its width; filaments united most of their lengths into a column 0.9–1.1 mm high, free filament tips not over 0.3 mm long; anthers 0.13–0.4 mm broad: pistillode thick, entire or obscurely lobed, 0.15–0.3 mm high. Female flower: pedicel glabrous or sparsely hirsutulous, 6.0–18.0 mm long, becoming 13–18 mm long in fruit; calyx-lobes ovate, mottled with dark-pigmented cells, margins thin and pale, becoming 1.2–1.5 mm long; ovary dark-flecked; style-branches 0.6–0.75 mm long, capitate. Seeds ca. 2.4 mm long, brownish, deeply pitted.

Distribution: montane forest, eastern Madagascar, alt. ca. 800 m (Map 4).

MADAGASCAR: EST: Bassin du Mangoro, Perrier de la Bâthie 9894, 9895 (P). OUEST: Gorge de Pisopiso, Ampandrandava, Seyrig 305 [Herb. Tananarive 5726] (P).

The Mangoro specimen of Bâthie is here chosen as lectotype, following Leandri's treatment of 1958. In the original description of *Cluytiandra madagascariensis* Leandri described the calyx as pubescent, a condition found in Bâthie 9651 but not in the Mangoro plants. Since Leandri in 1958 omitted Bâthie 9651 from the list of cited specimens, he was in effect designating the Mangoro collections as the typical element.

Not cited above is a specimen from the Massif du Betsomanga (Humbert & Capuron 24268) which has nearly glabrous juvenile twigs but probably belongs to *M. madagascariensis* on the basis of its dark-pigmented male flowers. The dark-pigmented cells present on most floral parts are especially characteristic of *M. madagascariensis* and suggest an affinity with the east African *M. fruticans*, as Leandri suggested. However, the African species is easily distinguished by its glabrous mottled leaves, several-flowered male cymules, longer female pedicels, and shorter style-branches. The closest taxon to *M. madagascariensis* is undoubtedly *M. humbertii*, which is vegetatively very similar but has pale flowers (without dark cells) and longer fruiting pedicels. Almost as close is *M. pubiflora*, but that plant has pubescent flowers and smaller seeds. All three of these Madagascar taxa with deciduous leaves and solitary flowers form a distinctive complex which on the basis of available specimens seems best treated as three distinct species, even though they are indubitably very closely allied.

17. **Meineckia humbertii** Webster, sp. nov.

Type: Humbert 19732, from forêt d'Analavelona, Madagascar (P).

Frutex verisimiliter monoicus, rami ramulisque hirtellis, subteretibus; foliis membranaceis hirtellis ellipticis obtusis; floris ♀ pedicello fructifero 2.7–3.6 cm longo, laciniis calycis 1.4–1.5 mm longis, non infuscatis; seminibus 2.5–2.9 mm longis.

Young branches very slender (0.5 mm thick or less), slightly angled, hirtellous; older branches terete, pale brownish, with scattered lenticels; foliage evidently deciduous. Stipules lanceolate, acuminate, thin and scarious, 1.3–2.0 mm long, becoming indurate and subpersistent. Leaf-blades membranous, elliptic to obovate, ca. 1.5–3.5 cm long, obtuse or subacute at the tip (not mucronulate), cuneate at the base, paler beneath, hirtellous on midrib and sides; midrib slightly raised on both sides, major lateral veins (5–7 on a side) not very prominent; reticulum of tertirary veinlets prominent beneath; margins plane; petioles hirtellous, 1.0–1.5 mm long. Probably monoecious; flowers apparently solitary or paired. Male flowers seen only in bud, dark-pigmented cells lacking. Female flower: pedicel slender, hirsutulous, becoming 27–36 mm long in fruit; calyx-lobes broadly ovate, becoming 1.4–1.5 mm long, pale and scarious except for the narrow green midrib; styles ca. 0.7 mm long, bipartite, branches subcapitate. Capsule not seen intact; columella ca. 2.5 mm long; seeds brownish, 2.5–2.9 mm long, either 1 or 2 per locule, somewhat irregularly pitted, the pits partly transversely elongated and not in distinct rows.

Distribution: known only from the type collection in south-western Madagascar. (Map 4).

MADAGASCAR: SUD-OUEST: forêt d'Analavelona, bassin du Fiherenana, sur basalte, 1000–1200 m, Humbert 19732 (P).

This is a rather weakly defined species, doubtless very close to *M. madagascariensis*, and differing mainly in its pale flowers and longer fruiting pedicels. It is also quite similar to *M. pubiflora*, but seems more sharply distinguished from that plant by virtue of its larger seeds and glabrous calyces.

18. **Meineckia pubiflora** Webster, sp. nov. **Fig. 17**

Type: Perrier de la Bâthie 9651, from bassin du Mangoky, Madagascar (P).

Frutex monoicus vel dioicus, ramulis hirtellis, foliis hirsutulis; calycis hirsutulis; floris ♀ pedicello fructifero 10–21 mm longo; seminibus 1.8–2.0 mm longis.

Shrub or small tree to 5 m high; branches subterete or obscurely angled, greyish or reddish brown, smooth or hirtellous. Stipules lanceolate, acuminate, scarious, reddish or stramineous, ca. 1.0–1.3 mm long. Foliage evidently deciduous; leaves (not observed mature) thin, roundish, less than 2 cm long, obtuse at the tip (not mucronulate), sparsely hirtellous above, more densely hirtellous beneath; lateral veins (ca. 4 or 5 on a side) and veinlet reticulum prominent

beneath. Monoecious (and also dioecious?); flowers solitary, lacking dark-pigmented cells. Male flower: pedicel up to 6 or 7 mm long, sparsely hirsutulous; calyx-lobes broadly elliptic or suborbicular, dorsally hirsutulous especially on the midrib (sometimes almost glabrous), ca. 1.7–1.8 mm long; disk partially adnate, 1.6–1.9 mm across; staminal column 1.1–1.5 mm long, much longer than the free filament tips (which are ca. 0.2–0.25 mm); anthers 0.4 mm broad (or more); pistillode unlobed, 0.2–0.35 mm high. Female flower: pedicel hirsutulous, becoming 16–20 mm in fruit; calyx-lobes broadly elliptic, hirsutulous, becoming ca. 1.1–1.3 mm long; style-branches 0.6–0.9 mm long, capitate. Seeds brownish, 1.8–2.0 mm long, deeply pitted.

Distribution: forest on acidic rock, southwestern Madagascar, alt. 300–700 m (Map 4).

MADAGASCAR: OUEST: Bassin du Mongoky, entre le Menamaty et le Zomandao, Perrier de la Bâthie 9651 (P); bassin de l'Onilahy, forêt d'Analamarina, vallée de l'Hazoroa, au sud de Sakaraha, Humbert 19644 (P, PUL).

The type collection of this species was originally cited under *Cluytiandra madagascariensis* by Leandri (Not. Syst. Paris 7: 193. 1939); but in the later treatment of that species (Fl. Madag. 111 (1): 141. 1958) it was omitted. Although there is a very strong resemblance, the hirsutulous flowers lacking dark-pigmented cells and the smaller seeds of *M. pubiflora* seem to warrant recognition as a distinct species. Even more similar than *M. madagascariensis* is *M. humbertii*, which is known only from the forêt d'Analavelona, not far from the Analamarina population of *M. pubiflora* (but at higher altitudes). However, although the longer fruiting pedicels and glabrous calyces of *M. humbertii* are perhaps unreliable characters for distinguishing it from *M. pubiflora*, the distinctly larger seeds of *M. humbertii* would appear to provide an adequate diagnostic feature.

19. **Meineckia orientalis** (Leandri) Webster, comb. nov.

Basionym: *Cluytiandra orientalis* Leandri, Not. Syst. Paris 7: 191. 1939; in Humbert, Fl. Madag. 111 (1): 141. 1958.

Type: Perrier de la Bâthie 9628, from Analamazaotra, Madagascar (P).

Glabrous shrub 1–2 m high, with evergreen foliage; branches sharply angled, dark reddish-brown, smooth. Stipules ovate, acute, auriculate at the base, reddish-brown with narrow scarious margins, ca. 1.0–1.3 mm long. Leaf-blades subcoriaceous, oval, (2–) 4–5 cm long, (1–) 1.5–2.2 cm broad, acute to short-acuminate at the tip, narrowed at the base, not paler beneath, margins plane or somewhat revolute; midrib and major lateral veins (mostly 7 or 8 on a side) plane above, distinctly raised beneath; veinlet reticulum prominulous beneath; petioles 1–3 mm long. Dioecious; female flowers solitary, males unknown. Female flower: pedicel becoming 17–22 mm long; calyx-lobes broadly ovate, margins pale and minutely denticulate,

ca. 1.7 mm long; disk mostly free from the calyx, cupuliform, the rim ca. 0.35 mm high, margins erose-denticulate; style-branches ca. 0.6 mm long. Columella 3.0–3.5 mm long; seeds brownish, 3.6–4.0 mm long, deeply pitted, the pits in ca. 12 longitudinal rows.

Distribution: known only from the type collection. (Map 4).

MADAGASCAR: EST/CENTRE: forêt d'Analamazaotra, alt. 800 m, Perrier de la Bâthie 9628 (P).

Although known only from the single type specimen, *M. orientalis* appears to be a very distinct species. LEANDRI (1939) regarded its generic position as provisional because of the lack of male flowers; however, the seeds are quite characteristic and there seems to be no reason to doubt the assignment of the species to *Meineckia*. The very sharply angled twigs and shining thinly coriaceous nearly sessile leaves give the plant a very distinctive aspect, so that it cannot be confused with any other Madagascar species.

TAXA OF DOUBTFUL STATUS

1. *Cluytiandra perrieri* Leandri, Not. Syst. Paris 7: 193. 1939; in Humbert, Fl. Madag. 111 (1): 142. 1958.

Type: Perrier de la Bâthie 9721, from Masaola, Madagascar (P).

Although known only from female material, this species certainly does not seem to belong to *Meineckia;* in particular, the several-flowered female clusters and peculiarly thickened styles do not accord with the other species. Vegetatively, the plant resembles various Madagascar species of *Blotia*, *Savia*, and *Wielandia*, but its apetalous flowers would exclude it from any of these. Until male flowers or fruits are collected, the assignment of the species must remain uncertain.

2. *Phyllanthus suberosus* Wight ex Muell. Arg. Linnaea 32: 11. 1863; DC. Prodr. 15 (2): 341; Hook. f. Fl. Br. Ind. 5: 287. 1887.

Type: Herb. Wight, Wallich 7910, from the Deccan, India [ex Hooker] (G-DC).

Homotypic synonym: *Neopeltandra suberosa* (Wight ex Muell. Arg.) Gamble, Fl. Madras 2: 1286. 1925.

This species has had a very confused history, and its disposition is still doubtful. On the basis of its stamens connate for most of their lengths, Mueller originally described it as distinct from the plant now called *Meineckia parvifolia*. Unfortunately, the single well-developed male flower on the Wallich specimen has been damaged, so that the staminal character cannot be confirmed. Hooker cited a collection of Heyne from "Samulcotta" as representing the species, but that specimen, and most of the ones cited by Gamble, clearly belong to *M. parvifolia*. The only distinguishing character of *Phyllanthus suberosus*, other than the dubious androecial difference, is the scabridulous

pubescence, which does not seem to be of any great taxonomic significance. Since it appears probable that *Phyllanthus suberosus* is a synonym of *Meineckia parvifolia*, no new combination is made for it here.

TAXA TO BE EXCLUDED FROM THE GENUS

1. *Cluytiandra schinzii* Pax, Bull. Herb. Boiss. 2 ser. 8: 635. 1908.
Type: Meynhart 779, from Boruma, Zambesi basin (n.v.).
This species was reduced to *Phyllanthus kirkianus* by Pax and Hoffmann (Pflanzenr. Heft 81: 211. 1922).

2. **Zimmermannia decaryi** (Leandri) Webster, comb. nov.
Basionym: *Cluytiandra decaryi* Leandri, Not. Syst. Paris 7: 193. 1939; in Humbert, Fl. Madag. 111 (1): 142. 1958.
Type: Decary 4459, from Massif de l'Angavo, a l'est d'Antanimora, Madagascar (P, n.v.).
Although it was not possible to consult the type collection of this species, Mr. Leandri has kindly made available two collections of var. *occidentalis* (Perrier de la Bâthie 1175, 1634). Despite an obvious similarity to the deciduous Madagascar taxa of *Meineckia*, these specimens diverge in two very important respects: the several parallel veins of the calyx-lobes (in both sexes), and the transversely ridged (rather than pitted) seeds. These characteristics point towards the African *Zimmermannia*, heretofore unknown from Madagascar, rather than to *Meineckia*. In one respect—the connate stamens—the specimens are more like *Meineckia*, since *Zimmermannia* has stamens free from the pistillode. Furthermore, the pollen grains (prepared by the courtesy of Dr. Willem Punt) lack the excrescences of *Zimmermannia capillipes* (PUNT, 1962) and are not unlike those of *Meineckia*.
The Madagascar plant described by Leandri as *Cluytiandra decaryi* thus represents a form transitional between *Meineckia* and *Zimmermannia*, and raises the question as to whether the two taxa can really be considered distinct genera. However, the calyces and seeds of *C. decaryi* are so typical of *Zimmermannia* that the species seems best placed in that genus, despite its discordant characters of connate stamens and small stipules. Until pollen of other species of *Zimmermannia* can be examined, no conclusions can be drawn from the palynological evidence, since the verrucae of *Z. capillipes* may prove to be simply an isolated variation. In transferring Leandri's species to *Zimmermannia*, no combination is made here for var. *occidentalis* since it has not been possible to evaluate its distinctness from the nominate variety.

ACKNOWLEDGEMENTS

The completion of this work was made possible through the aid of grants from the National Science Foundation and the John Simon Guggenheim Memorial Foundation. The author wishes to express his gratitude to the staff of the Botanical Museum, Utrecht, for the many courtesies extended during his stay there. Dr. Barbara Webster prepared the drawings from the author's preliminary sketches. Mr. J. Leandri assisted in providing specimens of and information about the Malagasian taxa.

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