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Lipochaeta and Melanthera (Asteraceae: Heliantheae subtribe Ecliptinae): establishing their natural limits and a synopsis

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Wagner, W. L. & H. Robinson (Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560–0166, U.S.A.). *Lipochaeta* and *Melanthera* (Asteraceae: Heliantheae subtribe Ecliptinae): establishing their natural limits and a synopsis. *Brittonia* 53: 539–561. 2001.—We restrict the genus *Lipochaeta* to the allopolyploid species of the typical section. *Lipochaeta* s.str. is interpreted to be the result of an intergeneric hybridization between *Melanthera* and a presently unknown taxon, perhaps of the genus *Wedelia*. *Lipochaeta* is characterized, in addition to its allopolyploidy ($n = 26$), by having both flavonols and flavones, disk corollas with 4 lobes, achenes tuberculate at maturity, the disk achenes flattened to slightly biconvex, and ray achenes obcompressed. *Lipochaeta* sect. *Aphanopappus* and *Wollastonia* are here reduced to synonymy under *Melanthera*. We transfer 14 Hawaiian *Lipochaeta* and one New Caledonian species as well as the Asian *Wedelia prostrata* to *Melanthera*. These transfers, along with the species in Africa and North America, bring the number of species in the genus to 35. *Melanthera* is delimited by an abruptly narrowed to truncate and flattened top of the achene, (0–)1–15(–20) often unequal, ciliate or barbellate, caducous pappus bristles immediately surrounding the corolla, involucre bracts and receptacular paleae with many veins forming longitudinal striations, and $n = 15$. The florets are 5-merous, the corollas are yellow or white, and rays are absent (in white-flowered species) or present and neutral or fertile. In dealing with species formerly placed in *Lipochaeta*, the Galapagos *L. laricifolia* is here transferred from the illegitimate generic name *Macraea* to *Trigonopterum* and the Brazilian *L. goyazensis* is transferred to *Angelphytum*. We maintain the earlier reduction of *Echinocephalum* under *Melanthera* and reduce all three taxa originally described in it to one, *M. latifolia*.

Key words: Asteraceae, Compositae, Heliantheae, Ecliptinae, *Echinocephalum*, *Lipochaeta*, *Macraea*, *Melanthera*, *Trigonopterum*, *Wedelia*, *Wollastonia*, Hawaiian Islands, Pacific islands, New World, Africa, Asia.

Taxonomic resolution is necessary for the group of species that have been placed under the various genera *Melanthera* Rohr, *Lipotriche* R. Br., *Lipochaeta* DC., *Macraea* Hook. f., *Trigonopterum* Steetz ex Anderss., and *Wollastonia* DC. from the Pacific and Palaeotropics. A natural taxonomic disposition of these genera is hindered by additional problems with some species of *Wedelia* Jacq. or taxa related to *Wedelia* and with South American species of the genus *Echinocephalum* Gardn. All of these

taxa have been placed by Robinson (1981) in the subtribe Ecliptinae of the tribe Heliantheae and have been shown to belong to the core of the Ecliptinae according to the chloroplast DNA studies of Panero et al. (1999). All the genera share achenes with phytomelanin in the walls not interrupted by striations, style bases not enlarged, style branches with stigmatic surfaces as a pair of separated lines, and corolla throats with a single scarcely colored resin duct. Relatedness of the genera is not in question, but

the precise delimitation of the genera involved has not been properly realized. Specifically, the problems are the narrow interpretation of *Melanthera* and the overly broad interpretation of *Lipochaeta*. There is also the need to formally synonymize the genus *Wollastonia* with *Melanthera* and to replace the illegitimate name *Macraea* Hook. f. with *Trigonopterum* Steetz ex N. J. Andersson.

The present study was initiated to review the available literature, evaluate morphological characters in putatively related taxa, and provide a natural classification for the Hawaiian taxa assigned to *Lipochaeta* in the most recent treatments (Gardner, 1979; Wagner et al., 1990). To accomplish this we have evaluated most of the taxa worldwide that are currently treated in the genera including *Lipochaeta*, *Macraea*, *Melanthera*, and *Wollastonia*, and many of those of *Wedelia*. Revisionary work (Becker, 1979; Fay, 1979; Strother, 1991; Wild, 1965), coupled with biosystematic studies by Gardner and Rabakonandrianina (cited below), has brought considerable order to this complex subtribe and has provided a solid foundation for the work presented here.

Many recent papers have dealt with aspects of the *Lipochaeta/Melanthera* problem. Those dealing with *Lipochaeta* include Gardner (1976, 1977a, 1977b, 1979), Gardner and La Duke (1978), Rabakonandrianina (1980), Rabakonandrianina and Carr (1981), and Carr (1978). Those dealing with *Melanthera* include Parks (1973), Wild (1965), and Cabrera (1970, 1974). Papers dealing with *Wollastonia* include Wild (1965) and Fosberg and Sachet (1980). The whole series of genera was treated by Stuessy (1977), Robinson (1981), and Strother (1991) as members of the Heliantheae subtribe Ecliptinae. Finally, Panero et al. (1999) did a chloroplast DNA study of the Ecliptinae showing that *Melanthera*, *Lipochaeta*, and *Wollastonia* are more closely related to one another than any are to the clades containing *Wedelia*, *Macraea*, and the *Wedelia* segregate *Sphagneticola* Hieron. A second more recent study focusing on the Ecliptinae using ITS (Chumley et al., 2000) shows a much more robust clade consisting of *Wulffia*, *Perymenium*, *Wollas-*

tonia, *Melanthera*, and *Lipochaeta*. Within this clade *Wollastonia* and *Melanthera* form a clade that is sister to *Lipochaeta*. The results of these two studies show the close relationship among these taxa.

Restriction of the Concept of *Lipochaeta*

The genus *Lipochaeta* was described by de Candolle (1836) to include 10 yellow-flowered, opposite-leaved species with fertile ray florets, triangular, triaristate, somewhat winged ray achenes, and biaristate, somewhat winged disk achenes. The name *Lipochaeta* was ostensibly inspired by the name *Lipotriche* R. Br. (1817), a name based on a specimen from Africa, but without describing any species. Lessing (1831) described two species in Brown's genus, *L. gymnomoides* and *L. australis*. Both of these species were transferred from *Lipotriche* by de Candolle (1836), the former to *Perymenium gymnomoides* (Less.) DC., and the latter to his new genus *Lipochaeta*, but using the oldest name available for the species, *L. lobata* (Gaud.) DC. The original element from Brown's genus was the only one kept in *Lipotriche* by de Candolle, and he used the African specimen cited by Brown for the type of the new species *Lipotriche brownei* DC., [= *Melanthera scandens* (Schumach. & Thonn.) Roberty].

Included in *Lipochaeta* by de Candolle were a series of American species from Mexico and the Caribbean, now mostly in *Lasiantha* DC., with one in *Wamalchitamia* Strother, five Hawaiian species, and finally there was mention of a single species now placed in *Zexmenia* La Llave. Four of the five Hawaiian names given by de Candolle, including the lectotype of *Lipochaeta*, *L. lobata* (Gaud.) DC., are members of the distinctive *Lipochaeta* section *Lipochaeta* having a chromosome number of $n = 26$ and the majority of the disk corollas with four lobes (Gardner, 1977a). Subsequent to the original description, during the remainder of the 19th century, a number of additional species were ascribed to *Lipochaeta*. Among these was the Galapagos endemic *Lipochaeta laricifolia* (Hook. f.) A. Gray. This taxon subsequently has been resurrected as the genus *Macraea* (Harling,

1962; Eliasson, 1984), a comparatively distantly related member of the Ecliptinae (Panero et al., 1999). By 1935, when Sherff revised the genus *Lipochaeta*, it was delimited to include only Hawaiian species and one from New Caledonia. The other species that had been assigned to the genus were primarily New World and had been transferred to a number of other genera. The genus was again revised by Gardner (1979) to comprise 22 shrubby perennial species and a single annual species, all Hawaiian, having two different basic chromosome numbers, collectively occupying a highly diverse array of habitats ranging from low coastal zone to steep dry or mesic slopes. Gardner also confirmed Harling's (1962) exclusion of *Macraea* of the Galapagos and accepted the placement of *Lipochaeta lifuana* Hochr. from New Caledonia in *Wedelia* [as *W. uniflora* (Forst.) Moore, a misapplied name now considered to be a synonym of the plant known as *Wollastonia biflora*]. Wagner et al. (1990) reduced the Hawaiian species to 20.

Data relevant to developing a monophyletic classification for the Hawaiian taxa have been available since the biosystematic and revisionary studies by Gardner (1976, 1977a, 1977b, 1979; Gardner & La Duke, 1978), and experimental hybridization and cytogenetic work by Carr (1978), Rabakonandrianina (1980), and Rabakonandrianina and Carr (1981). Nevertheless Gardner (1979) did not delineate a monophyletic group (Carr, 1978; Fosberg & Sachet, 1980; Wagner et al., 1990; Smith & Carr, 1991). Rabakonandrianina and Carr (1981) presented cytogenetic evidence that *Lipochaeta* sect. *Lipochaeta* arose by hybridization between taxa with *Wedelia*-like $n = 11$ ancestry and *Melanthera*-like $n = 15$ ancestry. This is the same typical element of *Lipochaeta* that is distinguished by the 4-lobed corollas of the disk florets. To date, morphological evidence of this same *Wedelia*-like ancestor in *Melanthera* and *Wollastonia* is lacking. Based on these data, we maintain the generic status of *Lipochaeta* but restrict it to include only the typical element.

The Broadening of the Concept of *Melanthera*

The name of the genus *Melanthera* emphasizes the black anthers. Such anthers are not unusual in the Heliantheae, but they are particularly obvious in the typical element of *Melanthera* where the corollas are white and there are no rays. Such white-flowered nonradiate heads have become the accepted character for the traditional concept of the genus. Other diagnostic features, less often emphasized, are the abruptly narrowed to truncate and flattened top of the achene with a cluster of many true pappus bristles immediately surrounding the corolla, and involucre bracts and receptacular paleae with many veins forming longitudinal striations. Such striations are found in species that have been placed in *Wulffia* Neck. ex Cass., *Wollastonia*, *Echinocephalum*, and *Lipochaeta*, and the character seems to delimit a related group. Achenes of *Melanthera* are not particularly noted for having wings, but a narrow, distinct wing is present even in the generic type. Among the related genera to *Melanthera* only the fleshy-fruited *Wulffia* seems to lack wings.

Bentham (1873) was the first to broaden the generic concept of *Melanthera*. The validly named genera he placed in synonymy were *Echinocephalum*, *Lipotriche*, *Psathurochaeta* DC., and *Wuerschmittia* Sch.-Bip., although no combinations were made. The genus *Wollastonia* was placed in *Wedelia*. The concept included species with yellow corollas and neutral or fertile rays. Wild (1965) also had an expanded concept of *Melanthera* in his treatment of the African species. It was technically broader than the concept of Bentham by the inclusion of the generic type of *Wollastonia* DC., a species with yellow corollas and fertile rays. With this concept of *Melanthera*, Wild abandoned the use of such generic characters as rays absent or present or neutral, and number of pappus bristles. Instead, he relied on achene shape and the strongly striate paleae. Unfortunately, the concepts of Wild have not been followed outside of Africa by many authors during the rest of the century.

Parks (1973) revised the North American

and Caribbean species of *Melanthera* that include only those taxa with white corollas, black anthers, and no rays. In doing so he dealt with only the narrow concept of the genus. At nearly the same time, Cabrera (1974) formally reduced the yellow-flowered and neutral-rayed *Echinocephalum* of South America to synonymy under *Melanthera*, with which it shares similar achenes and a pappus of many bristles.

It remains possible to restrict the concept of *Melanthera* by the white corollas and lack of rays, by the lack of fertile rays, or by the presence of many pappus bristles. However, these delimitations are practical in a broad geographical sense. Typical *Melanthera* extends into Brazil where *Echinocephalum* is found, and African species treated as *Melanthera* by Wild (1965) include some with sterile and some with fertile rays. Even *Wollastonia* has a single well-marked pappus bristle of the type seen in some *Melanthera*. We have decided to follow Wild's concept in regard to *Melanthera*, and treat all the species with striated receptacular bracts and nonfleshy, triangular to tetragonal, truncate, winged achenes as members of the genus. We have examined all possible taxa worldwide that might fit into this expanded concept of the genus.

The primary exception of taxa we do not include in *Melanthera* is the Hawaiian element that has 4-lobed corollas and *Wedelia*-like elements in its hybrid history. This is typical allopolyploid *Lipochaeta* and consists of six species.

A second exception made at present involves a few species from Australia that do not actually fit our broadened delimitation of *Melanthera*. These species include the presently named *Wedelia asperrima* Benth., *W. spilanthoides* F. Muell., and *W. verbesinoides* F. Muell. & Benth. The latter two species have striated receptacular paleae as in the *Melanthera* group, but they also have achenes biconvex and apically narrowed but not truncated to a narrow corolla insertion. *Wedelia asperrima* Benth., which may be related to these two species, has heads that look *Melanthera*-like, but has less strongly costate stems, lacks the striations in the paleae, and has much fatter though still biconvex nontruncate achenes. We be-

lieve that at least *W. spilanthoides* and *W. verbesinoides* with striated paleae represent products of a hybridization event unrelated to the one that gave rise to *Lipochaeta* between *Melanthera*-like and *Wedelia*-like taxa. The Australian species differ from Hawaiian *Lipochaeta* by their 5-lobed disk corollas and the slight necks on the achene.

Considerations Regarding *Wollastonia*

In a study dealing with Micronesian plants and thus geographically well-removed from the *Melanthera* problem of the Americas, Fosberg and Sachet (1980) resurrected the genus *Wollastonia* with the primary intent of rescuing the type species, *W. biflora*, from its common misplacement in the genus *Wedelia*. The uncertain relationship to a more strictly defined *Melanthera*, with its more numerous capillary bristles, lack of fertile rays, and white disk corollas, was of secondary importance.

Wollastonia was established by Decaisne (1834) for three species of the Pacific-Indian Ocean regions, one of which, *W. scabriuscula* (Gaud.) DC. ex Decne., has been demonstrated by Fosberg and Sachet (1980) to be the best choice for the type of *Wollastonia*. Fosberg and Sachet also show that *W. scabriuscula* is both a taxonomic and nomenclatural synonym of *Wedelia biflora*. In the same paper, they discussed the close relationship between *Lipochaeta* and *Wollastonia*, the latter recognized at that time on the basis of a single Pacific-wide species. They suggested that part of or, better, all of *Lipochaeta* is congeneric with *Wollastonia*, but held off making the transfers because Gardner's revision was recently completed but not yet published when they were writing their paper. Thus, there has been an assumption, dating from Fosberg and Sachet (1980), that *Wollastonia* would eventually be expanded to include other species from the Hawaiian Islands that were placed in *Lipochaeta* and perhaps even other Old World taxa.

The comments of Fosberg and Sachet (1980) ignored the de facto reduction of *Wollastonia* to the synonymy of *Melanthera* by Wild (1965). They instead chose to rely on the fertile rays and the single rather

than many pappus bristles to justify the separation from *Melanthera*. They mentioned several times that *Wollastonia* seemed to be closer to *Lipochaeta* than to the typical rayless, white, disk-flowered *Melanthera*, but they did not further evaluate *Wollastonia* or *Lipochaeta* to the possible merits of Wild's wider delimitation of *Melanthera*.

Synopsis of *Lipochaeta* and *Melanthera*

In this section we provide an account of all of the currently recognized species of *Lipochaeta* followed by those in *Melanthera*. Within the synopsis of *Melanthera* we have the species grouped into two alphabetical series: Pacific species with which we worked in greater detail; and the other additional species of the genus from North America, South America, and Africa. With a few exceptions that are discussed in the species notes, we have followed the most recent treatments for delimitation of species, including Parks (1973) for the white-flowered, rayless group, Wild (1965) for the African species, and Wagner et al. (1990) for the Hawaiian species. We evaluated the taxonomic status of the few additional species from Pacific Islands, Asia, and South America not covered in those revisions. We also provide here complete nomenclature and type information for the Pacific, South American species formerly in *Echinocephalum*, and the Asian species. For the species covered in the revisions by Parks (1973) and Wild (1965) we provide only very abbreviated information, including nomenclature of only the accepted name and synonyms only if the name is sometimes still recognized.

The reason for a full nomenclatural treatment of the Hawaiian species is that Gardner (1979) made numerous errors in typification, especially unnecessary lectotypifications, and many additional species were described after Gardner's treatment by St. John (1984). Although St. John's names were placed in synonymy by Wagner et al. (1990) under the same species as we do here, we have resolved problems in typification that could not be examined in the context of a floristic treatment. Moreover, some names have been placed either newly

into synonymy or placed differently than where Gardner (1979) placed the name.

We have included the geographical distribution for each species insofar as we know it. We have updated information on the distribution of several Hawaiian, other Pacific, and South American species. We do this, in part, so that all of the currently accepted taxa and their distributions of both *Lipochaeta* and *Melanthera* are available in one publication. This treatment differs from Wagner et al. (1990) in that we here recognize the extinct population from the island of Lana'i included in *Lipochaeta subcordata* as *Melanthera populifolia*, and we give subspecies status to the infraspecific Hawaiian taxa. We believe that the geographic/ecological distinctions along with the morphological diagnostic characters that distinguish them are best recognized at the subspecies rather than varietal rank.

Because the achene morphology has increased significance in our delimitation of *Melanthera* from *Lipochaeta* and other closely related genera of the Ecliptinae, we include two plates (Figs. 1, 2) illustrating the important differences. We have selected several species of *Melanthera* and *Lipochaeta* to show the range of variation as well as the distinguishing characteristics of the paleae, achene, and pappus. For comparison we chose a species each from *Perymenium* and *Wedelia*.

Key to *Lipochaeta* and *Melanthera*

1. Disk corollas with 4 lobes; achenes tuberculate at maturity, the apex rounded to sometimes truncate, hispidulous apically; disk achenes flattened, 2-angled; ray achenes obcompressed with a median ridge, rarely thickened and weakly 3-angled; pappus of deciduous connate scales forming an uneven corona, sometimes with short sharp or blunt awns and intervening squamellae; plants with both flavonols and flavones present; n = 26
 *Lipochaeta*
1. Disk corollas with 5 lobes; achenes smooth to tuberculate at maturity, the apex abruptly narrowed, truncate, minutely hispidulous apically; disk achenes not flattened, 4-angled; ray achenes 3-angled; pappus usually of 1–15(–20) deciduous short bristles; plants with flavonols present; n = 15
 *Melanthera*

Lipochaeta

LIPOCHAETA DC., Prodr. 5: 610. 1836. *Microchaeta*, Nutt., Trans. Amer. Philos. Soc. (n.s.) 7: 450. 1841, nom superfl.
 TYPE: *Lipochaeta lobata* (Gaud.) DC.

Suffruticose perennial herbs; stems erect, spreading to prostrate, rounded to quadrangular or subhexagonal, costate or ribbed, sometimes rooting at the nodes. Leaves opposite, rarely ternate; petioles present and winged or absent and the bases connate-perfoliate; blades chartaceous, subcoriaceous, or somewhat fleshy (*L. succulenta*), ovate to elliptic, lanceolate or linear-lanceolate, rarely deltate or spatulate, entire, margins entire to deeply lobed, serrate or irregularly and coarsely serrate, apex acute to obtuse, both surfaces subglabrous or more often appressed pubescent or hispidulous and scabrous with glutinous dots. Inflorescences terminal with heads solitary or few in cymose clusters. Heads with rays, erect; involucre hemispherical to broadly campanulate; involucre bracts in 2 equal or subequal series of 4–5 bracts each, appressed with scarcely spreading tips, ovate to oblong, green to tan and sometimes purple-tinged near base and along midrib; receptacle paleaceous, the paleae persistent, rigid, erect or arching over florets, weakly conduplicate at anthesis, flatter as achenes mature, obovate to oblanceolate, obtuse to nearly truncate, acute in one species, mucronate to apiculate, narrowly keeled and distinctly striate with many longitudinal ribs, sometimes tinged purple toward apex or along midrib, scabrid or asperulous outside, especially toward tip; ray florets 6–16 per head, pistillate and fertile, rays yellow, entire to 3-toothed; disk florets (15–)25–65 per head, hermaphroditic, corolla, 4(–5)-merous, yellow mostly glabrous to scabrid distally, veins without fiber sheath, lobes triangular to longer than wide, anther thecae brownish, apical appendage yellow, ovate. Achenes tuberculate at maturity, flattened to slightly biconvex, in rays obcompressed with median ridge inside, rarely thickened and more triangular, in disk flattened, 2-angled, in rays and disk rounded or sometimes

truncate and hispidulous apically, with a small central corolla and pappus attachment, distal hispidulous surface of little or no width, angles with narrow wings 0.3–0.6 mm, often greatly enlarged at maturity, sometimes deeply lobed, sometimes with narrow antrorse projections at upper corners, surface not fleshy; pappus of connate scales forming an uneven corona, sometimes with short sharp or blunt awns and intervening squamellae. Pollen grains ca. 27 μm diam. $n = 26$.

Lipochaeta is a genus of six species endemic to the Hawaiian Islands. The genus is here restricted to the allotetraploid taxa with the diploid taxa formerly included here transferred to *Melanthera*. The genus appears to have had an origin via hybridization between *Melanthera* with $n = 15$ and an unknown $n = 11$ *Wedelia*-like colonist, perhaps a species of *Wedelia*. Although we can with assurance eliminate the autotetraploidy hypothesis for *Lipochaeta* (Gardner, 1977a, 1977b; Gardner & La Duke, 1978), we cannot be sure if the origin of the genus was in the Hawaiian Islands or in a continental source area, probably North America or South America. Because of the impressive cytological variation in *Wedelia*, Carr (1978) suggested that the $n = 15$ and $n = 26$ groups assigned to *Lipochaeta* were the result of two separate introductions. This idea continued to be favored after they showed that the $n = 26$ group was of allopolyploid derivation (Rabakonandrianina, 1980; Rabakonandrianina & Carr, 1981). Without more precise information about the actual parentage, we cannot determine whether the hybridization event took place before or after colonization, since both hypotheses require two colonizations to the Hawaiian Islands. In a mainland origin the allopolyploid event took place in the continental source area followed by colonization of the *Lipochaeta* ancestor ($n = 26$). This hypothesis requires an independent colonization to the Hawaiian Islands by *Melanthera* ($n = 15$), presumably *M. biflora*. In the other hypothesis the only difference is that the *Wedelia*-like ($n = 11$) ancestor colonized the Hawaiian Islands and the allopolyploid event took place between Hawaiian *Melanthera* or the colonizing an-

cestor and this colonist, followed at some point by extinction of the *Wedelia*-like colonist. In addition to its allopolyploid origin, species of *Lipochaeta* differ in having disk corollas with 4 lobes (Gardner, 1977b) and, based on another study by Gardner (1976), in having both flavonols and flavones, whereas the diploid species here assigned to *Melanthera* have only flavonols. The achenes differ from those of *Melanthera* in that they are tuberculate at maturity, flattened to slightly biconvex, and in ray florets obcompressed. Species of *Lipochaeta* in general are more polymorphic, occur in often extensive populations, and are found at lower elevations and in hotter habitats than most species of Hawaiian *Melanthera*.

1. LIPOCHAETA CONNATA (Gaud.) DC., Prodr. 5: 611. 1836. *Verbesina connata* Gaud., Voy. Uranie 464. 1829. *Microchaeta connata* (Gaud.) Nutt., Trans. Amer. Philos. Soc. (n.s.) 7: 452. 1841. *Lipochaeta australis* (Less.) A. Gray var. *connata* (Gaud.) A. Gray, Proc. Amer. Acad. Arts. 5: 129. 1861. TYPE: U.S.A. Hawaiian Islands, s.l., 1819, C. Gaudichaud-Beaupré s.n. (HOLOTYPE: P [photo F]).

Distribution.—U.S.A. Hawaiian Islands, scattered in remnant dry forest, 20–1160 m, on Ni'ihau, Kaua'i, and West Maui.

1a. LIPOCHAETA CONNATA (Gaud.) DC. subsp. CONNATA

Lipochaeta alata Sherff, Bot. Gaz. (Crawfordsville) 95: 81. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i, along the Hanapepe River, near the Falls, 12 Jul 1895, A. A. Heller 2563 p.p. (HOLOTYPE: F-429034; ISOTYPES: GH, NY [microfiche, photo F]). See Wagner & Shannon (1999) for further discussion of this type.

Lipochaeta alata Sherff var. *acrior* Sherff, Bot. Gaz. (Crawfordsville) 95: 82. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i, s.l., 1840, U.S. Expl. Exped. s.n. (HOLOTYPE: US-57075 [photo F]; ISOTYPES: GH [photo F], US).

Lipochaeta profusa Sherff, Bot. Gaz. (Crawfordsville) 95: 95. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i/Ni'ihau, s.l., Jan 1885, I. Sinclair s.n. (HOLOTYPE: K [photo F]). Date cited by Sherff is the date the specimen was received at K, not the date of collection. Sherff cited island as Hawaii'i, but the locality was determined to be on Kaua'i or Ni'ihau (St. John, 1954: 144).

Lipochaeta profusa Sherff var. *robustior* O. Deg. &

Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 96. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i, 2 mi from Kekaha, 18 Jul 1932, O. Degener 4185 (leg. O. Swezey) (HOLOTYPE: F-659426 [photo F]; ISOTYPE: K—n.v.).

Lipochaeta alata Sherff var. *pulchrior* Sherff, Occas. Pap. Bernice P. Bishop Mus. 20(1): 20. 1949. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Puehu Ridge, along Koke'e rd., 15 Mar 1948, F. Fagerlind & C. Skottsberg 6635 (HOLOTYPE: GB [photo F, BISH—4]; ISOTYPES: F). Gardner (1979) erroneously cited this as a nom. nud.

Distribution.—U.S.A. Hawaiian Islands, scattered in remnant dry forest, 80–400 m, on Kaua'i, and West Maui.

1b. *Lipochaeta connata* (Gaud.) DC. subsp. *acris* (Sherff) W. L. Wagner & H. Rob., comb. et stat. nov.

Lipochaeta acris Sherff, Bot. Gaz. (Crawfordsville) 95: 83. 1933. *Lipochaeta connata* (Gaud.) DC. var. *acris* (Sherff) R. C. Gardn., Rhodora 81: 316. 1979. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Waimea, 2000–3000 ft, 1864–1865, H. Mann & W. T. Brigham 540 (HOLOTYPE: F-276925; ISOTYPES: BISH, G—2 [photo F], GH—2, MO, NY—n.v.).

Lipochaeta lobata (Gaud.) DC. var. *incisior* H. St. John, Pacific Sci. 13: 185. 1959. TYPE: U.S.A. Hawaiian Islands, Ni'ihau, Ka'aliwai, 750 ft, 29 Mar 1949, H. St. John 23572 (HOLOTYPE: BISH-501492; ISOTYPES: BISH—2, GH, MO—n.v., US).

Lipochaeta acris Sherff var. *lata* H. St. John, Pacific Sci. 38: 253. 1984. TYPE: U.S.A. Hawaiian Islands, Kaua'i, bottom of Ka'aweiki, 6 Mar 1969, R. W. Hobdy 94 (HOLOTYPE: BISH-80404).

Distribution.—U.S.A. Hawaiian Islands, scattered in remnant dry forest, 20–1,160 m, on Ni'ihau and Kaua'i.

2. LIPOCHAETA DEGENERI Sherff, Bot. Gaz. (Crawfordsville) 95: 84. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, SW point, plain near sea, 16 May 1928, O. Degener 4198 (HOLOTYPE: F-659444 [photo F]; ISOTYPES: A—n.v., F, G—n.v., GH—3, K—n.v., MO, NY—2 [microfiche], US, W—2).

Distribution.—U.S.A. Hawaiian Islands, known only from three collections near the southwestern point of Moloka'i, near sea level; probably extinct. Last collected in 1928.

3. LIPOCHAETA HETEROPHYLLA A. Gray, Proc. Amer. Acad. Arts 5: 130. 1861. *Li-*

pochaeta lobata (Gaud.) DC. var. *heterophylla* (A. Gray) Hillebr., Fl. Hawaiian Isl. 209. 1888. TYPE: U.S.A. Hawaiian Islands, Maui, West Maui, 1840, *U.S. Expl. Exped. s.n.* (LECTOTYPE, designated by Sherff, 1935: US-57063; ISOLECTOTYPE: GH). Both the lectotype and the isolecotype are mixed collections with *L. rockii* Sherff var. *dissecta* Sherff. The other material included in *L. heterophylla* by Gray was used as the type for *L. rockii* Sherff var. *dissecta* Sherff (US). Gardner (1979) incorrectly cited a Hillebrand collection as the type.

Lipochaeta hastata Hillebr., Fl. Hawaiian Isl. 208. 1888, nom. illeg., non *Lipochaeta hastata* Kellogg (1863). TYPE: U.S.A. Hawaiian Islands, Lana'i, 1851–1871, *W. Hillebrand s.n.* (HOLOTYPE: B [presumably destroyed; photo BISH, frag BISH-75694]; ISOTYPES: B—n.v., GH—n.v., MEL [photo BISH], US).

Lipochaeta peduncularis Drake, Ill. Fl. Ins. Pacif., part 4, 72, t. 35. 1888. TYPE: U.S.A. Hawaiian Islands, Lana'i, s.l., 1851–1855, *J. Rémy s.n.* (HOLOTYPE: P—n.v.).

Lipochaeta heterophylla A. Gray var. *molokaiensis* Sherff, Bot. Gaz. (Crawfordsville) 95: 96. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, W end of island, 1910, *J. F. Rock 10287* (HOLOTYPE: F-659408 [photo F]; ISOTYPES: BISH—4, GH [photo F], UC—n.v.).

Distribution.—U.S.A. Hawaiian Islands, scattered in open areas and margins of lava flows, primarily coastal, in grassland, and alien shrubland, 0–400 m, on Lana'i and scattered localities on Moloka'i and Maui.

4. LIPOCHAETA LOBATA (Gaud.) DC., Prodr. 5: 611. 1836. *Verbesina lobata* Gaud., Voy. Uranie 464. 1829. *Microchaeta lobata* (Gaud.) Nutt., Trans. Amer. Philos. Soc. II, 7: 451. 1841. *Lipochaeta australis* (Less.) A. Gray var. *lobata* (Gaud.) A. Gray, Proc. Amer. Acad. Arts 5: 130. 1861. TYPE: U.S.A. Hawaiian Islands, s.l., 1819, *C. Gaudichaud-Beaupré s.n.* (HOLOTYPE: P—n.v.; ISOTYPES: G [photo F], B [presumably destroyed; photo F]). Sherff cited this collection as *Gaudichaud 138* (based on G sheet).

Distribution.—U.S.A. Hawaiian Islands, scattered and often common in dry coastal habitats, sometimes in dry shrubland, 0–

400 m, on Ni'ihau, O'ahu, West Maui, and collected once on Hawai'i.

- 4a. LIPOCHAETA LOBATA (Gaudich.) DC. subsp. LOBATA

Lipotriche australis Less., Linnaea 6: 510. 1831. *Lipochaeta australis* (Less.) A. Gray, Proc. Amer. Acad. Arts 5: 129. 1861. TYPE: U.S.A. Hawaiian Islands, O'ahu, s.l., 1816–1817, *L. C. A. von Chamisso s.n.* (LE—n.v.). Sherff correctly cited the Chamisso collection as the type, but Gardner (1979) incorrectly (contrary to the ICBN Art. 52 Note 1) assumed Lessing's name was based on *Verbesina lobata* because Lessing included the name with a question mark, merely indicating that it was possibly the same. When Gray transferred this taxon he included *Verbesina lobata* Gaud. (1829), which predates *Lipotriche australis* (1831), and therefore he should have adopted "lobata" as the epithet for this taxon in *Lipochaeta*.

Verbesina hastulata Hook. & Arn., Bot. Beechey Voy. 87. 1832. *Lipochaeta hastulata* (Hook. & Arn.) DC., Prodr. 5: 611. 1836. *Microchaeta lobata* (Gaud.) Nutt. var. *hastulata* (Hook. & Arn.) Nutt., Trans. Amer. Philos. Soc. II, 7: 451. 1841. *Lipochaeta lobata* (Gaud.) DC. var. *hastulata* (Hook. & Arn.) Sherff, Bot. Gaz. (Crawfordsville) 95: 91. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, s.l., 1826–1827, *G. T. Lay & A. Collie s.n.* (HOLOTYPE: K [photo F]).

Lipochaeta calycosa A. Gray, Proc. Amer. Acad. Arts 5: 130. 1861. TYPE: U.S.A. Hawaiian Islands, O'ahu, [Diamond Hill], 1840, *U.S. Expl. Exped. s.n.* (HOLOTYPE: US-57070; ISOTYPES: GH). Gardner (1979) incorrectly cited the GH sheet as the holotype.

Lipochaeta australis (Less.) A. Gray var. *denticulata* Wawra, Flora 56: 77. 1873. *Lipochaeta lobata* (Gaudich.) DC. var. *denticulata* (Wawra) Sherff, Bot. Gaz. (Crawfordsville) 95: 92. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, s.l., 1868–1871, *H. Wawra 2294* (HOLOTYPE: W [photo F]).

Lipochaeta aprevalliana Drake, Ill. Fl. Ins. Pacif. 71, t. 34. 1888. *Lipochaeta lobata* (Gaud.) DC. var. *aprevalliana* (Drake) Sherff, Bot. Gaz. (Crawfordsville) 95: 92. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, s.l., 1851–1855, *J. Rémy 272* (HOLOTYPE: P—not located). The illustration was incorrectly taken to be the holotype by Gardner (1979).

Lipochaeta lobata (Gaud.) DC. var. *albescens* Sherff, Bot. Gaz. (Crawfordsville) 95: 92. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, Diamond Head, [steep slopes], 28 Mar 1895, *A. A. Heller 2021* (HOLOTYPE: F-429425 [photo F]; ISOTYPES: A, GH [photo F], K, MO, NY [microfiche, photo F], UC—n.v., US).

Lipochaeta lobata (Gaud.) DC. var. *grossedentata* O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 92. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, in gulch N of middle of ridge between Pu'u Pane and Pu'u Kamaohanui, 10 Jan

1932, *O. Degener*, K. K. Park & W. Bush 4299 (LECTOTYPE, designated by Gardner, 1979: F-666547 [photo F]; ISOLECTOTYPES: F [photo F], K—n.v.).

Lipochaeta lobata (Gaud.) DC. var. *hastulatooides* O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 93. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, [West Maui, SE part], Pohakea Gulch, 11 Jul 1927, *O. Degener 4305* (LECTOTYPE, designated by Gardner, 1979: F-666545 [photo F]; ISOLECTOTYPES: B—n.v., BM—n.v., F [photo F], G—n.v., GH, K—n.v., NY—2).

Lipochaeta subcordata A. Gray var. *membranacea* Sherff, Bot. Gaz. (Crawfordsville) 95: 91. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, western Maui, back of Lahaina, s.d., *E. Bishop 14* (HOLOTYPE: B [presumably destroyed; photo F]). Since this was the only collection we cannot be sure what species it represents, but it is likely to be *L. lobata*.

Lipochaeta niihauensis H. St. John, Pacific Sci. 13: 186. 1959. TYPE: U.S.A. Hawaiian Islands, Ni'ihau, Ki'i, 100 ft, 2 Apr 1949, *H. St. John 23664* (HOLOTYPE: BISH-501495; ISOTYPES: BISH—2, GH).

Lipochaeta trilobata H. St. John, Pacific Sci. 30: 42. 1976. TYPE: U.S.A. Hawaiian Islands, Hawai'i, [mtn. slope above Kealakekua], 26–29 Jan 1779, *D. Nelson s.n.* (HOLOTYPE: BM—n.v., photo OS—n.v.).

Lipochaeta christophersenii H. St. John, Pacific Sci. 38: 253. 1984. TYPE: U.S.A. Hawaiian Islands, O'ahu, Wai'anae Mtns., central Lualualei, below Kanehoa, head of valley 2, foot of cliffs, 450 m, 1 Jun 1932, *E. Christophersen 3691* (HOLOTYPE: BISH-471459; ISOTYPES: BISH—2, US). Collection year published as 1922 but specimen labels reads 1932.

Lipochaeta garberi H. St. John, Pacific Sci. 38: 259. 1984. TYPE: U.S.A. Hawaiian Islands, O'ahu, right fork of Wailupe Valley, 12 Jan 1920, *D. W. Garber & C. N. Forbes 141* (HOLOTYPE: BISH-75861). Forbes included as a collector on specimen label but not in publication.

Lipochaeta kaenaensis H. St. John, Pacific Sci. 38: 260. 1984. TYPE: U.S.A. Hawaiian Islands, O'ahu, Waialua Distr., Ka'ena, near base of cliff near Manini Gulch, 120 ft, 25 Apr 1978, *K. Nagata, B. Kimura, & G. Spence 1626* (HOLOTYPE: BISH-421917).

Lipochaeta lobata (Gaud.) DC. var. *hosakae* H. St. John, Pacific Sci. 38: 263. 1984. TYPE: U.S.A. Hawaiian Islands, O'ahu, Kipapa Gulch, Waipi'o, 24 Feb 1935, *E. Y. Hosaka 1281* (HOLOTYPE: BISH-146402; ISOTYPES: BISH).

Lipochaeta vittata H. St. John, Pacific Sci. 38: 278. 1984. TYPE: U.S.A. Hawaiian Islands, O'ahu, Ka'ena Point, N. Shore Rd., 1/2 mi W of improved road end, 100 yd. from ocean, 10 m, 7 Jan 1974, *R. C. Gardner 281* (HOLOTYPE: BISH-419080; ISOTYPES: OS—n.v.).

Distribution.—U.S.A. Hawaiian Islands, scattered and often common in dry coastal

habitats, sometimes in dry shrubland, 0–400 m, on Ni'ihau, O'ahu, West Maui, and collected once on Hawai'i.

4b. *Lipochaeta lobata* (Gaud.) DC. subsp. *leptophylla* (O. Deg. & Sherff) W. L. Wagner & H. Rob., comb. et stat. nov.

Lipochaeta lobata (Gaud.) DC. var. *leptophylla* O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 92. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, Wai'anae Range, at Kolekole Pass, 1–2 Feb 1915, *C. N. Forbes 2024.O* (LECTOTYPE, designated here: F-485293 [photo F]; ISOLECTOTYPES: BISH, F—2 [photos F], K—n.v., NY—n.v., UC—n.v.). Sherff cited “3 type sheets” at F; but Gardner cited one as the holotype (though he did not indicate which one).

Distribution.—U.S.A. Hawaiian Islands, rare, known only from Kolekole Pass and Kanehoa, Lualualei, Wai'anae Mountains, O'ahu. This distinctive subspecies is at risk of extinction and has been listed as federally endangered.

5. LIPOCHAETA ROCKII Sherff, Bot. Gaz. (Crawfordsville) 95: 100. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, W end, below Kawela, Mapulou, 22 Mar 1910, *J. F. Rock 6156* (HOLOTYPE: GH [photo F]; ISOTYPES: BISH—3, F [photo F]). Gardner (1979) cited 3 isotypes at F; only one seen (same as photo). (Fig. 1A–E)

Lipochaeta forbesii Sherff, Bot. Gaz. (Crawfordsville) 95: 83. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, [E Maui], Nu'u, S slope of Haleakala, 9 Mar 1920, *C. N. Forbes 1916.M* (HOLOTYPE: F-659397; ISOTYPES: BISH—2, K—n.v., NY—n.v., UC—n.v., US).

Lipochaeta heterophylla A. Gray var. *malvacea* O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 96. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, [W Moloka'i], near Kolo, 5 Apr 1928, *O. Degener 4199* (LECTOTYPE, designated by Gardner, 1979: F-659443; ISOLECTOTYPES: B—n.v., BISH, BM—n.v., CAS—n.v., F—3, G—2, GB—n.v., GH, K—n.v., MO—2, NY [microfiche], UC—n.v., US, W—n.v.).

Lipochaeta kahoalawensis Sherff, Bot. Gaz. (Crawfordsville) 95: 98. 1933. TYPE: U.S.A. Hawaiian Islands, Kaho'olawe, s.l., 1851–1855, *J. Rémy 269* (HOLOTYPE: P [photo F]).

Lipochaeta lobata (Gaud.) DC. var. *maunaloensis* Sherff, Bot. Gaz. (Crawfordsville) 95: 93. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, Maunaloa, Jun 1912, *C. N. Forbes 7.Mo* (HOLOTYPE: F-659396 [photo F]; ISOTYPE: BISH).

Lipochaeta rockii Sherff var. *dissecta* Sherff, Bot.

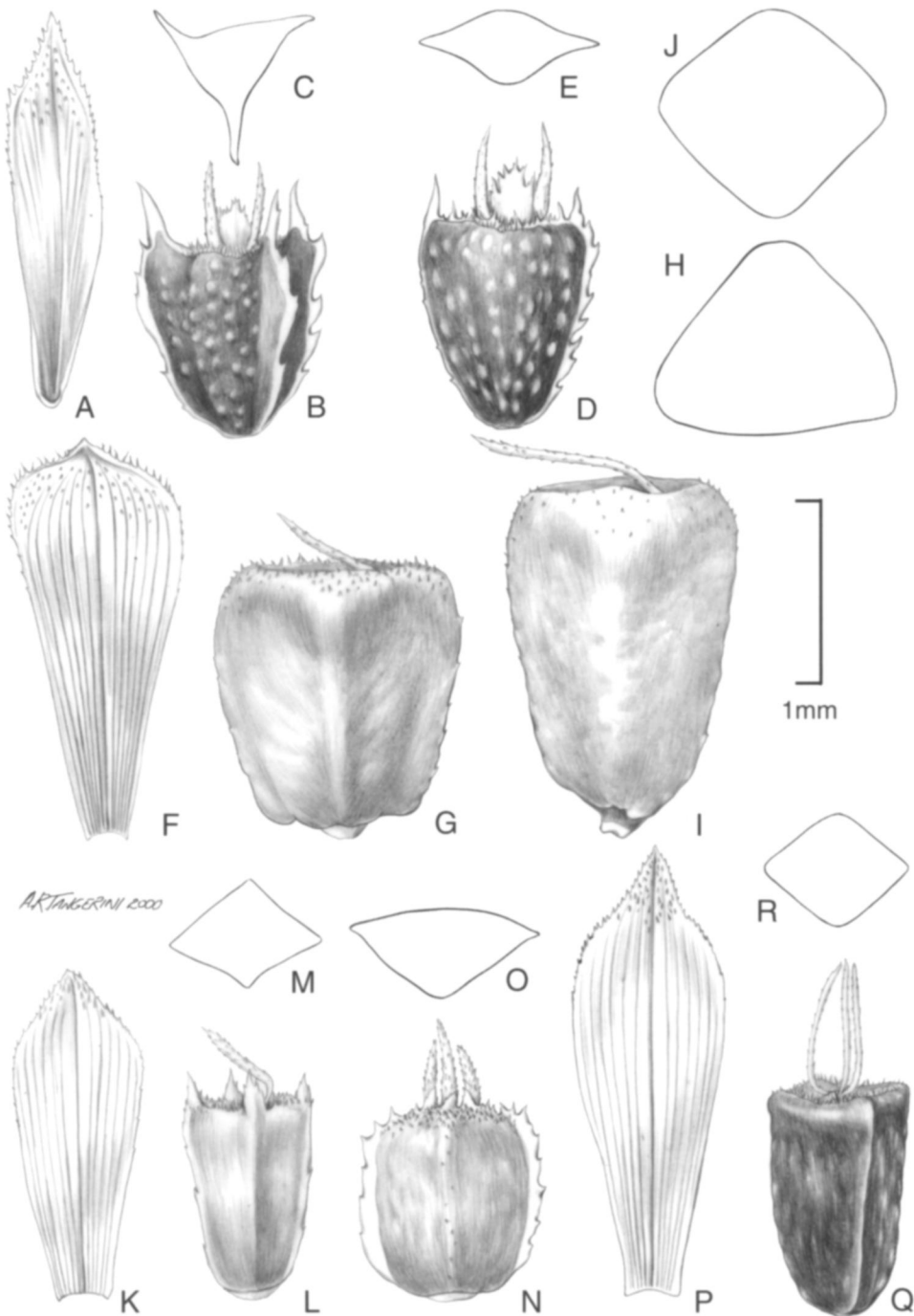


FIG. 1. Achenes and paleae of *Melanthera*, *Lipochaeta* (Ecliptinae). All specimens deposited in US. **A–E.** *Lipochaeta rockii* (Hawaiian Islands, Moloka'i, *Degener 22207*). **A.** Pale. **B.** Ray achene. **C.** Cross section of ray achene. **D.** Disk achene. **E.** Cross section of disk achene. **F–J.** *Melanthera biflora* (Caroline Islands, Palau Islands, *Fosberg 25812*). **F.** Pale. **G.** Ray achene. **H.** Cross section of ray achene. **I.** Disk achene. **J.** Cross section of disk achene. **K–O.** *M. lavarum* (Hawaiian Islands, Hawai'i, *Degener 4188*). **K.** Pale. **L.** Ray achene. **M.** Cross section of ray achene. **N.** Disk achene. **O.** Cross section of disk achene. **P–R.** *M. nivea* (Equador, Balao, *Eggers 14339*) [note: ray flowers absent in this species]. **P.** Pale. **Q.** Disk achene. **R.** Cross section of disk achene.

- Gaz. (Crawfordsville) 95: 101. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, E Maui, 1840, *U.S. Expl. Exped. s.n.* (HOLOTYPE: US-57065 [photo F]; ISOTYPE: GH—n.v.). See also *Lipochaeta heterophylla*.
- Lipochaeta rockii* Sherff var. *subovata* Sherff, Bot. Gaz. (Crawfordsville) 95: 101. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, s.l., 1851–1855, *J. Rémy* 270 (HOLOTYPE: P [photo F]).
- Lipochaeta succulenta* (Hook. & Arn.) DC. var. *trifida* Sherff, Bot. Gaz. (Crawfordsville) 95: 87. 1933. TYPE: U.S.A. Hawaiian Islands, Moloka'i, Manawai, Aug 1912, *C. N. Forbes* 397.Mo (LECTOTYPE, designated by Gardner, 1979: F-485234 [photo F]; ISOLECTOTYPES: BISH—3, F—2 [photo of "2nd type sheet" F], UC—n.v.).
- Lipochaeta forbesii* Sherff var. *sherffii* O. Deg. & Clay, Fl. Hawaiiensis, fam. 344. *Lipochaeta forbesii*. 1949. TYPE: U.S.A. Hawaiian Islands, Maui, [E Maui, S slope of Haleakala], between Kepuni and Palaha Gulches, on a'a lava, 1500 ft, 25 Dec 1948, *O. Degener* 19292 (HOLOTYPE: BISH-501024; ISOTYPES: A—n.v., B—n.v., BISH, F—3 [photo of "sheet 1" F], G—n.v., GB—n.v., GH, NY—2 [microfiche], US). The specimen in the F photo ("sheet 1") was remounted after it was photographed.
- Lipochaeta lobata* (Gaud.) DC. var. *makenensis* O. Deg. & Sherff in Sherff, Brittonia 12: 174. 1960. TYPE: U.S.A. Hawaiian Islands, Maui, [E Maui], Makena, 40 ft, 1 Apr 1959, *O. Degener*, *I. Degener* & *W. Fleming* 25133 (HOLOTYPE: F-1537169; ISOTYPES: BISH, F—2, G—n.v., GH—2, MEL [2 photos BISH], NY [microfiche], UC—n.v., US).
- Lipochaeta scabra* H. St. John, Pacific Sci. 30: 40. 1976. TYPE: U.S.A. Hawaiian Islands, Hawai'i, s.l., 26–29 Jan 1779, *D. Nelson s.n.* (HOLOTYPE: BM—n.v.).
- Lipochaeta elliptica* H. St. John, Pacific Sci. 38: 255. 1984. TYPE: U.S.A. Hawaiian Islands, Kaho'olawe, alongside jeep rd. from Hanakanaea Bay, past the dump and just S of concrete observation post, 90 ft, 21 Apr 1980, *G. Clarke & C. Corn* 370 (HOLOTYPE: BISH-475923).
- Lipochaeta elliptica* H. St. John var. *artialata* H. St. John, Pacific Sci. 38: 257. 1984. TYPE: U.S.A. Hawaiian Islands, Kaho'olawe, on coast, W side of island, just NW of Hanakanaea Bay, 20–40 ft, 22 Apr 1980, *L. W. Cuddihy & W. Char* 382 (HOLOTYPE: BISH-475924).
- Lipochaeta mauiensis* H. St. John, Pacific Sci. 38: 265. 1984. TYPE: U.S.A. Hawaiian Islands, Maui, E Maui, Hwy 31, 5.5 mi SE of 'Ulupalakua Ranch Office, 500 m, 18 Feb 1975, *R. C. Gardner* 378 (HOLOTYPE: OS—n.v.; ISOTYPE: BISH).
- Lipochaeta nesophila* H. St. John, Pacific Sci. 38: 270. 1984. TYPE: U.S.A. Hawaiian Islands, Ni'ihau, S half of island, Jan 1912, *J. F. G. Stokes s.n.* (HOLOTYPE: BISH-475922). The locality is in some doubt since *Lipochaeta rockii* is otherwise unknown from Ni'ihau.
- Lipochaeta rockii* Sherff var. *parva* H. St. John, Pacific Sci. 38: 276. 1984. TYPE: U.S.A. Hawaiian Islands, Kaho'olawe, alongside jeep rd. from Hanakanaea Bay, past dump, just S of concrete observation post, S side of rd., 90 ft, 21 Apr 1980, *G. Clarke & C. Corn* 374 (HOLOTYPE: BISH-475921).
- Distribution.*—U.S.A. Hawaiian Islands, scattered to common in coastal sites to dry forest, often in disturbed areas and margins of lava flows, 15–550 m, on Moloka'i, from scattered localities on Maui, common near the coast on Kaho'olawe, also a single collection presumably from the island of Hawai'i.
6. LIPOCHAETA SUCCULENTA (Hook. & Arn.) DC., Prodr. 5: 611. 1836. *Verbesina succulenta* Hook. & Arn., Bot. Beechey Voy. 87. 1832. *Microchaeta succulenta* (Hook. & Arn.) Nutt., Trans. Amer. Philos. Soc. II, 7: 451. 1841. TYPE: U.S.A. Hawaiian Islands, Ni'ihau, ("Onee-heow"), 1826–1827, *G. T. Lay & A. Collicie s.n.* (HOLOTYPE: K—n.v.).
- Lipochaeta lanceolata* Nutt., Trans. Amer. Philos. Soc. II, 7: 451. 1841. TYPE: U.S.A. Hawaiian Islands, O'ahu, near sea, Oct–Jan 1835–1836, *T. Nuttall s.n.* (HOLOTYPE: BM—n.v.).
- Lipochaeta australis* (Less.) A. Gray var. *decurrens* A. Gray, Proc. Amer. Acad. Arts 5: 129. 1861. *Lipochaeta connata* (Gaud.) DC. var. *decurrens* (A. Gray) Hillebr., Fl. Hawaiian Isl. 206. 1888. *Lipochaeta succulenta* (Hook. & Arn.) DC. var. *decurrens* (A. Gray) Sherff, Bot. Gaz. (Crawfordsville) 95: 86. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i, s.l., 1840, *U.S. Expl. Exped. s.n.* (HOLOTYPE: US-57076). Superfluously lectotyped by Gardner (1979).
- Lipochaeta connata* (Gaud.) DC. var. *littoralis* Hillebr., Fl. Hawaiian Isl. 206. 1888. TYPE: U.S.A. Hawaiian Islands, Moloka'i, Kalawao, 1851–1871, *Hillebrand s.n.* (LECTOTYPE, designated here: BISH-146350). Three collections were cited by Hillebrand.
- Lipochaeta variolosa* H. Lév., Repert. Spec. Nov. Regni Veg. 10: 122. 1911. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Wainiha, Jan 1910, *U. Faurie* 1008 (LECTOTYPE, designated by Gardner, 1979: P; ISOLECTOTYPES: BISH, G—2—n.v.).
- Lipochaeta succulenta* (Hook. & Arn.) DC. var. *angustata* Sherff, Bot. Gaz. (Crawfordsville) 95: 87. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i, s.l., 1909, *C. N. Forbes s.n.* (HOLOTYPE: F-485175 [photo F]; ISOTYPES: BISH, F [photo F]).
- Lipochaeta succulenta* (Hook. & Arn.) DC. var. *barclayi* Sherff, Bot. Gaz. (Crawfordsville) 95: 87. 1933. TYPE: U.S.A. Hawaiian Islands, Kaua'i, "Atooi" hills, Jul 1837, *G. Barclay* 1327 (HOLOTYPE: BM [photo F]).
- Lipochaeta robusta* H. St. John, Pacific Sci. 38: 274.

1984. TYPE: U.S.A. Hawaiian Islands, Maui, East Maui, Hana, Pu'u Ki [Pu'uki'i], 900 ft, 31 Dec 1936, *H. St. John & R. J. Catto 17891* (HOLOTYPE: BISH-471452; ISOTYPES: BISH—2, GH, US).

Distribution.—Hawaiian Islands, scattered along the coasts, usually in a narrow band within 30 m of the water, 0—100 m, on all of the main islands except Lana'i, and very rare on O'ahu.

Melanthera

MELANTHERA Rohr, *Skr. Naturhist.-Selsk.* 2(1):213. 1792. NEOTYPE: *Melanthera nivea* (L.) J. K. Small; designated by Cassini, *J. Phys. Chim. Hist. Nat. Arts* 87: 27. 1818. For a discussion on typification, see D. H. Nicolson, *Taxon* 30: 491–492. 1981. The problem with the typification of this name arises because ICBN Art 10.1 requires that the type of a generic name is the type of a name of a species. When von Rohr published the generic name he cited only a specimen (*von Rohr s.n.*, C) from Martinique that has never been used as type for the name of any species. Thus, Cassini's mention of *Bidens nivea* L. as the type of *Melanthera* can be taken as a neotypification. Because no species was included when the genus was published, typification has been debated by Strother (*Taxon* 19: 337. 1970), who considered the type to be *M. panduriformis* Cass. [= *M. nivea*], whereas Parks (1973) considered it to be *Calea aspera* Jacq. [= *M. aspera*, which here is a synonym of *M. nivea*]. One could propose a conserved type on von Rohr's specimen, which, if successful, would provide a conserved type vs. a neotype; but the controversy over what species name should be considered type would still remain. In spite of the controversy, none of the different selections of type has any effect on the application of the name.

Amellus P. Browne, *Civ. Nat. Hist. Jamaica*. 317. 1756, nom. rejec. (vs. *Amellus* L.). TYPE: *Santolina amellus* L. (= *Melanthera nivea* (L.) J.K. Small).

Lipotriche R. Brown, *Observ. Campos* 118. 1817. TYPE: *Lipotriche brownei* DC. [= *Melanthera scandens* (Schumach. & Thonn.) Roberty].

Wollastonia DC. ex Decne., *Nouv. Ann. Mus. Paris* 3: 414. 1834. LECTOTYPE: *W. scabriuscula* DC. ex Decne., nom. illeg.; designated by Fosberg, 1980: 32 [= *Melanthera biflora* (L.) Wild].

Psathurochaeta DC., *Prodr.* 5: 609. 1836. TYPE: *Psathurochaeta dregei* DC. [= *Melanthera scandens* (Schumach. & Thonn.) Roberty subsp. *dregei* (DC.) Wild].

Aphanopappus, Endl., *Gen. Pl. Suppl.* 2. 43. 1842. *Schizophyllum* Nutt., *Trans. Amer. Philos. Soc.* (n.s.) 7: 452. 1841, non E. M. Fries (1821). TYPE: *Aphanopappus nuttallii* Walpers, nom. illeg. [based on *Schizophyllum micranthum* Nutt.] [= *Melanthera micrantha* (Nutt.) W. L. Wagner & H. Rob.].

Wuerschmittia Sch.-Bip. ex Walp., *Repert.* 6: 161. 1846. TYPE: *Wuerschmittia abyssinica* Sch.-Bip. ex Walp. [= *Melanthera abyssinica* (Sch.-Bip. ex A. Rich.) Benth. & Hook. f.].

Echinocephalum Gardner, *London J. Bot.* 7: 294. 1848. LECTOTYPE: *Echinocephalum angustifolium* Gardn.; designated here [= *Melanthera latifolia* (Gardn.) Cabrera, not *M. angustifolia* A. Rich.].

Perennial herbs, vines, subshrubs, sometimes shrubs; stems often pale or maculate, quadrangular to subhexagonal, costate, usually sulcate when dry, appressed strigose to asperulate or hispid. Leaves opposite, petioles usually conspicuous, less often lacking or winged; blades herbaceous to chartaceous, ovate or deltate to linear, sometimes strongly trilobed to pinnately lobed, rarely ternately compound, margins remotely to closely serrulate or serrate, often with large teeth or lobes at broadest part, base subtruncate to narrowly cuneate or acuminate, apex acute to narrowly acuminate, upper surface mixed scabrid and scabridulous, lower surface appressed strigose to hispid, without glandular dots, usually trinervate from near base, rarely penninerved with short ascending veins. Inflorescences terminal or from axils of uppermost leaves, with 1–3 heads. Heads with or without rays, erect; involucre hemispherical to broadly campanulate; involucre bracts indurate with somewhat herbaceous tips, appressed with scarcely spreading tips, 10–14 in 1 or 2 subequal series, oblong to narrowly ovate, apex obtuse to acute or attenuate, strigillose outside; receptacle paleaceous, the paleae persistent, chartaceous with membranaceous bases, weakly conduplicate and enfolding the achene, becoming flatter as achene matures, scarcely to narrowly keeled, closely multistriated with longitu-

dinal ribs outside, oblanceolate, tips obtuse to mucronate, or lanceolate, or awned, asperulous or toothed distally. Ray florets 0–12, neutral or fertile; corollas 5-merous, yellow, tube ca. 1 mm long, glabrous, limb oblong, 2.3–13 mm long, apex bidentate, strigillose below, without glandular dots, papillose above; style absent or present. Disk florets ca. 10–100, bisexual; corollas white or yellow, tube glabrous; throat narrowly campanulate, glabrous outside or scabridulous above and along veins, veins without fiber sheath or with few fibers, lobes triangular to longer than wide, densely scabridulous outside, without glands, papillose inside, papillae often long, often only on margin; anther thecae black, apical appendage yellow, ovate. Achenes 3-angled (disk achenes 4-angled), abruptly narrowed or truncate above, upper surface broad, minutely hispidulous, with small central corolla and pappus attachment, with or without wings on angles or with a pseudopappus of projections on distal corners and edges, surface not fleshy; pappus usually of 1–15(–20) deciduous short bristles, mostly 1–2 mm long. Pollen grains 23–25 μm diam. $n = 15$.

Melanthera is delimited by the abruptly narrowed to truncate and flattened top of the achene with a cluster of 1–15(–20) pappus bristles immediately surrounding the corolla, involucre bracts and receptacular paleae with many veins forming longitudinal striations, and $n = 15$. The florets are 5-merous, the corollas are yellow or white, and rays are absent (in white-flowered species) or present and neutral or fertile. Typical *Melanthera* has white corollas, lacks rays, completely lacks fibers in the corolla throat, and has papillae not restricted to the margins of the inner surfaces of the disk corolla lobes. The genus is broadened here to include *Echinocephalum* of southeastern South America that has yellow florets, neutral rays, disk corolla throats with some fiber cells along the veins, and inner surfaces of the disk corolla lobes with papillae only along the margins. Wild (1965) is followed in his African treatment that included the fertile-rayed *Lipotriche* and *Wollastonia* in the synonymy of *Melanthera*. We here add *Lipochaeta* sect. *Aphanopappus*. The genus

has been credited with numerous species, and we here recognize 35 as distinct. Distribution is from eastern North America, through Central America, the West Indies, South America, Africa, Asia, and many Indian and Pacific Ocean islands. *Melanthera* appears to be most closely related to the neotropical genus *Wulffia* (*Tilesia* G. Mey.) based on the shared characters of strongly striate paleae and truncate achene apex. *Wulffia* is distinguished from *Melanthera* by its specialized fleshy achenes and lack of pappus.

All species of *Melanthera* that have been examined thus far have the same haploid chromosome number, $n = 15$ (Robinson et al., 1981). Examination of chromosome number atlases for the past two decades indicate other species have been counted, and all but three determinations were $n = 15$. The three exceptions we believe should be verified before being accepted. They are: *M. biflora* (as *Wedelia biflora*) $2n = 45$ (Ono, 1975, 1977), $2n = 50$ (Mathew & Mathew, 1978), and *M. elliptica* $n = 16$ (Gill & Omoigui, 1992).

PACIFIC SPECIES OF *MELANTHERA*

1. *MELANTHERA BIFLORA* (L.) Wild, Prodr. 5: 546. 1836. *Verbesina biflora* L., Sp. Pl., ed. 2, 1272. 1763. *Wollastonia scabriuscula* DC. ex Decne., Nouv. Ann. Mus. Paris 3: 414. 1834, nom. illeg. *Stemmodontia biflora* (L.) W. F. Wight in Safford, Contr. U.S. Natl. Herb. 9: 377. 1905. TYPE: India (HOLOTYPE: LINN). (Fig. 1F–J)

Lipochaeta ovata R. C. Gardn., Rhodora 81: 321. 1979, syn. nov. TYPE: U.S.A. Hawaiian Islands, O'ahu, Honolulu, 1852, *N. J. Anderson s.n.* (HOLOTYPE: GB [photo OS]). Many of the Anderson collections appear to have been labeled incorrectly: though stating "Hawaiian Islands," they were actually collected in southeastern Polynesia.

For additional synonymy see Fosberg & Sachet, 1980; Smith & Carr, 1991; Fosberg, 1993; Nicolson & Fosberg, in press.

Distribution.—*Melanthera biflora* is a widespread coastal species (sometimes occurring inland in disturbed sites) occurring from eastern Africa to southeastern Asia, southern Japan south to eastern Australia,

and most islands in the Indian and Pacific Oceans (but not in the Hawaiian Islands).

2. **Melanthera bryanii** (Sherff) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta bryanii Sherff, Bot. Gaz. (Crawfordsville) 95: 97. 1933. TYPE: U.S.A. Hawaiian Islands, Kaho'olawe, 300 m, 16 Feb 1931, *E. H. Bryan Jr. 736* (HOLOTYPE: BISH-501028 [photo F]; ISOTYPE: BISH).

Distribution.—U.S.A. Hawaiian Islands, known only from the type collection on slopes in *pili* grassland at 300 m on Kaho'olawe. *Melanthera bryanii* is apparently extinct.

3. **Melanthera fauriei** (H. Lév.) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta fauriei H. Lév., Repert. Spec. Nov. Regni Veg. 10: 122. 1911. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Holokele [Olokele], Mar 1910, *U. Faurie 1012* (HOLOTYPE: P [photo F]; ISOTYPE: BM). Sherff labeled the photo of the P sheet as "cotype," but in his monograph (1935) he made it clear that he did not know where the holotype was and that he was not sure whether the P sheet was a "cotype" or the holotype. BM isotype cited by Lauener (1980).

Lipochaeta deltoidea H. St. John, Pacific Sci. 26: 291. 1972. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Lower Hikimoe Valley, 1800 ft, 18 Apr 1969, *R. W. Hobdy 102* (HOLOTYPE: BISH-468055; ISOTYPES: BISH, GH). Gardner (1979) superfluously selected one of BISH sheets as the lectotype, and the BISH sheets are annotated as lectotype and isolectotype. St. John illustrated the specimen we take to be the holotype.

Distribution.—U.S.A. Hawaiian Islands, known from a few collections from diverse mesic forest, 480–900 m, in Koai'e Canyon, Olokele Canyon, Hikimoe Valley, and Po'opo'oiki Valley, below confluence with Ku'ia Valley, Kaua'i. *Melanthera fauriei* is at risk of extinction and is federally listed as endangered.

4. **Melanthera integrifolia** (Nutt.) W. L. Wagner & H. Rob., comb. nov. *Microchaeta integrifolia* Nutt., Trans. Amer. Philos. Soc. II, 7: 451. 1841. *Lipochaeta integrifolia* (Nutt.) A. Gray, Proc. Amer. Acad. Arts 5: 130. 1861. TYPE: U.S.A. Hawaiian Islands, Kaua'i, ("Atooi"), 4–26 Jan–Mar 1835, *T. Nuttall s.n.* (HOLOTYPE: BM).

Lipochaeta integrifolia (Nutt.) A. Gray var. *argentea* Sherff, Bot. Gaz. (Crawfordsville) 95: 84. 1933.

TYPE: U.S.A. Hawaiian Islands, Maui, on sandy isthmus, 1864–1865, *H. Mann & W. T. Brigham 371* (HOLOTYPE: F-276879 [photo F]; ISOTYPES: BISH, F, G—n.v., GH—2, MO, NY—n.v., US).

Lipochaeta integrifolia (Nutt.) A. Gray var. *gracilis* Sherff, Bot. Gaz. (Crawfordsville) 95: 85. 1933.

TYPE: U.S.A. Hawaiian Islands, s.l., Sep–Oct 1836, *C. Gaudichaud-Beaupré 217* (HOLOTYPE: GH [photo F]; ISOTYPES: B [presumably destroyed; photo F], P—n.v.).

Lipochaeta integrifolia (Nutt.) A. Gray var. *major* Sherff, Bot. Gaz. (Crawfordsville) 95: 85. 1933.

TYPE: U.S.A. Hawaiian Islands, O'ahu, on the old lava flow back of Diamond Head, 8 Apr 1895, *A. A. Heller 2092* p.p. (HOLOTYPE: GH [photo F]; ISOTYPES: A—n.v., MO, NY [microfiche; photo F], US). See Wagner & Shannon, 1999, for further discussion of this type.

Lipochaeta integrifolia (Nutt.) A. Gray var. *megacephala* O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 86. 1933.

TYPE: U.S.A. Hawaiian Islands, O'ahu, Ka'ena Point, 5 m, 14 Dec 1930, *E. Christophersen 1400* (HOLOTYPE: F-659415 [photo F]; ISOTYPE: BISH).

Lipochaeta porophila O. Deg. & I. Deg., Flora Hawaiiensis Fam. 344. *Lipochaeta porophila*. 1970.

TYPE: U.S.A. Hawaiian Islands, Hawai'i, Kau, between Punaluu and Kamehame Hill, near coast, 7 Jun 1969, *O. Degener, I. Degener & Mr. and Mrs. Picco 31985* (HOLOTYPE: NY [microfiche]; ISOTYPES: MO—n.v., US).

Distribution.—U.S.A. Hawaiian Islands, scattered to locally common along the coasts of Kure Atoll, Laysan, and all of the main islands.

5. **Melanthera kamolensis** (O. Deg. & Sherff) W. L. Wagner & H. Rob., comb. nov. *Lipochaeta kamolensis* O. Deg. & Sherff in Sherff, Amer. J. Bot. 38: 63. 1951. TYPE: U.S.A. Hawaiian Islands, Maui, [southernmost central E Maui], Kamole Gulch, 21 Dec 1948, *O. Degener, H. F. Clay, R. Bertram 19288* (HOLOTYPE: F [photo F]; ISOTYPES: B—n.v., BISH, BM—n.v., CM—n.v., CU—n.v., F [photo F, BISH], G—n.v., GH—2, K—n.v., LA—n.v., M—n.v., MO—2, NY—n.v., P—n.v., PH—n.v., US—2). Gardner's lectotypification (1979) of a GH sheet is superfluous.

Distribution.—U.S.A. Hawaiian Islands, known only from a few collections near one another in remnant dry forest at ca. 250 m: southeast of 'Ulupalakua Ranch office, Kamole Gulch, and west of Kepuni Gulch,

southeastern Maui. *Melanthera kamolensis* is now restricted to one population of less than 1000 individuals, and has been listed as federally endangered.

6. *Melanthera lavarum* (Gaud.) W. L. Wagner & H. Rob., comb. nov. (Fig. 1K–O)

Verbesina lavarum Gaud., Voy. Uranie 464. 1829.

Lipochaeta lavarum (Gaud.) DC., Prodr. 5: 611. 1836. *Microchaeta lavarum* (Gaud.) Nutt., Trans. Amer. Philos. Soc. II, 7: 451. 1841. TYPE: U.S.A. Hawaiian Islands, s.l., 1819, *C. Gaudichaud-Beaupré s.n.* (HOLOTYPE: P [photo F]; ISOTYPE: B [presumably destroyed; photo F]).

Lipochaeta lahaina Wawra, Flora 56: 77. 1873. TYPE: U.S.A. Hawaiian Islands, Maui, [W Maui], Lahaina, 1869–1870, *H. Wawra 1972* (HOLOTYPE: W—n.v.).

Lipochaeta lavarum (Gaud.) DC. var. *hillebrandiana* Sherff, Bot. Gaz. (Crawfordsville) 95: 89. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, Lahaina, near sea, 1851–1871, *W. Hillebrand s.n.* (HOLOTYPE: B [presumably destroyed; photo F]).

Lipochaeta lavarum (Gaud.) DC. var. *longifolia* Sherff, Bot. Gaz. (Crawfordsville) 95: 90. 1933. TYPE: U.S.A. Hawaiian Islands, Lana'i, Maunalei Valley, 9 Mar 1915, *G. C. Munro 202* (HOLOTYPE: BISH-500972 [photo F]; ISOTYPE: BISH [presumed]).

Lipochaeta lavarum (Gaudich.) DC. var. *ovata* Sherff, Bot. Gaz. (Crawfordsville) 95: 88. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, E Maui, below the crater at Kahikinui, Nov 1910, *J. F. Rock 8674* (HOLOTYPE: GH [photo F]; ISOTYPES: BISH—5, CAS—n.v., F [photo F], K—n.v., NY—n.v., UC—n.v.).

Lipochaeta lavarum (Gaud.) DC. var. *salicifolia* Sherff, Bot. Gaz. (Crawfordsville) 95: 88. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, near Lahaina, s.d., *E. Bishop s.n.* (HOLOTYPE: B [presumably destroyed; photo F]).

Lipochaeta lavarum (Gaud.) DC. var. *skottsbergii* Sherff, Bot. Gaz. (Crawfordsville) 95: 89. 1933. TYPE: U.S.A. Hawaiian Islands, Maui, s.l., 1833–1836, *F. D. Bennett 43* (HOLOTYPE: B [presumably destroyed; photo F]).

Lipochaeta lavarum (Gaud.) DC. var. *conferta* Sherff, Field Mus. Nat. Hist., Bot. Ser. 17: 582. 1939. TYPE: U.S.A. Hawaiian Islands, Lana'i, s.l., 1864–1865, *H. Mann & W. T. Brigham 358* (HOLOTYPE: F-276873 [photo F]; ISOTYPES: BISH—2, GH, MO, NY—n.v., US).

Lipochaeta lavarum (Gaud.) DC. var. *lanaiensis* Sherff, Field Mus. Nat. Hist., Bot. Ser. 17: 582. 1939. TYPE: U.S.A. Hawaiian Islands, Lana'i, Maunalei Gulch, Sep 1917, *C. N. Forbes 507.L* (LECTOTYPE, designated by Gardner, 1979: F-485197 [photo F]; ISOLECTOTYPES: BISH, F—2).

Lipochaeta lavarum (Gaud.) DC. var. *maneleana* Sherff, Field Mus. Nat. Hist., Bot. Ser. 17: 583. 1939. TYPE: U.S.A. Hawaiian Islands, Lana'i,

slopes above Manele, Jun 1913, *C. N. Forbes 288.L* (LECTOTYPE, designated by Gardner, 1979: F-659394 [photo F]; ISOLECTOTYPES: BISH, F [photo F], NY—2—n.v., US, W—n.v.).

Lipochaeta lavarum (Gaud.) DC. var. *stearnsii* O. Deg. & Sherff in Sherff, Field Mus. Nat. Hist., Bot. Ser. 17: 581. 1939. TYPE: U.S.A. Hawaiian Islands, Lana'i, Kapoho Canyon, 800 ft, Jun 1936, *O. Degener 11050* (leg. H. Stearns) (HOLOTYPE: F-954573 [photo F]; ISOTYPES: F, GH, MO—n.v., NY—3 [microfiche]).

Lipochaeta lavarum (Gaud.) DC. var. *scaposa* H. St. John, Pacific Sci. 38: 263. 1984. TYPE: U.S.A. Hawaiian Islands, Kaho'olawe, E coast of Wai-kahalulu Bay, slope below sea cliff, 45 ft, 22 Apr 1980, *G. Clarke & C. Corn 377* (HOLOTYPE: BISH-475920).

Lipochaeta molokiniensis H. St. John, Pacific Sci. 38: 267. 1984. TYPE: U.S.A. Hawaiian Islands, Molokini, W side, N of lighthouse, 90 ft, 23 Apr 1980, *G. Clarke 401* (HOLOTYPE: BISH-475925).

Distribution.—U.S.A. Hawaiian Islands, scattered to sometimes locally common primarily in coastal habitats but also inland in dry forest and rarely in the dry phases of mesic forest, 0–550 m, on Moloka'i, Lana'i, Maui, Kaho'olawe, and northwestern Hawai'i.

7. *Melanthera lifuana* (Hochr.) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta lifuana Hochr., Bull. New York Bot. Gard. 6: 297. 1910. *Wedelia lifuana* (Hochr.) Hochr. ex Guillaum., Bull. Soc. Bot. France 84: 59. 1927. *Wollastonia lifuana* (Hochr.) Fosb., Allertonia 7: 80. 1993. TYPE: New Caledonia, Loyalty Islands, Lifou, 1861–1867, *E. Viellard 799* (HOLOTYPE: NY; ISOTYPES: GH, K—n.v., NY—2).

Distribution.—New Caledonia, including the Loyalty Islands, the Ile des Pins, and Grande Terre, along the coasts. Also collected at least once on Annatam [Anatom] of the New Hebrides as cited by Sherff (1935: 63).

8. *Melanthera micrantha* (Nutt.) W. L. Wagner & H. Rob., comb. nov.

Schizophyllum micranthum Nutt., Trans. Amer. Philos. Soc. (n.s.) 7: 453. 1841. *Aphanopappus nuttallii* Walp., Repert. Bot. Syst. 2: 620. 1843, nom. illeg. *Lipochaeta micrantha* (Nutt.) A. Gray, Proc. Amer. Acad. Arts 5: 131. 1861. *Aphanopappus micranthus* (Nutt.) A. Heller, Minnesota Bot. Stud. 1: 915. 1897. TYPE: U.S.A. Hawaiian Islands, Kaua'i, ("Atooi"), Kolao [Koloa], 1835, *T. Nuttall s.n.* (HOLOTYPE: BM—n.v.).

Distribution.—U.S.A. Hawaiian Islands,

known only from diverse mesic forest, ca. 300–400 m, Ha'upu Ridge, Hanapepe Valley, Koai'e Canyon, Olokele Canyon, and Kaua'i. *Melanthera micrantha* is at risk of extinction and has been federally listed as endangered.

8a. ***Melanthera micrantha*** (Nutt.) W. L. Wagner & H. Rob. subsp. ***micrantha***

Distribution.—U.S.A. Hawaiian Islands, known only from diverse mesic forest, ca. 300–400 m, Koai'e and Olokele Canyons, and Hanapepe valley, Kaua'i.

8b. ***Melanthera micrantha*** (Nutt.) W. L. Wagner & H. Rob. subsp. ***exigua*** (O. Deg. & Sherff) W. L. Wagner & H. Rob., comb. et stat. nov.

Lipochaeta exigua O. Deg. & Sherff in Sherff, Amer. J. Bot. 28: 30. 1941. *Lipochaeta micrantha* (Nutt.) A. Gray var. *exigua* (O. Deg. & Sherff) R. C. Gardn., Rhodora 81: 325. 1979. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Nawiliwili, 0.75 mi SW of Hokunui, on summit ridge, 8 Jan 1940, O. Degener & E. Ordoñez 12610 (LECTOTYPE, designated by Gardner, 1979: F-1014051; ISOLECTOTYPES: B—n.v., BISH, F—2, G—n.v., GH, MO—2, NY—5 [microfiche], UC—3—n.v., US—2).

Distribution.—U.S.A. Hawaiian Islands, known only from diverse mesic forest, ca. 300–400 m, Ha'upu Ridge, Kaua'i.

9. ***Melanthera perdita*** (Sherff) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta perdita Sherff, Bot. Gaz. (Crawfordsville) 95: 99. 1933. TYPE: U.S.A. Hawaiian Islands, [probably Ni'ihau], s.l., 26–29 Jan 1779, D. Nelson s.n. (HOLOTYPE: BM [photo F]).

Lipochaeta kawaihoensis H. St. John, Pacific Sci. 13: 181. 1959. TYPE: U.S.A. Hawaiian Islands, Ni'ihau, Kawaihoa Point, head of steep gully, 300 ft, 31 Mar 1949, H. St. John 23611 (HOLOTYPE: BISH-500977; ISOTYPES: BISH—2, MO—n.v., US—2).

Distribution.—U.S.A. Hawaiian Islands, known only from the types, listed above. Although habitats on Ni'ihau have been extensively altered by ranching, it is not known definitively whether this species is extinct. Suitable habitats, including the type locality, are on private land and are not accessible for surveys. The species is thus presumed to be extinct.

10. ***Melanthera populifolia*** (Sherff) W. L. Wagner & H. Rob., comb. et stat. nov.

Lipochaeta subcordata A. Gray var. *populifolia* Sherff, Bot. Gaz. (Crawfordsville) 95: 91. 1933. *Lipochaeta populifolia* (Sherff) R. C. Gardn., Rhodora 81: 328. 1979. TYPE: U.S.A. Hawaiian Islands, Lana'i, Maunalei Valley, 18 Jun 1918, G. C. Munro 670 (HOLOTYPE: F-659412 [photo F]; ISOTYPES: BISH—3, US [photo F]).

Distribution.—Hawaiian Islands, known only from the type collection Maunalei Valley, Lana'i, and almost certainly extinct.

11. ***Melanthera remyi*** (A. Gray) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta remyi A. Gray, Proc. Amer. Acad. Arts 5: 131. 1861. TYPE: U.S.A. Hawaiian Islands, O'ahu, s.l., 1851–1855, J. Rémy 260 (HOLOTYPE: GH [fragment BISH-501044, photo F]).

Distribution.—U.S.A. Hawaiian Islands, occurring in locally moist sites in dry forest to *Leucaena* shrubland, 30–180 m, north-western Wai'anae Mountains, O'ahu.

12. ***Melanthera subcordata*** (A. Gray) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta subcordata A. Gray, Proc. Amer. Acad. Arts 5: 130. 1861. TYPE: U.S.A. Hawaiian Islands, Hawai'i, on the coast, 1840, U.S. Expl. Exped. s.n. (HOLOTYPE: US-57067).

Lipochaeta flexuosa Drake, Ill. Fl. Ins. Pacif., part 4, 72, t. 35. 1888. TYPE: U.S.A. Hawaiian Islands, Hawai'i, s.l., 1851–1855, J. Rémy 265 (HOLOTYPE: P).

Lipochaeta intermedia O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 102. 1933. TYPE: U.S.A. Hawaiian Islands, Hawai'i, Kona Distr., Hu'ehu'e, May 1932, O. Degener 4254 (leg. A. Meebold) (HOLOTYPE: F-668723 [photo F; frag G]).

Distribution.—U.S.A. Hawaiian Islands, scattered in dry forest and alien grassland, 550–1800 m, North Kona District and Pu'u Kanalopaka Nui, and South Kohala District, Hawai'i.

13. ***Melanthera tenuifolia*** (A. Gray) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta tenuifolia A. Gray, Proc. Amer. Acad. Arts 5: 131. 1861. TYPE: U.S.A. Hawaiian Islands, O'ahu, Ka'ala Mtns., 1840, U.S. Expl. Exped. s.n. (LECTOTYPE, designated by Sherff, 1935: GH; ISOLECTOTYPES: NY—n.v., US). Sherff indicated that Gray had two collections available, the one he selected as the lectotype and Rémy 276

(GH, P), with the material of both collections mounted on the same sheet at GH. Gardner (1979) superfluously lectotypified with the same specimen as Sherff.

Distribution.—U.S.A. Hawaiian Islands, rare in diverse mesic forest, 700–900 m, only in the central Wai'anae Mountains, O'ahu.

**14. *Melanthera tenuis* (O. Deg. & Sherff)
W. L. Wagner & H. Rob., comb. nov.**

Lipochaeta tenuis O. Deg. & Sherff in Sherff, Bot. Gaz. (Crawfordsville) 95: 102. 1933. TYPE: U.S.A. Hawaiian Islands, O'ahu, Wai'anae Valley, on lateral spur leading to summit ridge between Ka'ala and Kalena [up toward Mt. Ka'ala], 24 Apr 1932, O. Degener, K. K. Park & W. Bush 4258 (LECTOTYPE, designated by Gardner, 1979: F-666542 [photo F]; ISOLECTOTYPES: F [photo F], K—n.v., MO, NY [microfiche]). Sherff cited the collector only as O. Degener and gave no collection number; MO sheet lists all three collectors and gives a number, and was annotated by Sherff "Cotype!" Both sheets at F have labels prepared by Sherff, with no collector number and only Degener given as the collector.

Lipochaeta dubia O. Deg. & Sherff in Sherff, Field Mus. Nat. Hist., Bot. Ser. 17: 580. 1939. TYPE: U.S.A. Hawaiian Islands, O'ahu, NE ridge [slope] of Pu'u Hapapa, 7 May 1939, O. Degener, E. Ordoñez, J. Foster 12331 (HOLOTYPE: F-1004397 [photo F]; ISOTYPES: A—2—n.v., F—2, GB—n.v., GH—3, MO, NY—3 [microfiche], US—3). Sherff changed the number on the labels of the F sheets from 12332 to 12331; NY sheets all have correct number of 12331 on Degener's original label.

Lipochaeta tenuis O. Deg. & Sherff var. *sellingii* O. Deg. & Sherff, Fl. Hawaiiensis, fam. 244. *Lipochaeta tenuis*. 1940. TYPE: U.S.A. Hawaiian Islands, O'ahu, NE slope of Pu'u Hapapa, near contour trail, 3 Sep 1938, O. H. Selling 3336 (HOLOTYPE: GB; ISOTYPE: BISH). Cited as a Selling collection, but labels on BISH and GB sheets have all three collectors (Cranwell, Selling, and Skottsberg) listed. Gardner (1979) erroneously cited Degener *et al.* 12253 as the type of this name; although collected from the same plant.

Lipochaeta minuscula O. Deg. & Sherff in Sherff, Bot. Leaflet 9: 9. 1954. TYPE: U.S.A. Hawaiian Islands, O'ahu, on ridge N of Kolekole Pass, 15 Jun 1947, O. Degener 21660 (leg. M. Kerr) (HOLOTYPE: F [photo F]; ISOTYPE: BISH). Gardner (1979) superfluously lectotypified on BISH sheet, but Sherff clearly cited F sheet as the type.

Distribution.—U.S.A. Hawaiian Islands, uncommon in diverse mesic forest, on slopes, or in open sites such as streambeds, 700–900 m, only in the central Wai'anae Mountains, O'ahu.

15. *Melanthera venosa* (Sherff) W. L. Wagner & H. Rob., comb. nov.

Lipochaeta venosa Sherff, Bot. Gaz. (Crawfordsville) 95: 100. 1933. TYPE: U.S.A. Hawaiian Islands, Hawai'i, Waimea, Nohonaohae Crater, Jun 1910, J. F. Rock 8349 (HOLOTYPE: F-659409 [photo F]; ISOTYPES: BISH—4, GH, UC—n.v., US).

Lipochaeta pinnatifida H. St. John, Pacific Sci. 38: 272. 1984. TYPE: U.S.A. Hawaiian Islands, Hawai'i, Waimea, several hundred meters N of Pu'u Pa'a, near tank rd., 2400 ft, 1 Feb 1981, F. R. Warshauer 3160 (HOLOTYPE: BISH). St. John considered Warshauer 3160, which was collected to demonstrate variability within a population of *Melanthera venosa* (Warshauer, pers. comm. 1984), a mixed collection, and used different parts of it as the types of two taxa, the other sheet being used as the type of *L. setosa*. Holotype missing 8/1987; not found in general collection at BISH in June 1997.

Lipochaeta setosa H. St. John, Pacific Sci. 38: 276. 1984. TYPE: U.S.A. Hawaiian Islands, Hawai'i, Waimea, several hundred meters N of Pu'u Pa'a, near tank rd., 2400 ft, 1 Feb 1981, F. R. Warshauer 3160A (HOLOTYPE: BISH). St. John segregated this portion of a collection and added the "A." He named the other part *Lipochaeta pinnatifida*. The two sheets collected were made to show the population variation of *Melanthera venosa* (Warshauer, pers. comm., 1984). Holotype missing 8/1987; not found in general collection in Jun 1997.

Lipochaeta warshaueri H. St. John, Pacific Sci. 38: 280. 1984. TYPE: U.S.A. Hawaiian Islands, Hawai'i, Kohala Dist., Waimea Plain, near base of Kohala slopes, gulch next to Waikamali Gulch, 1680 ft, 31 Jan 1981, F. R. Warshauer 3159 (HOLOTYPE: BISH). Present disposition is based on the description and illustration as the holotype has been missing since Aug 1987.

Distribution.—U.S.A. Hawaiian Islands, scattered in dry shrubland, 730–915 m, known only from South Kohala District, Nohonaohae, Holoholoku, and Heihei cinder cones, Pu'upa, and an unnamed cinder cone northeast of Nohonaohae, Hawai'i. *Melanthera venosa* is at risk of extinction and has been federally listed as endangered.

**16. *Melanthera waimeaensis* (H. St. John)
W. L. Wagner & H. Rob., comb. nov.**

Lipochaeta waimeaensis H. St. John, Pacific Sci. 26: 293. 1972. TYPE: U.S.A. Hawaiian Islands, Kaua'i, Waimea Canyon, upper slope of W side, 1200 ft, 17 Apr 1967, R. W. Hobdy 101 (HOLOTYPE: BISH-501058; ISOTYPES: BISH, GH, US). St. John wrote "Holotype" on both BISH sheets, but illustrated 501058 and caption says it is from the holotype. We therefore consider it to be the holotype and the other sheet to be an isotype.

Distribution.—U.S.A. Hawaiian Islands, known only from the type locality in diverse mesic forest, ca. 350–400 m, on the upper slope, west side of Waimea Canyon, Kaua'i. *Melanthera waimeaensis* is at risk of extinction and has been federally listed as endangered.

OTHER SPECIES OF *MELANTHERA*

17. *MELANTHERA ABYSSINICA* (Sch.-Bip. ex A. Rich.) Benth. & Hook. f., Gen. Pl. 2: 377. 1873. *Wuerschmittia abyssinica* Sch.-Bip. ex A. Rich., Tent. Fl. Abyss. 1: 413. 1848. TYPE: Africa. Ethiopia, *Schimper 334* (LECTOTYPE, designated here: P—n.v.; ISOLECTOTYPES: BM—n.v., BR—n.v., K—n.v., M—n.v.). Two additional syntypes were cited in the protologue.

Distribution.—Africa (Angola, Congo, Eritrea, Ethiopia, Kenya, Sierra Leone, Sudan, Tanzania, Togo, and Zambia).

18. *MELANTHERA ALBINERVIA* O. Hoffm., Bol. Soc. Brot. 13: 30. 1896. TYPE: Africa. Angola, *Anchieta 119* (HOLOTYPE: COI; ISOTYPE: LISU).

Distribution.—Africa (Angola, Congo, Kenya, Malawi, Mozambique, Namibia, Transvaal, Tanzania, Uganda, Zimbabwe, and Zambia).

18a. *MELANTHERA ALBINERVIA* O. Hoffm. subsp. *ALBINERVIA*

Distribution.—Africa (Angola, Malawi, Mozambique, Namibia, Transvaal, Tanzania, Zimbabwe, and Zambia).

18b. *MELANTHERA ALBINERVIA* O. Hoffm. subsp. *ACUMINATA* (S. Moore) Wild, Kirkia 5: 12. 1965. *Melanthera acuminata* S. Moore, J. Linn. Soc., Bot. 35: 344. 1902. TYPE: Africa. Kenya, *Scott Elliot 7052* (HOLOTYPE: BM—n.v.; ISOTYPE: K—n.v.).

Distribution.—Africa (Kenya, Uganda, and Tanzania).

18c. *MELANTHERA ALBINERVIA* O. Hoffm. subsp. *CAUDATA* Wild, Kirkia 5: 12. 1965.

TYPE: Africa. N Rhodesia [Zambia], *Cruse 224* (HOLOTYPE: K—n.v.).

Distribution.—Africa (Congo and Zambia).

19. *MELANTHERA ANGUSTIFOLIA* A. Rich. in Sagra, Hist. Isla Cuba 11: 54. 1850. TYPE: Cuba, *La Sagra s.n.* (LECTOTYPE, designated by Parks, 1973: P—n.v.).

Distribution.—U.S.A. (southern Florida), western Cuba, Hispaniola, Dominican Republic, Mexico (Chiapas, Quintana Roo, Tabasco, Vera Cruz, and Yucatan), Central America (Guatemala, Honduras, and Panama).

20. *MELANTHERA ELEGANS* C. D. Adams, J. W. Afr. Sci. Assoc. 8: 135. 1964. TYPE: Africa. Guinea, *C. D. Adams 12728* (HOLOTYPE: K—n.v.).

Distribution.—Africa (Guinea).

21. *MELANTHERA ELLIPTICA* O. Hoffm., in Engl., Bot. Syst. Jahrb. 24: 474. 1898. TYPE: Africa, *Kling 47* (SYNTYPE: B [presumably destroyed]); *Kling 162* (SYNTYPE: B [presumably destroyed]); *Kling 163* (SYNTYPE: B [presumably destroyed]); *Kling 47* (SYNTYPE: B [presumably destroyed]); *Büttner 34* (B [presumably destroyed]); *Büttner 678* (B [presumably destroyed]).

Distribution.—Africa (Cameroon, Central African Republic, Ghana, and Nigeria).

22. *MELANTHERA FELICIS* C. D. Adams, J. W. Afr. Sci. Assoc. 8: 135. 1964. TYPE: Africa. Guinea, 24 Jan 1936, *Jacques-Felix 1868* (HOLOTYPE: K—n.v.).

Distribution.—Africa (Guinea).

23. *MELANTHERA GAMBICA* Hutch. & Dalz., Fl. W. Trop. Afr. 2, 1: 146. 1931. TYPE: Africa. Gambia, *Hayes 586* (HOLOTYPE: K—n.v.).

Distribution.—Africa (Gambia and Guinea-Bissau).

24. *MELANTHERA LATIFOLIA* (Gardn.) Cabrera, Darwiniana 16: 411. 1970. *Echin-*

ocephalum latifolium Gardn., London J. Bot. 7: 294. 1848. TYPE: Brazil, Ceará Prov., in cane fields near Crato, Oct 1838, *G. Gardner 1728* (LECTOTYPE, designated here: BM; ISOLECTOTYPES: K [photo US], NY—2, US—frag). One additional syntype was cited (*G. Gardner 3848*). (Fig. 2A–C)

Echinocephalum lanceolatum Gardner, London J. Bot. 7:295. 1848, syn. nov. TYPE: Brazil, Ceará Prov., near Aracaty, Aug 1838, *G. Gardner 1729* (HOLOTYPE: BM—n.v.; ISOTYPES: K—n.v. [photo US], US—frag).

Echinocephalum angustifolium Gardner, London J. Bot. 7:295. 1848, syn. nov. TYPE: Brazil, Goyaz Prov., near Sapê, Feb 1840, *G. Gardner 3848 (bis)* (HOLOTYPE: BM—n.v.; ISOTYPES: K—n.v. [photo US], US—frag).

Distribution.—South America, widespread in the east from Brazil, Paraguay, Bolivia and Argentina, 40–300(–1100) m, usually along rivers or in inundated savanna, sometimes in mesic forest.

25. MELANTHERA LIGULATA Small, Bull. New York Bot. Gard. 3: 439. 1905. TYPE: U.S.A. Florida, *Small & Wilson 1775* (HOLOTYPE: NY—n.v.).

Distribution.—U.S.A (Florida).

26. MELANTHERA NIVEA (L.) Small, Fl. SE U.S. 1251, 1340. 1903. *Bidens nivea* L. Sp. Pl. 2: 833. 1753. TYPE: Dillenius, J. 1732 Hort., Elth. tab. 47 (LECTOTYPE, designated by Parks, 1973). (Fig. 1P–R)

Melanthera aspera (Jacq.) Small, Bull. Torrey Bot. Club 36: 164. 1909. *Calea aspera* Jacq., Collectanea 2: 290. 1788. TYPE: *Jacquin* (HOLOTYPE: BM [photo US]).

Distribution.—Illinois and southeastern United States to northern South America (Colombia, Ecuador, Peru, and Venezuela), and the Greater and Lesser Antilles.

27. MELANTHERA PARVIFOLIA Small, Fl. SE U.S. 1251, 1370. 1903. TYPE: USA. Florida, *Blodgett s.n.* (HOLOTYPE: NY—n.v.; ISOTYPE: GH—n.v.).

Distribution.—U.S.A. (southern Florida).

28. MELANTHERA PROSTRATA (Hemsl.) W. L. Wagner & H. Rob., comb. nov.

Wedelia prostrata Hemsl., in F. Forbes & Hemsl., J. Linn. Soc., Bot. 23: 434. 1888, nom. nov. *Verbesina prostrata* Hook. & Arn., Bot. Beechey Voy. (5), 195. 1837, non L. (1753). *Wollastonia prostrata* Hook. & Arn., Bot. Beechey Voy. (6), 265. 1838, non DC. (1836). TYPE: China, Macao and adjacent islands, Apr 1827, *Lay & Collie s.n.* (HOLOTYPE: K—n.v.).

Distribution.—Coastal areas from Bonin Islands, Korea, China, Japan (Honshu), Ryukyu Islands, Taiwan, and Vietnam.

Melanthera prostrata is often subdivided into two varieties. *Melanthera prostrata* var. *rosbusta* Makino is now thought to represent a hybrid between *M. prostrata* and *M. biflora* (Peng et al., 1998), which we do not recognize formally with a binomial.

29. MELANTHERA PUNGENS Oliv. & Hiern, Fl. Trop. Afr. 3: 382. 1877. TYPE: Africa. Sudan, *Schweinfurth 1990* (HOLOTYPE: K—n.v.; ISOTYPE: BM—n.v.).

Distribution.—Africa (Central African Republic, Congo, Senegal, Sudan, and Uganda).

30. MELANTHERA RHOMBIFOLIA O. Hoffm. & Muschler, Mem. Soc. Bot. Fr. 2, 8: 117. 1910. TYPE: Africa. Mali, *Chevalier 999* (HOLOTYPE: P—n.v.).

Melanthera tithonioides Assi, Adansonia 4: 338. 1964. TYPE: Africa. Ivory Coast, *Mangenot & Assi 1A 4142* (HOLOTYPE: P).

Distribution.—Africa (Ivory Coast, Mali, and Nigeria).

31. MELANTHERA RICHARDSIAE Wild, Kirkia 5: 9. 1965 (as *M. richardsae*). TYPE: Africa. N Rhodesia [Zambia], *Richards 1491* (HOLOTYPE: K—n.v.; ISOTYPES: BR—n.v., E—n.v.).

Distribution.—Africa (Rwanda, Tanzania, Uganda, and Zambia).

32. MELANTHERA ROBINSONII Wild, Kirkia 5: 15. 1965. 1965. TYPE: Africa. N Rhodesia [Zambia], *Robinson 2099* (HOLOTYPE: SRGH—n.v.; ISOTYPE: K—n.v.).

Distribution.—Africa (Congo, Tanzania, and Zambia).

33. MELANTHERA SCABERRIMA Hiern, Cat.

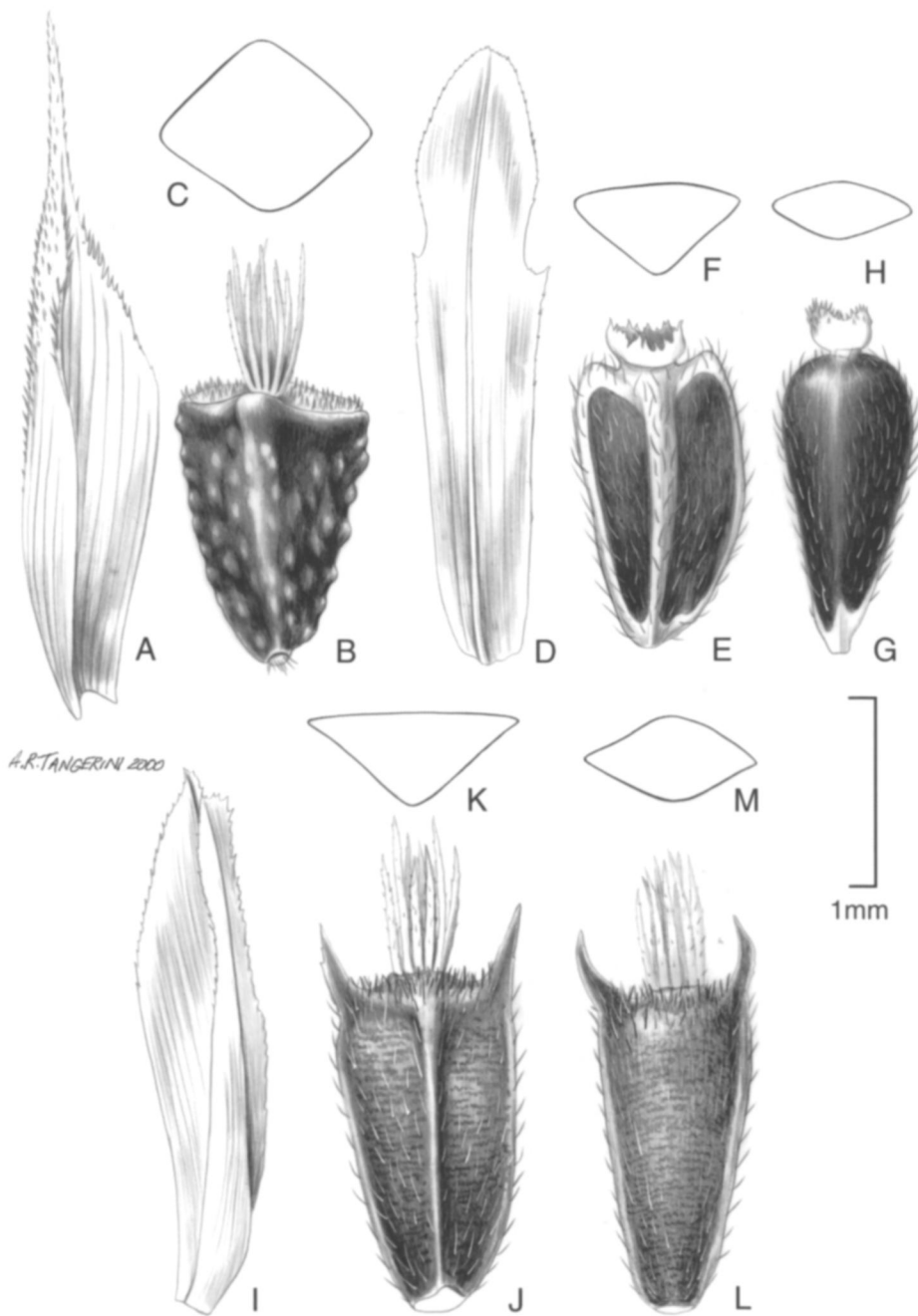


FIG. 2. A–C. *M. latifolia* (Argentina, Entre Ríos, Dpto. Concordia, Parque Rivadavia, *Burkart et al.* 25502) [note: ray flowers neutral in this species]. A. Pale. B. Disk achene. C. Cross section of disk achene. D–H. *Wedelia calycina* (Virgin Islands, St. Croix, *Fosberg & Ogden* 55325). D. Pale. E. Ray achene. F. Cross section of ray achene. G. Disk achene. H. Cross section of disk achene. I–M. *Perymenium jelskii* (Peru, Prov. Otuzco, Dpto. La Libertad, Chanchacap, *Sagástegui et al.* 11669). I. Pale. J. Ray achene. K. Cross section of ray achene. L. Disk achene. M. Cross section of disk achene.

Afr. Pl. Welw. 1, 3: 582. 1898. TYPE: Africa. Angola, *Welwitsch 3556* (HOLOTYPE: BM—n.v.; ISOTYPES: K—n.v., LISU—n.v.).

Distribution.—Africa (Angola).

34. MELANTHERA SCANDENS (Schumach. & Thonn.) Roberty, Bull. I.F.A.N. 16: 68. 1954. *Buphtalmum scandens* Schumach. & Thonn., Beskr. Guin. Pl. 392. 1827. TYPE: Africa. Ghana, *Thonning s.n.* (HOLOTYPE: C—n.v.).

Distribution.—Widespread in Africa.

- 34a. MELANTHERA SCANDENS (Schumach. & Thonn.) Roberty subsp. DREGEI (DC.) Wild, Kirkia 5: 8. 1965. *Psathurochaeta dregei* DC., Prodr. 5: 609. 1836. TYPE: Africa. [Republic of South Africa], Natal [KwaZulu-Natal], *Drege s.n.* (HOLOTYPE: G-DC [microfiche]).

Distribution.—Africa (Mozambique, Republic of South Africa, and Swaziland).

- 34b. MELANTHERA SCANDENS (Schumach. & Thonn.) Roberty subsp. MADAGASCARIENSIS (Bak.) Wild, Kirkia 5: 7. 1965. TYPE: Africa. Madagascar, *Baron 2344 p.p.* (K—n.v.).

Distribution.—Africa (Angola, Congo, Ethiopia, Kenya, Malawi, Mozambique, Sudan, Tanzania, Uganda, Zambia, and Madagascar).

- 34c. MELANTHERA SCANDENS (Schumach. & Thonn.) Roberty subsp. SCANDENS

Distribution.—Africa (Angola, Cameroon, Congo, Gabon, Ghana, Nigeria, and Sierra Leone).

- 34d. MELANTHERA SCANDENS (Schumach. & Thonn.) Roberty subsp. SUBSIMPLICIFOLIA Wild, Kirkia 5: 6. 1965. TYPE: Africa. Cameroon, *Mildbraed 10752* (K—n.v.).

Distribution.—Africa (Cameroon, Congo, Ghana, Kenya, Malawi, Sierra Leone, Sudan, Tanzania, Uganda, Zimbabwe).

35. MELANTHERA TRITERNATA (Klatt) Wild, Kirkia 5: 9. 1965. *Wedelia triternata*

Klatt, Bull. Herb. Boiss. 4: 839. 1896. TYPE: Africa. Mozambique, *Menyharth 735* (HOLOTYPE: GH—n.v.).

Distribution.—Africa (Angola, Botswana, Mozambique, Namibia, Transvaal, Zambia, and Zimbabwe).

EXCLUDED NAMES

- Lipochaeta amazonica* Poepp., Nov. Gen. Sp. 3: 49. 1845. = *Wedelia rudis* (Baker) Benth. ex H. Rob.
Lipochaeta costaricensis (Benth.) Benth. & Hook. f., Gen. Pl. 2: 373. 1873. = *Lasianthaea fruticosa* (L.) K. Becker var. *fasciculata* (DC.) K. Becker.
Lipochaeta asymetrica H. Léveillé, Fedde Repert. 10: 122. 1911. = *Bidens asymetrica* (H. Léveillé) Sherff
Lipochaeta fasciculata DC., Prodr. 5: 610. 1836. = *Lasianthaea fruticosa* (L.) K. Becker var. *fasciculata* (DC.) K. Becker.
Lipochaeta goyazensis Hook., Lond. J. Bot. 7: 406. 1848. = *Angelphytum goyazense* (Hook.) H. Rob. & W. L. Wagner, comb. nov.
Lipochaeta hastata Kellogg, Proc. Calif. Acad. Sci. 2: 106. 1863. = *Verbesina hastata* (Kellogg) Kellogg ex Curran
Lipochaeta lantanifolia Schauer, Linnaea 19: 729. 1847. = *Jefea lantanifolia* (Schauer) Strother
Lipochaeta laricifolia (Hook. f.) A. Gray, Proc. Amer. Acad. Arts 5: 131. 1862. = *Trigonopterum laricifolium* (Hook. f.) W. L. Wagner & H. Rob., comb. nov. *Macraea laricifolia* Hook. f., Trans. Linn. Soc. London 20: 210. 1847. In the process of determining the present disposition of this taxon we discovered that *Macraea* Hook. f. (Trans. Linn. Soc. London 20: 209. 1847) was a later homonym of *Macraea* J. Lindl. (Quart. J. Sci. Lit. Arts ser. 2, 1: 104. 1828), a synonym of *Viviania* Cav. in the Geraniaceae. The next and only available generic name is *Trigonopterum* Steetz ex N. J. Andersson (Kongl. Vetensk. Acad. Handl. 1853: 183. 1854. TYPE: *T. pontenii* N. J. Andersson). We here make the correct combination for the Galápagos Islands endemic (for evidence for generic recognition see Harling, 1962; Eliasson, 1984).
Lipochaeta macrocephala Hook. & Arn., Bot. Beechey Voy. (10) 436. 1841. = *Lasianthaea macrocephala* (Hook. & Arn.) K. Becker
Lipochaeta monocephala DC., Prodr. 5: 610. 1836. = *Lasianthaea fruticosa* (L.) K. Becker var. *fruticosa*.
Lipochaeta scaberrima Benth., J. Bot. 11: 43. 1840. = *Oyedaea scaberrima* (Bentham) Blake
Lipochaeta? *serrata* (Llave) DC., Prodr. 5: 611. 1836. = *Zexmenia serrata* Llave
Lipochaeta strigosa DC., Prodr. 5: 610. 1836. = *Wamalchitamia strigosa* (DC.) Strother
Lipochaeta tagetiflora G. Don in Sweet, Hort. Brit. ed. 3: 360, nom. nud.
Lipochaeta texana Torr. & A. Gray, Fl. N. Amer. 2: 357. 1842. = *Wedelia acapulcensis* Kunth var. *hispidata* (Kunth) Strother
Lipochaeta umbellata DC., Prodr. 5: 610. 1836. = *Las-*

ianthaea ceanothifolia (Willd.) K. Becker var. *ceanothifolia*
Lipochaeta umbellata DC. var. *conferta* DC., Prodr. 5: 610. 1836. = *Lasianthaea ceanothifolia* (Willd.) K. Becker var. *ceanothifolia*

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