Systematic Botany (1987), 12(4): pp 601–608

A New Species of *Remya* (Asteraceae: Astereae) on Kaua'i and a Review of the Genus

WARREN L. WAGNER

Department of Botany, Bernice P. Bishop Museum,
P.O. Box 19000-A, Honolulu, Hawaii 96817

DERRAL R. HERBST

U.S. Fish and Wildlife Service, P.O. Box 60165,
Honolulu, Hawaii 96850

ABSTRACT. *Remya* (tribe Astereae) is a genus of three species endemic to the Hawaiian Islands. Until 1985, only two species, *R. mauiensis* and *R. kauaiensis*, were known. They were both thought to be extinct. Although rediscovered in 1971 and 1983, respectively, the plants are very rare and the populations endangered. A new species in the genus is described: **R. montgomeryi** sp. nov., known only from cliffs near the rim of Kalalau Valley, Kaua'i. The most diagnostic features distinguishing it within the genus include complete lack of pubescence; long, thin peduncles; heads with a larger, hemispherical involucre; acute to obtuse phyllaries; and more numerous disk florets. Examination of material of all three species suggests that the heads are monoecious; the ray florets are pistillate and disk florets functionally staminate. *Remya kauaiensis* and *R. montgomeryi* differ from *R. mauiensis* in having dimorphic disk florets; the outer ones are smaller, have funnelform corollas, and apparently are neutral or pistillate whereas the inner ones are considerably larger, have campanulate corollas, and appear to be functionally staminate. *Remya* may be related to the Australasian genus *Olearia*.

Remya is a small genus in the tribe Astereae. Three species can be distinguished, all endemic to the Hawaiian Islands. Two of them, *R. kauaiensis* Hillebrand and *R. mauiensis* Hillebrand, were described in 1888. Apparently neither species was of common occurrence during historical times, and only two collections had been made of *R. mauiensis* before its rediscovery in 1971: one by William Hillebrand on West Maui (1851–1871); the other in 1920, in the same place, by C. N. Forbes. The species was thought to be extinct until it was rediscovered in 1971 by L. E. Bishop, W. Gagné, and S. Montgomery on the northeast facing slopes of Manawainui Gulch, West Maui, at 850 m. Since then more individuals have been found in Pāpalaua Gulch, 0.8 km west of Manawainui Gulch. Because of the sprawling habit of *R. mauiensis* and dense growth of the surrounding vegetation, it is difficult to determine the exact number of individual plants, but there appear to be only about 20–25 plants in Manawainui Gulch and 1–2 in Pāpalaua Gulch.

Remya kauaiensis has a similar history having been first collected prior to 1870 on Kaua'i by V. Knudsen at "Waimea" (which probably means somewhere on the Kōke'e Plateau), Kaua'i. The specimen was sent to W. Hillebrand who described the species. Over 80 years later, a second collection was made by O. Degener (in 1952) near Waipo'o Falls, Kōke'e, Kaua'i. *Remya kauaiensis* was considered to be extinct until 1983 when it was rediscovered by a Kaua'i forester, G. Kawakami, who located two small populations, one in Ka'ula'ula Valley and one in Kauhao Valley, both in Kōke'e State Park. Timothy Flynn (Pacific Tropical Botanical Garden) has determined that these two populations each consist of 2–6 plants. In 1985 Flynn found two additional small populations in Mākaha Valley, Kōke'e State Park. In 1986 it was found growing with *R. montgomeryi* in upper Kalalau Valley. The rediscovery of this species was reported by Wagner et al. (1986).

In 1985, S. Montgomery discovered a third species of *Remya*, described herein as *Remya montgomeryi* W. L. Wagner & Herbst, on the sheer, virtually inaccessible, cliffs below the upper rim of Kalalau Valley near Pu'uokila, Kaua'i. This new species, like the other two, apparently is rare, with only a relatively few individuals known, although there may be more populations on the steep slopes and cliffs of this large Kaua'i valley. Rediscovery of the first two species

and the find of the new Kalalau Valley species has led to an increased knowledge of this endemic genus, especially with regard to floral morphology, which is described here.

This work originated when the treatment of the genus was prepared for the upcoming *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, and Sohmer in prep.). Sufficient new information has become available to warrant a review of the genus at this time.

Tribal and Generic Relationships

The only chromosome number known for *Remya*, $n = 18$ (Carr 1985), indicates a possible polyploid origin, based on $x = 9$, which is the base number for tribe Astereae (Grau 1977). The acute to subobtuse, non-receptive tips of the style branches also align *Remya* with the Astereae. Only the reduced pappus in *Remya* seems somewhat out of place in the tribe.

Fosberg (1948), in his often-cited paper on the derivation of the Hawaiian flora, suggested that *Remya* was possibly of American affinity, perhaps based on Bentham's (1876) tentative placement of *Remya* adjacent to the American genus *Grindelia* Willd. Searches for possible relationships within the Astereae have led us to suggest an Australasian affinity.

Remya may be related to the genus *Olearia* Moench, a genus of about 100 species of New Guinea, Australia, and New Zealand. In particular, it appears to be closely allied to New Zealand species. *Olearia* is a genus of shrubs and small trees. Like *Remya*, many species of *Olearia* have alternate, serrate leaves that are usually densely tomentose on the lower surface. The arrangement of heads in *Olearia* is variable but most species have a paniculate arrangement that exhibits similar patterns of branching to the species of *Remya*, although *Olearia* species usually have more heads per inflorescence. Both genera also have involucres with the phyllaries in several overlapping series, and the individual phyllaries have scarious, usually slightly lacerate margins. The ray florets are pistillate in both genera. Furthermore, their common possession of similar style branches; convex, alveolate receptacles; and compressed, ribbed or striate achenes further supports the contention that *Olearia* and *Remya* are related. *Remya* differs from *Olearia* primarily in its liana habit, monoecious heads, and reduced pappus of 3–9(14) non-barbellate bristles. The known chromosome counts for *Olearia* (Pai 1964; Solbrig et al. 1964) do not argue against this hypothesis. Numbers known for *Olearia* species are $n = 9$ with polyploidy common including $n = 18, 54$.

Taxonomy

REMYA Hillebrand ex Bentham in Bentham & Hooker, Gen. pl. 2:pars. prima Addend. 536. 1873; Gen. pl. 2:1231. 1876.—TYPE: *R. mauiensis* Hillebrand. According to TL-2 the first set of all duplicate pages in Genera Plantarum were "cancels" intended to be destroyed; they included, however, descriptions to several new genera such as *Remya*.

Densely tomentose or glabrous shrubs; stems sprawling or scandent to weakly erect, usually branched. Leaves simple, alternate, narrowly elliptic, broadly ovate, or lanceolate, lower surface white-tomentose or glabrous, margins serrate to dentate, short-petiolate. Heads in terminal panicles, disciform; involucre ovoid to globose or hemispherical, the bracts coriaceous to chartaceous, in several imbricate series; receptacle naked, convex, alveolate; ray florets pistillate, rays inconspicuous and emarginate, or vestigial, cream-colored, stamens absent, style branches with short, acute or subobtuse, unreceptive tips; disk florets of one or two types, the outer row, in species with two types, smaller and narrowly funnelform, apparently neutral or pistillate, the inner ones tubular at the base, abruptly or gradually expanded to the campanulate or funnelform upper part and functionally staminate, corollas 4–5-merous, dark yellow, style branches not separating; pappus of 3–9(14) stiff, unequal to subequal, persistent, somewhat flattened, non-barbellate bristles. Achenes narrowly obovoid, compressed, 3–4-angled with 1–2 striations on the faces. $n = 18$.

A genus comprising three species endemic to the Hawaiian Islands of Kaua'i and Maui. Named in honor of J. Rémy (1826–1893), a French botanist and traveler who collected in Hawai'i from 1851 to 1855.

Key to the Species of *Remya*

1. Plants glabrous; peduncles purple, thin, 8–15 mm long at anthesis; apex of the phyllaries acute to obtuse; Kaua'i ..... 3. *R. montgomeryi*

1. Plants tomentose, at least on the younger stems, inflorescences, and lower leaf surfaces; peduncles at most purple-tinged, stout, 0–5 mm long at anthesis; apex of the phyllaries attenuate-aristate to mucronate.
   2. Leaves lanceolate to elliptic-lanceolate or broadly ovate, blades usually ca. 2–3 times longer than wide, 4.5–17 cm long, 2.2–7 cm wide, base cuneate, petioles 1.2–2.2 cm long; Kaua'i ..... 1. *R. kauaiensis*
   2. Leaves narrowly elliptic, blades 5–12 times longer than wide, 9–18 cm long, 0.8–2.6 cm wide, base long-attenuate, petioles 0–1 cm long; Maui ..... 2. *R. mauiensis*

1. REMYA KAUAIENSIS Hillebrand, Fl. Hawaiian Isl. 194. 1888 (fig. 1).—TYPE: Hawai'i, Waimea, date unknown, *V. Knudsen s.n.* (holotype: B, presumably destroyed; fragment of the type: BISH-498498!).

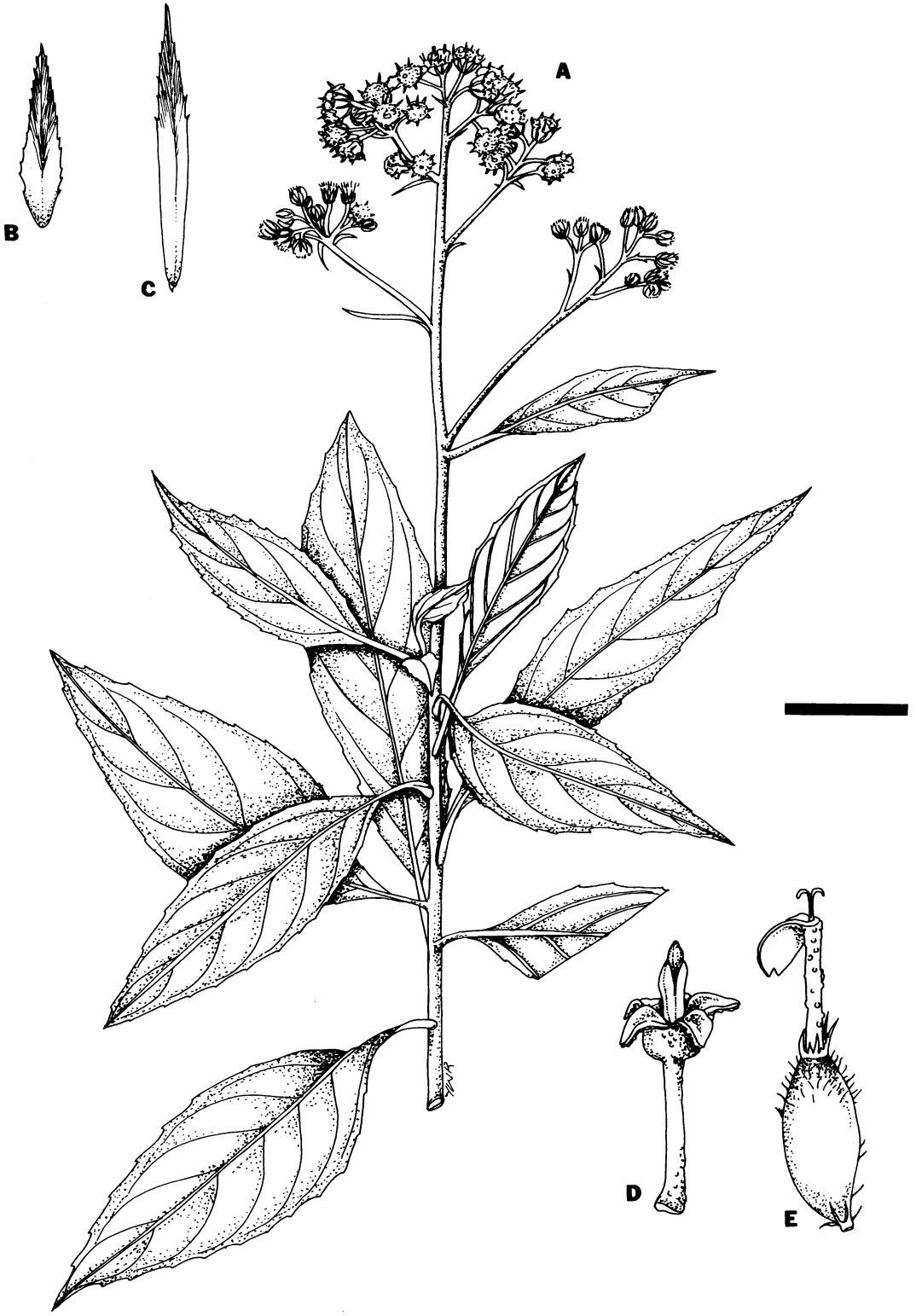
Remya kauaiensis var. *magnifolia* Degener & Sherff in Sherff, Bot. Leaf1. 9:8. 1954. TYPE: Hawai'i, Kaua'i, along Kōke'e Stream near Waipo'o falls on ledges over stream, 3 Jan 1952, *O. Degener 21521* (holotype: F; isotypes: AC, B, BISH!, F, G, NY).

Weakly erect to scandent shrubs 1–4 m tall, forming loosely tangled clumps that sprawl over or among the branches of other vegetation; stems leafy near the ends, younger parts densely whitish tomentose. Leaves lanceolate to elliptic-lanceolate or broadly ovate, 4.5–17 cm long, 2.2–7 cm wide, upper surface sparsely arachnoid-tomentose when young, becoming glabrate, lower surface densely whitish tomentose, margins sharply serrate-dentate to dentate, base cuneate, petioles 1.2–2.2 cm long. Heads in densely whitish tomentose, open panicles 10–20 cm long, peduncles stout, 2–5 mm long; involucre subglobose, 3 mm high, 2.5–3 mm in diam., the phyllaries purple-tinged, margins serrulate, sometimes only in the upper half, apex attenuate-aristate; ray florets 16–20 per head, pistillate, the corolla tube 1–1.2 mm long, rays cream-colored, variable in length, usually 0.8–1 mm long, apex notched, sometimes suppressed and only 0.2–0.3 mm long; disk florets of two types, several of the outer ones smaller, pistillate, corollas narrowly funnelform, 1.4–1.5 mm long, the lobes 0.4–0.5 mm long, and stamens absent, the inner disk florets 5–10 per head, larger, functionally staminate, corollas campanulate, 1.5–2 mm long, the expanded part 0.8–0.9 mm long, the lobes 0.4–0.5 mm long, style branches usually not separating, all corollas with tubes glandular puberulent; pappus of 4–8 somewhat flattened bristles, 2–3 of them long, the others very short. Achenes ca. 1.5 mm long, puberulent. Known from five small populations of 1–6 plants each in mixed mesophytic forest, ca. 1050–1100 m, in the Kōke'e area of Kaua'i.

Specimens examined. U.S.A. HAWAI'I. **Kaua'i:** Waimea District, Ka'ula'ula Valley, north facing slope below Lapa Loop Road, elev. ca. 855 m, 16 Jun 1983, *Flynn & Kawakami 448* (BISH), 26 May 1984, *Wagner et al. 5363* (BISH); Mākaha Valley, 2.4 km down Mākaha Ridge Road, elev. ca. 915 m, 12 Aug 1985, *Flynn et al. 1166* (PTBG), 17 Aug 1985, *Wagner et al. 5620* (BISH); Kauhao Valley, on a steep slope below the Boy Scout Camp, 22 Aug 1983, *Hobdy 1825* (BISH); upper Kalalau Valley, 1100 m, on exposed vertical rock faces (growing with *R. montgomeryi*), Aug 1986, *Montgomery s.n.* (BISH).

2. REMYA MAUIENSIS Hillebrand, Fl. Hawaiian Isl. 194. 1888.—TYPE: Hawai'i, West Maui, ridge back of Wailuku, *W. Hillebrand & J. M. Lydgate s.n.* (lectotype: BISH-500459!, here designated; isolectotype: BISH!). Hillebrand cited two collections: "gulches back of Lahaina" and "on a ridge of Wailuku Valley," and all specimens of both collections can be regarded as syntypes. Since the material in Hillebrand's own herbarium at B was destroyed, the excellent specimen at BISH from the ridge of Wailuku Valley is herein designated as the lectotype. This specimen bears a label in Hillebrand's handwriting stating "*Remya mauiensis* Hbd., Wailuku; Maui." An additional label which C. N. Forbes had typeset states the collectors as "W. Hillebrand & J. M. Lydgate." Forbes is known often to have used these labels for both Hillebrand's collections, as well as those made by Hillebrand and Lydgate. According to Lydgate (1921), it is possible that the collection was made by both of them since they botanized together on West Maui in late summer of 1869.

Sprawling, many-branched shrubs 1–2 m tall, forming loosely tangled clumps that sprawl on or among the branches of other vegetation; branches ascending, densely leafy along the new growth, young parts densely whitish tomen-


A
B
C
D
E

tose. Leaves chartaceous, narrowly elliptic, 9–18 cm long, 0.8–2.6 cm wide, upper surface arachnoid-tomentose when young, becoming glabrate, lower surface densely grayish white tomentose, margins coarsely serrate, base long-attenuate, petioles 0–1 cm long. Heads in compact, arachnoid-tomentose panicles 5–13 cm long, peduncles 0–5 mm long; involucre ovoid to obovoid, 4–5 mm high, 2–2.5 mm in diam., the phyllaries purple-tinged, margins serrulate, sometimes only in the upper half, apex attenuate-aristate to mucronate; ray florets 12–14 per head, pistillate, rays cream-colored, 0.6–0.8 mm long, corolla tube 1.5–1.6 mm long; disk florets 7–12 per head, staminate, corollas campanulate, 2.5 mm long, the expanded part 1–1.3 mm long, glandular puberulent, the lobes 0.5–0.6 mm long, style branches not separating; pappus of 4–9 somewhat flattened, short, subequal bristles. Achenes 1.5 mm long, glabrate to sparsely puberulent near the base. $n = 18$ (Carr 1985). Restricted to West Maui in mixed mesophytic forest, 850–920 m, Manawainui Gulch, Pāpalaua, and previously Olowalu Canyon, ʻĪao Valley, and behind Lahaina.

Specimens examined. U.S.A. HAWAIʻI. **Maui:** Manawainui Gulch, on steep NE facing hillside in dry-mesic forest, elev. 855 m, 12 Apr 1971, *Bishop et al. 047163* (BISH), 29 Aug 1971, *Bishop & Theobold 1176* (HAW), 17 Aug 1973, *St. John 26877* (BISH), 24 May 1973, *Herbst & Hobdy 3023* (BISH), 15 Jun 1977, *Stemmermann & Hobdy 2330* (HAW); Olowalu Valley, ridge in the upper part, 14 May 1920, *Forbes 2367.M* (BISH, 3 sheets).

3. **Remya montgomeryi** W. L. Wagner & Herbst, sp. nov. (fig. 2).—TYPE: Hawai'i, Kaua'i, Kōke'e State Park, steep cliffs several hundred m below rim of Kalalau Valley, 0.5 km directly NW of Pu'uokila, 1035 m, Jul 1985, *S. L. Montgomery s.n.* (holotype: BISH-492006!; isotype: BISH!).

Capitulis in panuculis apertis usque ad 24 cm longis, pedunculis tenuibus 8–15 mm longis, involucroa hemisphaerico 4–4.5 mm diametro, bracteis minime laceratis apice acuto vel obtuso, flosculis radiatis ca. 12 femineis, corollis vestigiatis 0.7–0.8 mm longis, pappis 4–8(14) setis perumque inaequalibus, flosculis disci biformatis eis exterioribus ca. 14 neutralibus corollis tubulosis 1.2–1.3 mm longis, lobis stigmatis non separatis, setis pappi 0–3(6) plerumque inaequalibus eis interioribus ca. 35 masculis, corollis campanulatis ca. 2–2.2 mm longis, lobis stigmatis plerumque non separatis, setis pappi plerumque nullis.

Weakly erect shrubs to ca. 1 m tall; stems leafy toward the apex, glabrous. Leaves thin, closely spaced, narrowly elliptic, 13–15 cm long, 2–3.2 cm wide, glabrous, margins coarsely serrate to irregularly doubly serrate, alternate teeth greatly different in size, the larger ones 2–3 mm long, the smaller ones 0.3–1 mm long, petioles 0.4–0.6 cm long. Heads in purplish brown, erect, open panicles up to 24 cm long, peduncles thin, 8–15 mm long; involucre hemispherical, 2–2.5 mm high, 4–4.5 mm in diam., the phyllaries purple, entire or slightly lacerate, apex acute to obtuse; ray florets ca. 12 per head, pistillate, corolla vestigial, 0.7–0.8 mm long, rays vestigial, stamens absent, pappus of 4–8(14) somewhat flattened, unequal to sometimes subequal bristles; disk florets of two types, the outer ones ca. 14 per head, neutral, corolla tubular, 1.2–1.3 mm long, the lobes 0.3 mm long, style branches not separating, stamens absent, pappus of 0–3(6) somewhat flattened, unequal to sometimes subequal bristles, the inner disk florets ca. 35 per head, much larger, functionally staminate, corolla campanulate, 2–2.2 mm long, the expanded part 1.2 mm long, the lobes ca. 0.7 mm long, stamens fertile, style branches usually not separating, pappus nearly always absent. Achenes slightly falcate, 1.6–1.8 mm long, 3-4-angled, compressed, glabrous. Known only from one population on steep cliffs below the rim of Kalalau Valley, ca. 0.5 km directly NW of Pu'uokila, Kōke'e, at ca. 1100 m, Kaua'i.

Additional specimens. U.S.A. HAWAIʻI. **Kaua'i:** upper Kalalau Valley, on exposed vertical rock faces, *Flynn & Montgomery 1869* (BISH, PTBG).

This striking species is known only from the type locality where it grows with *Lepidium serra*

←

FIG. 1. *Remya kauaiensis*, drawn from *Wagner et al. 5363* (BISH). A. Habit. B. Outer involucral bract. C. Inner involucral bract. D. Inner staminate disk corolla. E. Ray floret. Bar equals 2.5 cm in A and 1 mm in B–E.

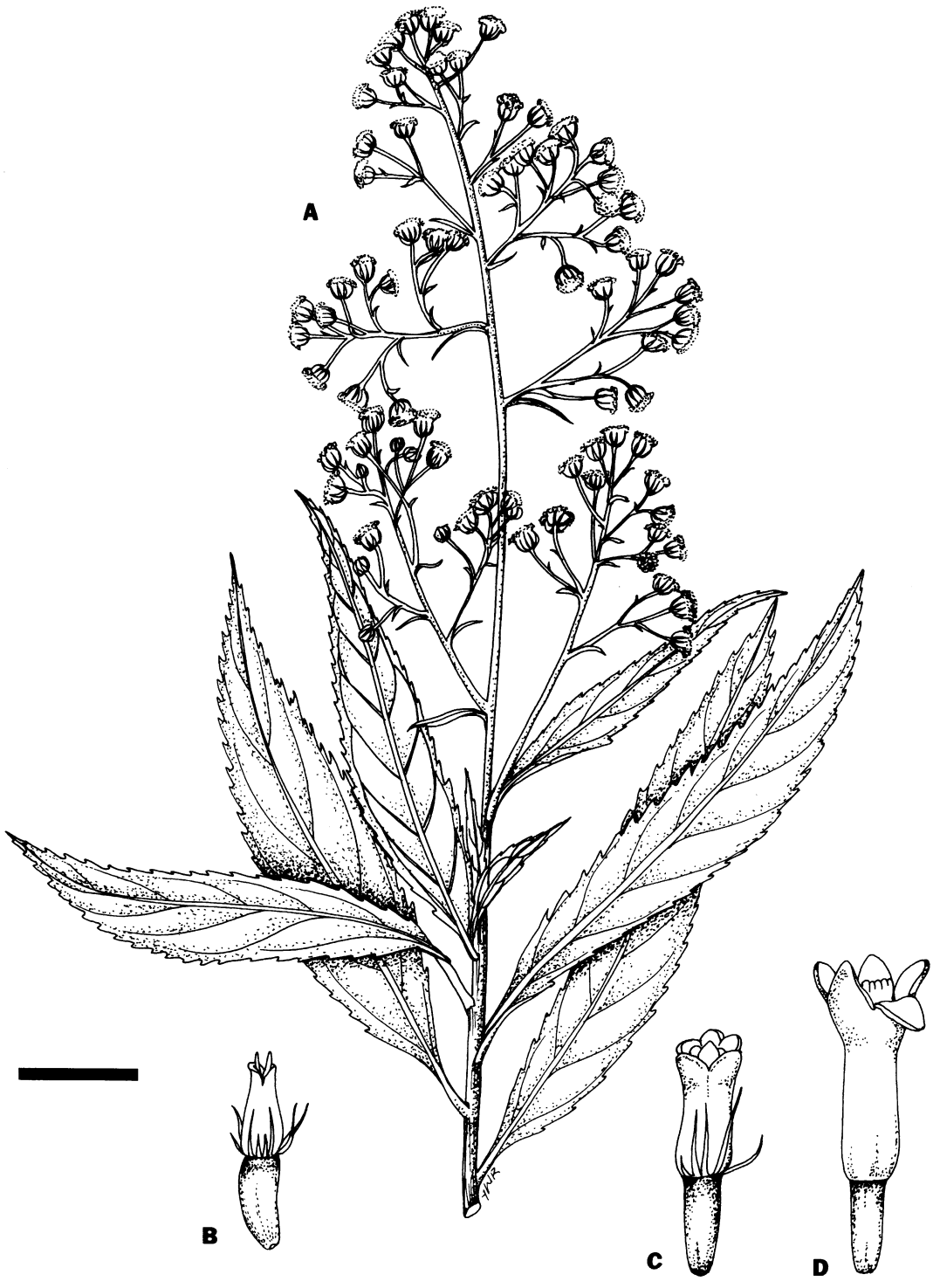


FIG. 2. *Remya montgomeryi*, drawn from holotype, *Montgomery s.n.* (BISH). A. Habit. B. Ray floret, pistillate. C. Outer disk floret (just prior to anthesis). D. Inner disk floret (just prior to anthesis). Bar equals 2 cm in A and 1 mm in B–D.

TABLE 1. Comparison of diagnostic characters in *Remya*.

Species	Habit	Leaf shape	Leaf pubescence	Peduncles	Involucre	Ray florets	Disk florets	Phyllaries	Pappus
R. kauaiensis	Stems 1–4 m long, forming loosely tangled, sprawling clumps	Lanceolate to elliptic-lanceolate or broadly ovate	Upper: arachnoid when young, becoming glabrate; lower: densely tomentose	Stout, 2–4 mm long	Subglobose, 2.5–3 mm in diameter	16–20 per head, rays 0.8–1.0 or 0.2–0.3 mm long	Two types: several outer smaller, neutral; 5–10 inner longer, male	Serrulate, with attenuate-aristate apex	4–8 unequal bristles
R. mauiensis	Stems 1–2 m long, forming loosely tangled, sprawling clumps	Narrowly elliptic	Same as *R. kauaiensis*	Stout, 0–5 mm long	Ovoid to obovoid, 2–2.5 mm in diameter	12–14 per head, rays 0.6–0.8 mm long	One type, male	Same as *R. kauaiensis*	4–9 subequal bristles
R. montgomeryi	Stems ca. 1 m long, weakly erect	Narrowly elliptic	Glabrous	Thin, 8–15 mm long	Hemispherical, 4–4.5 mm in diameter	Ca. 12 per head, rays vestigial	Two types: ca. 14 outer smaller, neutral; ca. 35 inner larger, male	± slightly lacerate, with acute to obtuse apex	Ray florets: 4–8(14) usually unequal bristles; of outer disk florets: 0–3(6) usually unequal bristles; of inner disk florets: absent

H. Mann, *Lysimachia glutinosa* Rock, *Metrosideros polymorpha* Gaudich., *Nototrichium sandwicense* (A. Gray) Hillebrand, and *Remya kauaiensis*. The plants were not uncommon on the particular cliff where the type was collected (Montgomery pers. comm.), but the exact size of the population is not known. Although the extremely rough terrain did not allow a thorough search, Flynn (pers. comm.) did not observe any intermediates between *R. kauaiensis* and *R. montgomeryi*..

Discussion

The most distinctive features of *Remya montgomeryi* include the complete absence of pubescence; long, thin peduncles; heads with a larger, hemispherical involucre; acute to obtuse phyllaries; and a comparatively large number of disk florets. The diagnostic features of all three species are compared in table 1. *Remya montgomeryi* appears to be more closely allied to *R. kauaiensis* which also has the unusual dimorphic disk florets. The outer florets in these two species are smaller and apparently neutral by virtue of having non-separating style branches and lacking stamens. The corollas are narrowly funnelform. By contrast the inner florets are larger with conspicuous campanulate corollas and fertile stamens, but they have non-separating style branches and thus are apparently nonfunctional. In *R. mauiensis*, however, the disk florets are all of the large, apparently staminate type, with campanulate corollas. The reproductive biology of each of these floret types has not yet been determined, since the plants are extremely rare, and until recently living populations were unknown. Our knowledge is based on examination of the florets of only a few individuals.

Acknowledgments. The contribution by W.L.W. to the paper was supported by a grant from the Irwin Charity Foundation to S. H. Sohmer. We appreciate assistance from Timothy Flynn in the fieldwork on Kaua'i, and Steve Montgomery for bringing this interesting new species to our attention. The Latin diagnosis was kindly provided by Harold St. John. The illustrations were drawn by Yevonn Wilson-Ramsey, to whom we are grateful. We thank Susan Mill for preparing the manuscript on the word processor and for editorial help. We also appreciate the helpful comments from Almut Jones, John Semple, Meredith Lane, and Tim Lowrey on an earlier draft.

Literature Cited

Bentham, G. 1876. Addenda et corrigenda in volumine secundo. Compositae. Pp. 1230–1238 in *Genera plantarum. . . ,* G. Bentham and J. D. Hooker. London: Lovell Reeve & Co.

Carr, G. D. 1985. Additional chromosome numbers of Hawaiian flowering plants. Pacific Sci. 39:302–306.

Fosberg, F. R. 1948. Derivation of the flora of the Hawaiian Islands. Pp. 107–119 in *Insects of Hawaii,* vol. 1. ed. E. C. Zimmerman, Honolulu: Univ. Hawaii Press.

Grau, J. 1977. Astereae—Systematic review. Pp. 539–565 in *The Biology and Chemistry of the Compositae,* vol. 1, eds. V. H. Haywood, J. B. Harborne, and B. L. Turner. London: Academic Press.

Lydgate, J. M. 1921. Reminiscences of an amateur collector. Hawaiian Almanac and Annual for 1922: 61–67.

Pai, O. J. 1964. Some chromosome numbers of cultivated plants. J. Heredity 55:186, 192.

Solbrig, O. T., L. C. Anderson, D. W. Kyhos, P. H. Raven, and L. Rüdenberg. 1964. Chromosome numbers in Compositae V. Astereae II. Amer. J. Bot. 51:513–519.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1986. Contributions to the flora of Hawai'i I. Acanthaceae to Asteraceae. Bishop Mus. Occas. Pap. 26: 102–122.