

REVISION OF THE GENUS ACANTHOSPERMUM.

By S. F. BLAKE.

INTRODUCTION.

The genus *Acanthospermum*, a member of the Melampodioid *Heliantheae*, was established by Schrank in 1819 on the single species *A. brasilum*. In the following year the same species, which had been originally published by Loeffling in 1758 as *Melampodium australe*, was again described and figured as the type of a new genus, *Centrospermum*, in the *Nova Genera et Species* of Humboldt, Bonpland, and Kunth, and in 1825 it became the type of the genus *Orcya* of Velloso; while the genus *Echinodium* of Poiteau, published as a synonym by Cassini in 1829, was likewise based on this species. In De Candolle's *Prodromus*, in 1836, four species of *Acanthospermum* were recognized, divided between two sections based on the shape of the fruits. With the exception of two new species described from the Galapagos Islands by Robinson and Greenman, no other species of the genus have been published. In the present revision three new species from South America are described, bringing the total number of valid species in the genus to eight.

All the species of *Acanthospermum* are natives of America, but with their spiny *Xanthium*-like fruits they are easily transported, and two have reached the Old World as widespread if scattered introductions. *A. hispidum*, found in South America from Colombia and Venezuela to Argentina, and native over at least a part of this region, occurs as a weed in the southern United States as far north as New Jersey, in Honduras, Nicaragua, and the Lesser Antilles, and in Sénégal, Angola, Natal, and Hawaii. Gossweiler describes it in Angola as "a peculiar colonial weed appearing on waste places frequented by native carriers." *A. australe*, likewise occurring over essentially all of South America, and certainly a native of that continent, has been collected in the Lesser Antilles, the Hawaiian Islands, and India, and is becoming frequent along railroads in the southern United States occurring sporadically as far north as Massachusetts and Oregon. The fruits of this species, thickly covered with hooked prickles,

easily become entangled in the wool of sheep and are said to cause financial loss in the Southern States in this way, by lowering the quality of the wool. A third species, *A. humile*, originally described from Santo Domingo, is known as a presumptive native from the islands of the Greater Antilles, with the exception of Porto Rico, and occurs also in Panama and in Florida. In Florida it is of recent collection, and is certainly a weed of comparatively recent introduction. The first record for the species in Panama ¹ was from waste places, and subsequent collections are from similar situations, so that there can be little doubt that the plant is an introduction in that region also.

The five other species of the genus are each known from only one or at most two collections of specimens, all of which were with little doubt indigenous where found. The two most distinct of these come from Paraguay and the Galápagos Islands, respectively. Of the three other species, forming a very closely interrelated group, two are from Ecuador and one is from the Galápagos Islands, the latter not at all closely allied to the single other species of the islands.

SYSTEMATIC TREATMENT.

ACANTHOSPERMUM Schrank.

Acanthospermum Schrank, Pl. Rar. Hort. Monac. pl. 53. 1819.

Centrospermum H. B. K. Nov. Gen. & Sp. 4: 270. pl. 397. 1820.

Orcya Vell. Fl. Flum. 344. 1825; Fl. Flum. Icon. 8: pl. 83. 1827.

Echinodium Poit.; Cass. Dict. Sci. Nat. 59: 235. 1829, as synonym.

Pubescent dichotomous annuals, with opposite, subentire to pinnatifid leaves and small, sessile or short-peduncled heads solitary in the axils and forks of the stem; heads heterogamous, radiate, the ray flowers 5 to 8, 1-seriate, fertile, those of the disk 5 to 30, sterile; proper involucre of 4 to 6 elliptic to ovate, herbaceous, 1-seriate phyllaries; inner phyllaries of the same number as the ray achenes and closely enveloping them, enlarged in fruit; receptacle small, convex, the pales membranous, concave, subtending the disk flowers, more or less persistent; ray corollas ligulate, small or medium, elliptic to ovate, emarginate or tridenticulate, the tube as long as or much shorter than the limb, pale yellow; disk corollas yellowish, with short cylindrical tube, cylindrical-funnelform or campanulate throat, and 5-lobed limb; anthers barely cordate to cordate-sagittate at base, the appendage ovate, obtuse, somewhat inflexed; style of ♂ flowers clavate, obtuse, undivided, hispidulous; fruit (achenes of the ray with their closely enveloping indurate phyllaries) cuneate or oblong-fusiform, rarely trigonous-turbinate, weakly or strongly laterally compressed, more or less densely echinate on the whole surface, the angles, or rarely only at apex, with straightish or usually uncinuate prickles, those at the apex of fruit usually elongate; pappus none.

Type species, *A. brasilum* Schrank, which is *A. australe* (Loefl.) Kuntze.

¹ Steetz; Seem. Bot. Voy. Herald 155. 1854.

KEY TO SPECIES.

Leaves pinnatifid; fruit trigonous-turbinate, with 4 or 5 spines at summit, smooth on sides; ligules 7.5 mm. long. Section LECOCARPOPSIS Blake.

1. *A. lecocarpoides*.

Leaves lyrate-repand-dentate to subentire; fruit spiny at least on the angles, as well as at apex; ligules 1 to 1.5 mm. long.

Fruit strongly compressed, cuneate in outline, obscurely ribbed, the two terminal prickles largest; heads usually sessile. Section CERATOCHLAENA DC.

Terminal prickles slender-subulate, terete or very slightly flattened, about as long as the body of the fruit.

Leaves with ovate or oval blade, abruptly contracted into a distinctly petiolar winged base..... 2. *A. humile*.

Leaves oval or obovate, gradually narrowed to the base.... 3. *A. hispidum*.

Terminal prickles lanceolate or lanceolate-subulate, more or less flattened, much shorter than the body of the fruit.

Body of fruit (excluding the terminal prickles) 3.5 to 3.8 mm. long. 4. *A. donii*.

Body of fruit 4 to 5 mm. long.

Body of fruit 5 mm. long..... 5. *A. simile*.

Body of fruit 4 to 4.5 mm. long..... 6. *A. microcarpum*.

Fruit oblong-fusiform or oblong-obovate in outline, slightly compressed, strongly ribbed; heads (at least those in the forks) peduncled. Section XANTHOIDES DC.

Fruit sharply 2-beaked..... 7. *A. consobrinum*.

Fruit obtuse, with open orifice at apex..... 8. *A. australe*.

1. *Acanthospermum lecocarpoides* Robins. & Greenm. Amer. Journ. Sci. III. 50: 141. 1895. PLATE 23, a.

Erect, sparsely branched, 28 cm. high; stem fuscous, densely stipitate-glandular and hispid with short several-celled spreading hairs, subglabrate below; leaf blades 4.5 to 9 cm. long, 2.2 to 4.5 cm. wide, ovate in outline, divided to middle or deeper into 6 to 8 pairs of ovate to obovate lobes, these lacinate above the middle or pinnatifid nearly to base with somewhat revolute divisions, densely hispidulous-glandular above, beneath equally green, hispidulous along the nerves and glandular elsewhere, pinnate-veined, narrowed at base into the petiole; petioles margined above, glandular-hispidulous, 1.5 to 2.5 cm. long; heads solitary in the forks of the stem, 1.8 to 2.5 cm. wide; peduncles densely glandular-hispidulous, 2.3 to 4.5 cm. long; phyllaries 4, ovate, acute, hispidulous on both sides with glandular-tuberculate hairs and glandular, crenate-serrate, united at base, 9 to 10 mm. long; ray flowers about 6; rays ligulate, yellowish, oblong-elliptic, tridenticulate, about 9-nerved, stipitate-glandular dorsally, merely closed in a ring at base without proper tube, 7.5 mm. long, 2.2 mm. wide; disk corollas about 30, glandular, the tube cylindric, 1.5 mm. long, the throat campanulate, scarcely broader, 0.7 mm. long, the 5 teeth erect, lanceolate, subacuminate, 1 mm. long; stamens strongly sagittate at base; pales slender, acuminate, densely stipitate-glandular, 4 mm. long; fruit trigonous-turbinate, somewhat gibbous above the middle, densely stipitate-glandular and hispidulous with several-celled glandular-based hairs, the body 5 to 5.5 mm. high, 4.5 to 5 mm. wide, bearing around the rounded apex 4 or 5 slender-subulate, wide-spreading, straight or somewhat curved horns 3 to 7 mm. long, the two on the inner angles always present, that on the outer angle sometimes obsolete.

TYPE LOCALITY: Hood Island, Galápagos Islands.

SPECIMENS EXAMINED:

GALÁPAGOS ISLANDS: Hood Island, July, 1891, *Baur* 128 (type, G²); May, 1899, *Snodgrass & Heller* 744 (G).

² The following abbreviations are used to indicate the herbaria in which specimens are deposited: B, British Museum; Ber., Royal Herbarium, Berlin; G, Gray Herbarium; K, Kew Herbarium; N, U. S. National Herbarium; Prod., Prodromus Herbarium.

This very distinct species closely simulates the monotypic genus *Lecocarpus*, also endemic in the Galápagos Islands (on Chatham and Charles islands), but is at once distinguishable by the lack of the broad spreading circular border which terminates the fruiting phyllaries in that genus. *A. lecocarpoides* has been recorded by Stewart³ from Sappho Cove on Chatham Island.

2. *Acanthospermum humile* (Swartz) DC. Prodr. 5: 522. 1836. PLATE 23, b.

Melampodium humile Swartz, Prodr. Veg. Ind. Occ. 114. 1788.

Centrospermum humile Less. Syn. Gen. Compos. 217. 1832.

Acanthospermum humile α *normale* Kuntze, Rev. Gen. Pl. 1: 303. 1891.

Much branched, erect or decumbent, 30 cm. long or more; stem fuscous, densely puberulous and hispid-pilose with many-celled spreading hairs; leaf blades 1 to 2.8 cm. long, 1 to 3.3 cm. wide, ovate or deltoid-ovate, obtuse or acutish, abruptly narrowed into a margined petioliform base, irregularly crenate-dentate or repand-serrate, gland-dotted and hispid-pilose particularly along the veins on both sides, slightly paler beneath, the irregularly serrulate, lobulate, or entire, petioliform, margined base 4 to 18 mm. long; heads solitary in the axils and forks of the stem, sessile or on peduncles 3 mm. long or less, 3.5 to 4 mm. wide in anthesis, 12 to 15 mm. in fruit; outer phyllaries 5, oval, acutish, 3-nerved, hispid-pilose chiefly on margin, 2.5 mm. long, 1 mm. wide; ray flowers 5 to 7, their corollas erect, pale yellowish, oval, emarginate, hispid-pilose, 1.3 mm. long, about equaled by the style, with very short tube; disk corollas 5, stipitate-glandular and sparsely hispid-pilose, 1.4 mm. long; pales emarginate, lacerate at apex, 1.3 mm. long; fruit cuneate, compressed-trigonous, gland-dotted and more or less pilosulous, uncinately prickly on the angles and the apical margin, the sides unarmed or with a few sparse prickles, the body 3 mm. long, the two large terminal prickles (one usually straight, one uncinately) 2 to 3 mm. long.

TYPE LOCALITY: "Jamaica, Domingo."

SPECIMENS EXAMINED:

FLORIDA: Ballast wharf, Pensacola, August, *Curtiss* 1491* (N).

CUBA: Weed, Laguna Jovero and vicinity, 1911, *Shafer* 10968 (N), 10985 (N). Open places in thicket, valley of Río Bacuranao, Havana, 1912, *Wilson & León* 11605 (N). Vicinity of Vento, Havana, 1904, *Wilson* 1328 (N). Roadside near La Gloria, Camaguey, 1909, *Shafer* 321 (N). Maisi to Sabana, Oriente, 1910, *Shafer* 7936 (N). Without definite locality, *Wright* 311 (N). Nueva Gerona, Isle of Pines, 1904, *Curtiss* 361 (N).

JAMAICA: Green Valley, altitude 610 meters, 1895, *Harris* 5733 (B). Sand near beach, Long Acre Point, west of Black River, 1907, *Harris* 9964 (B, N). Without definite locality, *Dr. Wm. Wright* (B).

SANTO DOMINGO: Paradis, Province of Barahona, 1909, *Türckheim* 2709 (N); in 1911, *Fuertes* 1100 (N). Without definite locality, *Swartz* (B).

PANAMA: Boca Chica de Horconitos, Chiriquí, 1911, *Pittier* 5123 (N). Chagres, 1850, *Fendler* 171 (N). Along beach between Fató and Playa de Damas, Province of Colón, 1911, *Pittier* 3833 (N). Waste places about Panama, July, 1862, *Hayes* (B). Without definite locality, *Hayes* 198 (B); *Seemann* 296 (B).

CULTIVATED: Kew Gardens, 1784 (B).

Swartz,⁴ in his amplified description of this species, remarks: "Planta agricolis odiosa; et semina pullis Gallinarum et Meleagridum obnoxia."

3. *Acanthospermum hispidum* DC. Prodr. 5: 522. 1836.

PLATE 23, c.

Acanthospermum humile β *hispidum* Kuntze, Rev. Gen. Pl. 1: 303. 1891.

Erect, 20 to 55 cm. high, dichotomous; stem stout, striatulate, hispid-pilose with spreading many-celled hairs, sordid-puberulous between them; leaf blades 2 to 12.5 cm. long, 0.8 to 8 cm. wide (including the cuneate base), elliptic to ovate or

³ Proc. Calif. Acad. IV. 1: 148. 1911.

⁴ Fl. Ind. Occ. 3: 1371. 1806.

deltoid-ovate, acute to obtuse, mucronulate, gradually cuneate below the middle into a sessile base (those of the pairs united), serrulate or doubly repand-serrate to subentire, rather sparsely hispid-pilose on both sides, gland-dotted and slightly paler green beneath; heads solitary in the axils and forks of the stem, in anthesis 4 to 5 mm. wide, in fruit 13 to 18 mm.; peduncles 3 to 15 mm. long; outer phyllaries 5, ovate or narrowly elliptic-ovate, acutish, hispid-pilose mainly on the margin, 3.5 to 4 mm. long; ray flowers 5 to 8, their corollas pale yellow, elliptic, tridenticulate at the slightly spreading apex, sparsely hispid-pilose, half longer than the style, 1.5 mm. long; disk corollas about 7, shortly hispid-pilose, 1.7 mm. long; pales stipitate-glandular on back, lacerate-ciliate at the subtruncate apex, 2 mm. long; fruit cuneate, strongly compressed, gland-dotted, rather densely uncinat-hispid all over the body, 4 to 5 mm. long, the two terminal straightish or curved, strongly divergent prickles 3 to 4 mm. long; sterile ovaries stipitate-glandular.

TYPE LOCALITY: "In Brasiliae sabulosis maritimis circa Bahiam." Type collected by Salzmann.

ILLUSTRATIONS: Engl. & Prantl, *Pflanzenfam.* 4⁵: f. 108, M; Proc. Amer. Acad. 38: pl. 1, f. 4.

SPECIMENS EXAMINED:

- NEW JERSEY: Ballast grounds, Camden, 1879, *Martindale* (N).
 GEORGIA: Waste places and roadsides, Darien, 1903, *Harper* 1999 (N).
 FLORIDA: Ballast ground, Pensacola, 1880, *Mohr* (N); in 1899, *Curtiss* 6501 (N).
 ALABAMA: Ballast ground, Mobile, 1893, *Mohr* (N).
 SALVADOR: Without definite locality, *Velasco* (J. D. Smith, no. 8884; N); *Renson* 183 (N).
 HONDURAS: San Pedro Sula, Santa Bárbara, altitude 200 meters, 1889, *Thièrme* (J. D. Smith, no. 5296; N).
 NICARAGUA: Roadsides, Grenada, 1869, *Lévy* 228 (K).
 CULEBRITA: Waste places, Culebrita, 1906, *Britton & Wheeler* 280 (N).
 ST. THOMAS: In 1880, *Eggers* 3 (K).
 ST. JOHN: Roadside, Bethania to Rosenberg, 1913, *Britton & Shafer* 252 (N).
 TORTOLA: Rocky hill, Road Town to Sea Cow Bay, 1913, *Britton & Shafer* 672 (N).
 VIRGIN GORDA: Roadside near Valley, 1913, *Britton & Fishlock* 1099 (N).
 ST. CROIX: Bassin pasture, 1895, *Ricksecker* 20 (N).
 MONTSERRAT: Richmond, 1907, *Shafer* 127 (N).
 GUADELOUPE: Lowlands, Galisbi, 1904, *Duss* 4203 (N).
 TOBAGO: Roadside, Bethesda, 1909, *Broadway* 3141 (B).
 COLOMBIA: Anapoima, Magdalena, altitude 500 meters, *Triana* 1332 (B, K).
 El Overo, Cauca, 1853, *Holton* 358 (K). Without definite locality, *Linden* 1378 (B, K).
 VENEZUELA: Weed, near Caracas, *Ernst* (Moritz, no. 1500; B). *Tovar*, 1856-57, *Fendler* 1969 (K).
 PERU: Lima, *Cuming* 987 (K). Callao, *Wilkes Expedition* (G, N).
 BOLIVIA: Bolivian Plateau, 1891, *Bang* 1137 (N). Guanai to Tipuani, 1892, *Bang* 1445 (N). Province of Larecaja, *Mandon* 31 (B, K, G). Dry sunny field, Tarija, 1902, *R. E. Fries* 1056 (N). Corral, Velasco, altitude 200 meters, 1892, *Kuntze* (N). Open grassy pampas, Carrapari, May, 1864, *Pearce* (B).
 BRAZIL: Waste ground in village, Fernando do Noronha, 1887, *Ridley, Lea & Ramage* 105 (B, K). Pernambuco, 1887, *Ridley, Lea & Ramage* (B). Maçino, Province of Alagoas, 1838, *Gardner* 1345 (B, K). Oeiras, Province of Piauh, 1839, *Gardner* (B). Province of Bahia, *Salzmann* 21 (K); *Gardner* 869 (B); *Glocker* (B, K). Arrayas, Province of Goyaz, 1840, *Gardner* 3842 (B, K.), Cuyacá, Province of Matto Grosso, 1893, *Malme* 1266 (B). Province of

Minas Geraes, *Claussen* (B). Piracicaba, Province of Sao Paulo, 1894, *Campos Novas* (N). Without definite locality, *Sello* (K); *Martius* 645 (K); *Gardner* 2211 (B).

PARAGUAY: L'Assomption, 1874, *Balansa* 874 (K). Central Paraguay, 1888-90, *Morong* 162 (N). Cordillera de Altos, 1903, *Fiebrig* 1000 (G, K). San Bernardino, *Hassler* 3895 (G).

ARGENTINA: Tucumán, *Lorentz & Hieronymus* 90 (K). Córdoba, 1878, *Hieronymus* (B, K). Estancia Germania near Córdoba, 1874, *Lorentz* 37 (B). Buenos Aires, *Tweedie* 739 (K). Province of Catamarca, 1915, *Jørgensen* 1093 (G).

SÉNÉGAL: In 1906, *Farmar* 16 (K).

ANGOLA: "A peculiar colonial weed, appearing on waste places frequented by native carriers," N'Dalatando Cazengo, 1912, *Gossweiler* 5541 (B).

NATAL: Durban, 1910, *Franks* (Wood, no. 11676) (K).

HAWAIIAN ISLANDS: Hawaii, 1851-55, *Rémy* 256 (G).

From its only near relative, *A. humile*, this much more widely distributed species is easily distinguished by its cuneate-based, not distinctly petioled leaves, and by its fruits, which are rather densely uncinatate on the sides as well as on the angles. Its local name in Matto Grosso is given by Malme as "carapicho." In Ceará it is known as "retirante," and an infusion of the root is used as a remedy for coughs and bronchitis.⁵

4. *Acanthospermum donii* Blake, sp. nov.

PLATE 23, d.

Herbaceous, branching, 30 cm. high and more, the base not seen; stem compressed, striatulate, whitish, pilose with spreading whitish hairs and puberulous between them with closely appressed hairs, glabrate below; leaf blades 3.5 to 8 cm. long, 1.5 to 4 cm. wide, rhombic-oval or broadly obovate, obtuse, gradually narrowed into a cuneate base, subsessile, repand-dentate (the teeth about 9 to 15 pairs, depressed, scarcely mucronulate), triplinerved above the base, green on both sides and rather sparsely pilose, the hairs longer along the veins; heads solitary in the axils and the forks of the stem, subsessile or on very short (1.5 mm. long) peduncles, in anthesis 6 to 8 mm., in fruit 9 to 11 mm. thick; outer phyllaries 4 or 5, oblong or obovate, obtuse, herbaceous, pilose-ciliate, united at extreme base, 3-nerved, 3.5 to 4.5 mm. long, 1 to 2.3 mm. wide; ray corollas about 8, yellow, oval, emarginate, 1 mm. long; disk corollas about 14, pale yellow, sparsely pilose and glandular, 1.8 mm. long (tube 0.6 mm.), the throat obscure, the teeth ovate; fruit cuneate, strongly compressed, 4 mm. high, 1 mm. wide at base, 3.5 to 4 mm. wide across the spines at apex, the body (exclusive of the terminal spines) 3.5 to 3.8 mm. long, whitish, with a short conic-subulate compressed spine on the inner angle and a longer one on the outer, 1-ridged on inner face, with sparse subulate uncinatate-tipped aculei on the sides and back.

Type in the British Museum, from the herbarium of Ruiz and Pavón, collected in Ecuador (?). Fragments of type in Gray Herbarium.

The type specimens in the British Museum, labeled as of Mexico but certainly from South America and probably from Ecuador, were marked by David Don many years ago as a new species of *Melampodium*, under a name which would be in no way distinctive in *Acanthospermum*.

5. *Acanthospermum simile* Blake, sp. nov.

PLATE 23, e.

Subsimple or dichotomous annual, at length 1 meter long; stem subcompressed, striate, whitish, rather densely pilose with loosely spreading, many-celled hairs, and between them closely appressed-pilosulous; leaf blades 3.5 to 7.7 cm. long, 3 to 3.8 cm. wide, rhombic-ovate or rhombic-oval, obtuse, gradually narrowed below the

⁵ Dias da Rocha, Bot. Med. Cear. 98. 1919.

middle into a margined petioliform base, sessile, obscurely repand, triplinerved above the base, green on both sides and rather sparsely pilose, the hairs longer and spreading along the veins, elsewhere more or less appressed; heads solitary in the axils and forks of the stem, sessile, 10 to 11 mm. thick in fruit; outer phyllaries 5, oblong or oblong-oval, rounded at apex, herbaceous, pilose-ciliate and on back sparsely pilose, 4.5 to 5 mm. long, 1.5 to 2 mm. wide; ray corollas about 10, yellow, oval, emarginate, 1 mm. long; disk corollas about 13, yellowish, sparsely pilose and glandular; fruit cuneate, compressed, flattened and 1-ridged on inner angle, 5.5 mm. long, 1 mm. wide at base, 4.8 mm. wide across the tips of the spines, the body (exclusive of the terminal spines) 5 mm. long, dull or greenish white, gland-dotted, with a short lanceolate compressed spine on the inner angle at apex and a longer lanceolate-subulate one on the outer, bearing about 2 stout aculei on the dorsal angle, on margin of inner angle, and at apex, the sides bearing 2 to 4 weak prickles.

Type in the British Museum, collected on savannas near the River Daule, near Guayaquil, Ecuador, by R. Spruce (no. 6307). Fragments of type in the Gray Herbarium.

Closely related to the last preceding species, which probably comes from essentially the same region, but distinguished by its larger fruit. The type collection was distributed as *Acanthospermum xanthioides* DC. (*A. australe*), an unrelated species. Two of the fruits are sometimes connate into one.

6. *Acanthospermum microcarpum* Robinson, Proc. Amer. Acad. 38: 208. *pl. 1, f. 3.* 1902. PLATE 23, f.

Erect, branching, 30 cm. high; stem stoutish, rather densely hirsute-pilose with several-celled wide-spreading hairs, in age glabrate; leaf blades 2.6 to 4.3 cm. long, 1 to 1.8 cm. wide, rhombic or rhombic-ovate, obtuse, abruptly or gradually contracted below the middle into a cuneate sessile base, crenate-serrate above the base, 3-nerved, rather sparsely hirsute-pilose on both sides with several-celled ascending hairs, gland-dotted beneath; heads sessile or subsessile in the forks of the stem and in the axils, 9 mm. wide in fruit; phyllaries 4 to 6, elliptic or oblong-elliptic, obtuse or acutish, hispid-pilose-ciliate and sparsely hispid-pilose on back, 3.5 to 4.5 mm. long; ray corollas 8, yellowish white, quadrate-oval, tridentate, glandular on back, 1 mm. long; disk corollas 8, 1.2 to 1.5 mm. long, the slender tube and short-campanulate throat 0.5 to 0.7 mm. long, sparsely hispid-pilose with several-celled hairs and gland-dotted, the 5 teeth ovate, acutish, spreading, sparsely hispid and gland-dotted; anthers cordate-sagittate at base; united style branches of ♂ flowers clavate, obtuse, hispidulous above; pales obovate, concave, lacerate at the obtuse apex; fruit trigonous-cuneate, compressed, 4.8 to 5.5 mm. high, 4 to 4.3 mm. wide across the tips of the spines, the body (exclusive of the terminal spines) 4 to 4.5 mm. long, with 2 lance-subulate, slightly compressed, straight or slightly curved spines at apex, gland-dotted, about 3-nerved on the sides, bearing mostly above middle on back and on sides toward apex a few subulate, straightish or slightly uncinat aculei.

TYPE LOCALITY: Charles Island, Galápagos Islands.

SPECIMEN EXAMINED:

GALÁPAGOS ISLANDS: Charles Island, May, 1899, *Snodgrass & Heller 446* (type; G).

Acanthospermum microcarpum is intermediate between *A. donii* and *A. simile*, both of Ecuador, but is distinguished by the size of its fruit.

7. *Acanthospermum consobrinum* Blake, sp. nov. PLATE 23, g.

Branched procumbent "annual," 30 cm. long and more, the base not seen; stem subterete, striate, whitish, glandular-puberulous and pilose with loosely spreading shining many-celled hairs; leaf blades 1.7 to 2.5 cm. long, 6 to 12 mm. wide, obovate or rhombic-obovate, obtuse, cuneate into a sessile base, dentate above the middle (teeth 2 to 4 pairs, triangular, more or less depressed), triplinerved above the base, green on both sides and sparsely pilose with more or less appressed hairs, those along

the midrib longer and spreading; heads solitary in the axils and the forks of the stem, in anthesis 7 mm., in fruit about 1.8 cm. thick; peduncles curved, 3 to 4 mm. long; phyllaries 4 or 5, ovate to oblong-ovate, obtusish, herbaceous, 3-nerved, pilose-ciliate, 4 to 5 mm. long, 1.8 to 2.5 mm. wide; ray corollas about 7, yellowish, oblong-oval, tridenticulate, sparsely glandular, 1 mm. long; disk corollas about 7, yellowish, glandular and pilose on the tube (1 mm. long), sparsely glandular on the teeth, 2.5 mm. long; fruit obovoid-fusiform, distinctly compressed, 9.5 to 10 mm. long, whitish, gland-dotted, 2-beaked at apex, the outer beak curved, slender-subulate, the inner longer and straight, grooved on its inner face, the body acute at base, 3 to 3.3 mm. wide above the middle, about 8-ridged, the ridges bearing firm glochidiate-tipped aculei, those on the margins of the outer angle the longest (3 to 3.5 mm. long).

Type in the British Museum, collected in waste lands, L'Assomption, Paraguay, April 6, 1874, by Balansa (no. 874a). Fragments of type in the Gray Herbarium.

This species is at once recognizable by its fruit, which is to a slight degree intermediate between that of *A. australe* and that of the section *Ceratochlaena*.

8. *Acanthospermum australe* (Loefl.) Kuntze, Rev. Gen. Pl. 1: 303. 1891.

PLATE 23, h-m.

Melampodium australe Loefl. Iter Hisp. 268. 1758.

Acanthospermum brasiliense Schrank, Pl. Rar. Hort. Monac. pl. 53. 1819.

Centrospermum xanthioides H. B. K. Nov. Gen. & Sp. 4: 271. pl. 397. 1820.

Orcya adhaerescens Vell. Fl. Flum. 345. 1825; Fl. Flum. Icon. 8: pl. 83. 1827.

Echinodium prostratum Poit.; Cass. Dict. Sci. Nat. 59: 245. 1829, as synonym.

Acanthospermum xanthioides DC. Prodr. 5: 521. 1836.

Acanthospermum xanthioides α *obtusifolium* DC. Prodr. 5: 522. 1836.

Acanthospermum xanthioides β *acutifolium* DC. Prodr. 5: 522. 1836.

Acanthospermum xanthioides γ *glabratum* DC. Prodr. 5: 522. 1836.

Acanthospermum hirsutum DC. Prodr. 5: 522. 1836.

Procumbent or creeping, 60 cm. long or more; stem compressed, whitish, short-pilose with oblique many-celled hairs; leaf blades 1.3 to 3.7 cm. long, 0.7 to 3.2 cm. wide, rhombic-ovate or triangular, acute to obtuse, cuneate into the narrowly margined petiole, triplinerved, irregularly dentate-serrate above the cuneate entire base with callous-tipped teeth, sparsely appressed-pilosulous, dotted with impressed glands, particularly beneath; petioles 3 to 15 mm. long; heads solitary in the axils and at apices of stem and branches, in anthesis 6 to 7 mm., in fruit 1.5 to 2 cm. wide; peduncles sordidly hispid-pilose, 1.5 cm. long or less; outer phyllaries 5, oval or elliptic, obtusish, herbaceous, 3-nerved, ciliate and on back sparsely pilose, 3 to 4 mm. long; ray corollas 5 to 8, yellowish, densely stipitate-glandular, 1 mm. long, the erect limb 3-toothed; disk corollas about 12, yellowish, pilose below, glandular above, 2.5 mm. long (tube 1 mm., teeth 0.8 mm. long); pales scarious, glandular and ciliate, fimbriate-ciliate at the deeply emarginate apex, 2.5 mm. long; fruit obliquely ellipsoid-fusiform, slightly compressed, 5 to 7-ribbed, with open orifice at the obtuse apex, 7 to 8.5 mm. long, densely glandular, the ribs bearing 1 or 2 rows of ascending uncinat pricks 1 to 2 mm. long.

TYPE LOCALITY: Vicinity of Barcelona, Venezuela. Type collected by Loefling, February 15, 1755.

ILLUSTRATIONS: Schrank, Pl. Rar. Hort. Monac. pl. 53; H. B. K. Nov. Gen. & Sp. 4: pl. 397; Lam. Tabl. Encycl. pl. 988; Vell. Fl. Flum. Icon. 8: pl. 83; Britt. & Brown, Illustr. Fl. ed. 2. 3: f. 4420.

SPECIMENS EXAMINED:

MASSACHUSETTS: Lawrence, 1906, *Mrs. E. Schneider* (G).

VIRGINIA: Well established near Alexandria, 1912, *Summers* (N).

NORTH CAROLINA: Raleigh, 1880, *Hyams* (N). W. & W. Railroad near Goldsboro, 1890, *Coville* 48 (N). Streets of Wilmington, 1879, *Hyams* (N).

SOUTH CAROLINA: Streets, Blufftown, *Mellichamp* (B).

- GEORGIA: Along railroad near Rocky Face, Whitfield County, 1900, *Harper* 290 (N). Stone Mountain, 1893, *Small* (N); in 1897, *Eggert* (N); in 1900, *Pollard & Maxon* 471 (N). Abundant in sandy soil along railway, Godwinsville, 1901, *Dewey* 545 (N).
- FLORIDA: Jacksonville, *Curtiss* 1491, 4476, 5515 (N); in 1899, *Pieters* 22 (N). Gainesville, 1876, *Garber* (N). Along railroad, Eustis, 1894, *Nash* 724 (N). Clarcona, Orange County, 1899, *Meislahn* 128 (N). Dunedin, 1900, *Tracy* 6918 (N). Cedar Keys, 1874, *Palmer* 273 (N). Common along Chattahoochee River, 1897, *Bush* 18 (N). Apalachicola, 1890, *Biltmore Herbarium* 107a (N).
- ALABAMA: Tuscaloosa, *Mohr* (N). Waste places in sandy soil, Ozark, 1880, *Mohr* (N). Grandbay, Mobile County, 1879, *Mohr* (N).
- TENNESSEE: Along railroad, Tellico Junction, 1894, *Bain* (N).
- MISSISSIPPI: Scranton, 1898, *Tracy* 4837 (N).
- LOUISIANA: Port Eads, 1900, *Tracy & Lloyd* 517 (N).
- OREGON: Ballast, Linton, 1916, *J. C. Nelson* 975 (G).
- MARTINIQUE: *Sieber* 204 (G; distributed as *Siegesbeckia flosculosa*); in 1868, *Hahn* 409 (B; distributed as *Siegesbeckia flosculosa*).
- ST. VINCENT: *Alex. Anderson* (B).
- GRENADA: *Thomson* (B).
- COLOMBIA: Villarica, altitude 450 meters, *Triana* 1333 (B). Upata, *Otto* 1018 (G).
- VENEZUELA: Caracas, *Moritz* 206, 691 (B). Road from Caracas to La Guayra, altitude 1,100 to 1,700 meters, 1913, *Pittier* 5874 (N). Cerro del Gelipán, altitude 1,370 meters, 1891, *Eggers* 13233 (N).
- BRITISH GUIANA: 1838-39, *Schomburgk* 663 (B, N); in 1841, *Schomburgk* "195 (144)" (B, N).
- FRENCH GUIANA: Karouany, 1857, *Sagot* 349 (B). Without definite locality, *Poiteau* (B).
- BOLIVIA: Yungas, 1890, *Bang* 324 (N). Cochabamba, 1891, *Bang* 884 (N). Maipiri, altitude 1,525 meters, 1886, *Rusby* 1348 (N). Coroico, 1866, *Pearce* (B).
- BRAZIL: Near Para, 1850-51, *Spruce* (B). District of the Rio Plata, Province of Pernambuco, 1839, *Gardner* 2902 (B), 2903 (K). Province of Bahia, *Salzmann* 38 (K); *Sello* 583 (K); in 1817, *Lockhart* (B); in 1842, *Glocker* 33 bis (B). Chapada, Province of Goyaz, 1840, *Gardner* 3297 (B). Santa Cruz, Province of Matto Grosso, 1891-92, *S. L. Moore* 761 (B). Province of Rio de Janeiro, *Gaudichaud* (K); *MacGillivray* 317 (K); *Glaziou* 13999 (K); *Miers* 3019 (K); *Gardner* 57 (K); *Wilkes Expedition* (N). Porto Alegre, Province of Rio Grande do Sul, 1892, *Malme* 276 (B).
- PARAGUAY: On termite hills of yellow loam, between Río Apa and Río Aquidaban, Villa Sana, 1908-09, *Fiebrig* 5204 (B). Cerro de Tobati, *Fiebrig* 744 (K). Cordillera Central, 1897, *Hassler* 3882 (B); in 1900, *Hassler* 7045 (B). South Paraguay, 1892, *Kuntze* (N).
- URUGUAY: Concepción, 1877, *Lorentz* 951 (B).
- HAWAIIAN ISLANDS: Diamond Head, Oahu, 1895, *Heller* 2030 (B, N).
- INDIA: Singapore, 1861, *T. Anderson* 52 (B). Ang Mo Ko, Singapore, 1891, *Ridley* 2740 (B).

This species, which is commonly known as "Paraguay bur" or "sheep bur," has spread throughout most of the Southern States, especially along railroads, and occurs sporadically on waste heaps and ballast as far north as Massachusetts and Oregon. An account of the plant by J. P. Berckmans, which appeared in the Bulletin of the

Torrey Botanical Club many years ago,⁶ contains the earliest record available of the presence of the Paraguay bur in the United States and is of sufficient interest to be reproduced here.

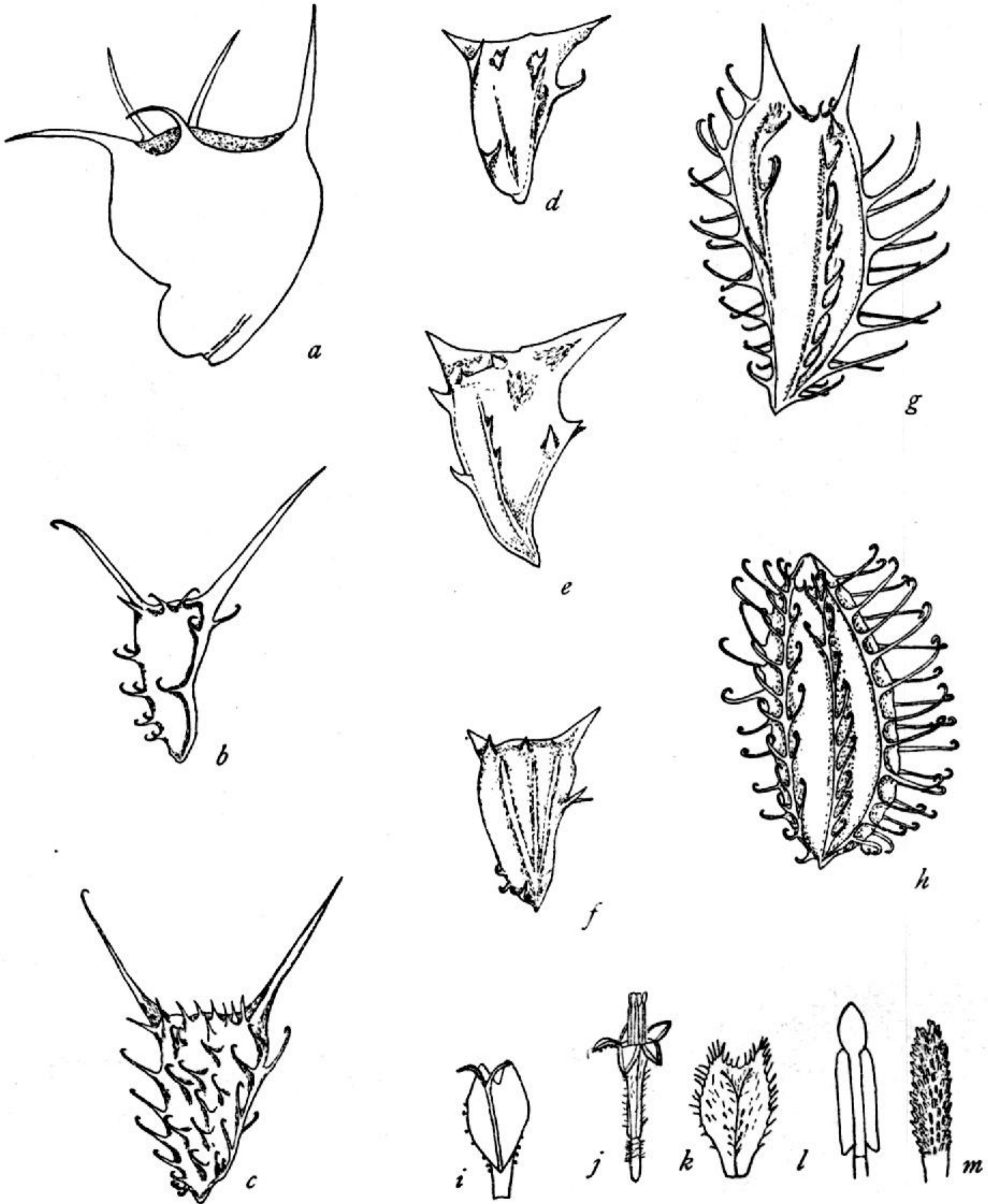
"ACANTHOSPERMUM XANTHOIDES.—About the year 1851 the then existing factory of Belleville, a few miles from Augusta [Georgia], received a quantity of wool imported from Buenos Aires. This wool was found to contain great numbers of small burs, which were separated by the picking machine, and the 'trash' was thrown outside of the picker room. The following year there sprang up innumerable plants of a spreading habit, which covered the ground all around the factory, and in a very few years the surrounding country was filled with the plant. The hooks upon the involucre allow the heads, or burs, to attach themselves to the legs of cattle, and in this way the seeds are carried about and widely scattered.

"I first saw the plant in 1857, when it made its appearance on my place simultaneously with *Lespedeza striata*, and I attribute its introduction here to the servants, who formerly had frequent intercourse with those at the Belleville factory. I have seen the plant in numerous places along the South Carolina Railroad, and there is scarcely a roadside within many miles of Augusta, if the soil is sandy, that is free from this plant. While it seems to prefer sandy localities, it will grow quite as luxuriantly on clay soils. Mr. Ravenel gave me its name many years ago."

The vernacular name of this species in Brazil is given by Baker as "carrapicho" or "carapixo."

EXPLANATION OF PLATE 23.—*a*, fruit of *Acanthospermum lecocarpoides*, Baur 128, scale 4.5; *b*, fruit of *A. humile*, Pittier 5123, scale 4.5; *c*, fruit of *A. hispidum*, Britton & Fishlock 1099, scale 4.5; *d*, fruit of *A. donii*, Ruiz & Pavón, scale 4.5; *e*, fruit of *A. simile*, Spruce 6307, scale 4.5; *f*, fruit of *A. microcarpum*, Snodgrass & Heller 446, scale 4.5; *g*, fruit of *A. consobrinum*, Balansa 874a, scale 4.5; *h*, fruit of *A. australe*, Bang 884, scale 4.5; *i*, ray corolla of *A. australe*, Curtiss 1491, scale 10; *j*, disk flower of *A. australe*, scale 5; *k*, pale of *A. australe*, flattened and viewed from back, scale 5; *l*, anther of *A. australe*, scale 10; *m*, apex of style of hemaphrodite flower of *A. australe*, scale 10.

⁶ Bull. Torrey Club 6: 90. 1876.



FRUITS AND FLORAL DETAILS OF ACANTHOSPERMUM.

REVISION OF THE GENUS FLOURENSIA.

By S. F. BLAKE.

INTRODUCTION.

The genus *Flourensia*, established by De Candolle¹ in 1836 to include a Chilean plant described by Molina as a *Helianthus* and three new species, was divided by him into two groups—one, Chilean, including the two radiate species *F. thurifera* (Mol.) DC., with a variety *angustifolia* DC., and *F. corymbosa* (a true *Viguiera*); the other, Mexican, with the two discoid species *F. laurifolia* and *F. cernua*, both based on Berlandier's collections. In the *Genera Plantarum* of Bentham and Hooker² *Flourensia* was included under *Helianthus* with some mention of its peculiarities, while *F. corymbosa* was relegated to *Viguiera*. In 1883 Gray³ discussed the genus, considering the discoid species typical, suggesting that *F. thurifera* might be included as a section "under Bertero & Colla's name (not Cassini's) of *Diomedea*"⁴ and giving the new name *Viguiera poeppigii* to *F. corymbosa*. The genus was again referred to *Helianthus* by Baillon⁵ in 1886, but was recognized as distinct by Hoffman⁶ in 1890, and has been retained by all subsequent authors.

In 1870 Philippi⁷ described *F. hispida* from Chile, and in the next decade Griesbach published three radiate species, truly referable to the genus, from Argentina. Philippi's species, however, represented in the Berlin Herbarium by an authentic but very poor specimen, is a *Viguiera* apparently identical with *V. gilliesii* (Hook. & Arn.) Hieron.

In 1891 Philippi⁸ published *Helianthus atacamensis*, referred to *Flourensia* by Reiche⁹ in 1905, and in 1895¹⁰ several new species

¹ Prodr. 5: 592. 1836.

² Gen. Pl. 2: 376. 1873.

³ Proc. Amer. Acad. 19: 7. 1883.

⁴ Bertero's reference of *Helianthus thurifer* to *Diomedea* Cass. (*Borrchia*) surely does not justify the citation of a genus "*Diomedea* Bert. non Cass.", as given in all our systematic works.

⁵ Hist. Pl. 8: 46. 1886.

⁶ In Engl. & Prantl, Pflanzenfam. 4⁵: 237. 1890.

⁷ Anal. Univ. Chile 36: 186. 1870.

⁸ Verz. Antofag. Tarapac. Pfl. 48. 1891.

⁹ Fl. Chil. 4: 94-95. 1905.

¹⁰ Anal. Univ. Chile 90: 36-40. 1895.

of *Helianthus*, of which four were referred as species or varieties to *Flourensia* by Reiche in 1905. Only *H. atacamensis* has been examined by the writer, but from description it is clear that all Philippi's species belong to *Viguiera*, or perhaps in part to true *Helianthus*; certainly none is referable to *Flourensia*.

The genus *Flourensia*, here limited as it was redefined by the writer¹¹ in 1913, includes 23 species, nine Mexican, of which one enters the southwestern United States, the other 14 native in the Andes from central Peru to Chile and the Province of Córdoba in Argentina. All are low, more or less resinous, alternate-leaved shrubs, with few-seriate involucre of herbaceous or only basally indurate phyllaries, thickened or more or less compressed achenes, villous at least on the margin, and persistent or rarely deciduous pappus of two often trifid awns and rarely a few narrow acute squamellae. The present revision, begun at the Berlin Herbarium in the summer of 1914, has been completed by a study of the material in the British Museum, the Kew Herbarium, the Gray Herbarium, and the United States National Herbarium, in the course of which it has been possible to examine types of all the species with the exception of the original *Helianthus thurifer* of Molina, material of which is probably no longer in existence.

SYSTEMATIC TREATMENT.

FLOURENSIA DC.

Flourensia DC. Prodr. 5: 592. 1836.

Resinous shrubs, with alternate, linear-lanceolate to ovate or oval, feather-veined leaves and cymose-panicked or solitary heads; heads small to large, many-flowered, radiate or discoid, the rays neutral or rarely styliferous but sterile, the flowers all yellow; involucre 2 to 4-seriate, graduated or subequal, the phyllaries lanceolate or linear-lanceolate to ovate, herbaceous or subherbaceous throughout, or often subindurate and more or less striate below; receptacle flattish; pales scarious or subscarious, nerved, usually obtusish, keeled, embracing and falling with the achenes; rays usually present, oval to oblong, neutral, or rarely styliferous but sterile; disk corollas with slender tube and cylindrical or funnelliform throat, the short limb 5-toothed; anthers with ovate terminal appendages and cordate-sagittate bases; style branches usually slender and recurved, with short, obtuse or acutish, dorsally hispidulous appendages; disk achenes somewhat compressed or strongly thickened, often striate, oblong or cuneate to obovate, silky-villous, at least on margin, rarely with narrow crustaceous margin; pappus usually persistent (rarely deciduous or altogether wanting), of two often trifid awns and rarely intermediate squamellae, the latter usually united with the awns and probably representing their decurrent ampliate bases.

Type species, as here selected, *F. laurifolia* DC.

¹¹ Proc. Amer. Acad. 49: 348-349, 350. 1913.

KEY TO SPECIES.

Heads discoid.

Leaves entire.

Leaves ovate to obovate, 2 to 6 cm. wide..... 1. *F. laurifolia*.

Leaves 4 to 11.5 mm. wide.

Leaves narrowly lanceolate, 4 to 7.5 mm. wide..... 2. *F. retinophylla*.

Leaves ovate to oval, 6.5 to 11.5 mm. wide..... 3. *F. cernua*.

Leaves mucronate-dentate, rhombic-ovate..... 4. *F. ilicifolia*.

Heads radiate.

Young branches densely pilose-lanate; heads numerous, in regular cymose panicles..... 5. *F. glutinosa*.

Young branches not pilose-lanate; heads solitary to several at tips of branches, not regularly cymose-paniculate.

Petioles mostly 1 to 1.5 cm. long; leaves with the secondary veinlets not prominent-reticulate beneath..... 6. *F. collodes*.

Petioles much shorter, or else leaves with the secondary veinlets prominent-reticulate.

Phyllaries 13 to 23 mm. long, with ovate or lanceolate base and elongate linear-attenuate tip..... 7. *F. pringlei*.

Phyllaries 4 to 15 mm. long, or if longer without linear-attenuate tip.

Leaves narrowly oblong-elliptic to lanceolate, very glutinous, strictly entire, thick, mainly 5 to 13 cm. long. Heads 1 to 4, axillary and terminal, 3.5 to 5.3 cm. wide, on peduncles 3 to 8 cm. long.

Phyllaries narrowly lanceolate; leaves 3.3 to 6.5 cm. long. 8. *F. resinosa*.

Phyllaries (at least the inner) with broad rhombic-obovate base and lanceolate tip; leaves 7.5 to 13 cm. long..... 9. *F. heterolepis*.

Leaves usually oval, ovate, or broadly elliptic, rarely lanceolate, not strongly glutinous.

Involucre (at least in youth) densely and usually subcanescently pilose or hispid-pilose.

Leaves densely and finely prominent-reticulate, 1.5 to 2.5 cm. long..... 10. *F. microphylla*.

Leaves loosely reticulate, 2 to 4.2 cm. long..... 11. *F. suffrutescens*.

Involucre green, subglabrous or sparsely pubescent chiefly on the margin of the phyllaries.

Leaves narrowly lanceolate, hispid-hirtous especially on margin, 4.5 to 9.5 mm. wide; branchlets hirtous..... 12. *F. hirta*.

Leaves usually ovate, oval, or elliptic, mostly more than 1 cm. wide, not hispid-hirtous; branchlets not hirtous.

Leaves usually entire, when regularly denticulate narrowly oblong-lanceolate to lanceolate.

Leaves mostly ovate or oval or, if narrowly lanceolate, strictly entire.

Leaves entire (except in *F. leptopoda*); involucre 4 to 11 mm. high, the phyllaries not lance-spatulate.

Leaves not rhombic-ovate, entire or rarely with a few irregular teeth; petioles less than one-third as long as blade.

Phyllaries narrow, linear to lanceolate, rarely with slightly dilated ovate-lanceolate bases.

Leaves 1.5 to 5 cm. long, 4 to 18 mm. wide.

Leaves strongly prominent-reticulate. 13. *F. fiebrigii*.

Leaves not prominent-reticulate.

Phyllaries narrowly lanceolate, not widened at base; leaves narrowly oblong or elliptic, 0.4 to 1 cm. wide..... 14. *F. polyclada*.

- Phyllaries linear-lanceolate or linear-spatulate from an ovate-lanceolate base; leaves ovate or oblong-ovate, 1.1 to 1.8 cm. wide 15. *F. niederleinii*.
 Leaves 5 to 13 cm. long, usually 2 to 5 cm. wide.
 Heads about 2.5 cm. wide; disk flowers 16 to 23.
 16. *F. campestris*.
 Heads 3.6 to 4 cm. wide; disk flowers 29 to 40.
 17. *F. riparia*.
 Phyllaries broad, ovate or oval.
 Outer or middle phyllaries with ovate base and abruptly narrowed tip..... 18. *F. tortuosa*.
 All the phyllaries broadly ovate to oblong, without abruptly narrowed tip..... 19. *F. oolepis*.
 Leaves rhombic-ovate, deeply repand-dentate; petioles about one-third as long as blade..... 20. *F. leptopoda*.
 Leaves elliptic to ovate or oblong-elliptic, usually coarsely repand-dentate; involucre 1 to 2 cm. high, the phyllaries usually lance-spatulate..... 21. *F. thurifera*.
 Leaves narrowly lanceolate or oblong-lanceolate, usually denticulate, 7 to 13 mm. wide 22. *F. angustifolia*.
 Leaves oval or oblong-oval, 2 to 4 cm. wide, regularly denticulate.
 Phyllaries lanceolate to oblong-lanceolate, 7 to 8 mm. long.
 23. *F. macrophylla*.

1. *Flourensia laurifolia* DC. Prodr. 5: 592. 1836.

Helianthus laurifolius Benth. & Hook.; Hook. & Jacks. Ind. Kew. 1²: 1112. 1893, as synonym.

Shrub, 1.5 to 3 meters high, much branched, resinous-viscid, especially on the younger parts, and sparsely hispidulous or puberulous on the peduncles; leaf blades 5.5 to 13 cm. long, 2 to 6 cm. wide, ovate to elliptic-ovate or obovate, acuminate or acute, rarely obtuse, mucronulate, cuneate at base, entire, resinous, shining, strigillose along costa above, otherwise glabrous, finely prominulous-reticulate on both sides (the larger lateral veins about 14 pairs); petioles sparsely strigillose, 5 to 10 mm. long; heads in cymose panicles of 3 to 7 at ends of branches and branchlets, usually overtopped by the leaves; peduncles 1.5 to 2.8 cm. long, axillary, sometimes nodding in fruit; disk in flower turbinate-hemispheric, 1.5 cm. high, 1 to 1.3 cm. wide, in fruit subglobose; involucre 3 to 4-seriate, graduated, 10 to 11 mm. high, the outermost phyllaries linear-lanceolate or lance-ovate, obtuse to acutish, coriaceous-herbaceous, green, about 6 mm. long, ciliate toward tip, the others oblong-ovate to oblong-lanceolate, narrowed above the middle to an obtusish tip, resinous, glabrous or obscurely ciliolate, blackish green with paler margin, subcoriaceous, in old fruit spreading or reflexed; disk corollase cylindrical-funneliform, 6.8 mm. long (tube 2 mm.); pales scarious laterally, resinous at the obtusish tip, 12 mm. long; achenes narrowly obovate, somewhat thickened, densely pilose, 7.5 mm. long; awns 2, pilose, often 2 or 3-fid below, about 5 mm. long; squamellae none.

TYPE LOCALITY: Between Victoria ("Vittoria") and Tula, Tamaulipas, Mexico.

ILLUSTRATION: Deless. Icon. Sel. 4: pl. 35.

SPECIMENS EXAMINED:

TAMAULIPAS: Between Victoria and Tula, "cerca las Minces," November, 1830, *Berlandier* 2205 (type collection; B, G, K, Prod.). Mountains between Victoria and Tamaulipas, 1830, *Berlandier* 785 (G). Near Victoria, altitude 320 meters, 1907, *Palmer* 32 (G, N).

SAN LUIS POTOSÍ: Minas de San Rafael, 1911, *Purpus* 4789a (B, G, N). San Luis Potosí to Tampico, 1878-79, *Palmer* 1109 (G, K).

Flourensia laurifolia is readily distinguished by its discoid heads and large, ovate to obovate leaves.

2. *Flourensia retinophylla* Blake in Robinson, Proc. Amer. Acad. 49: 505. 1913.

Much-branched resinous shrub, with brownish gray bark, the branchlets viscid; leaves mostly crowded toward the ends of the branchlets, their blades 2.5 to 3.5 cm. long, 4 to 7.5 mm. broad, narrowly lanceolate, acute to subacuminate at both ends, mucronulate, entire, viscid, reticulate-venulose, with very indistinct primary veins; petioles very narrowly margined, 1 to 2 mm. long; heads in racemose corymbs of 2 to 6 at tips of branchlets, exceeded by the leaves, on 1-headed 1 to 3-bracteolate peduncles 0.4 to 1 cm. long; disk 12 to 15-flowered, turbinate, 10 to 13 mm. high; involucre triseriate, graduated, 8 mm. high, the phyllaries oblong-lanceolate to subovate-lanceolate, obtusish, yellowish green, lineate-striate, glutinous; pales firm, mucronate, obtuse, about 3-nerved, 8.5 to 10 mm. long; disk corollas glutinous, 5 to 5.8 mm. long (the tube 1.1 to 1.5 mm.); achenes cuneate, slightly thickened, densely villous, 6 mm. long; awns 2, serrulate, somewhat ampliate at the base, 3 mm. long; squamellae none.

TYPE LOCALITY: Sierra de la Paila, Coahuila, Mexico.

SPECIMENS EXAMINED:

COAHUILA: Sierra de la Paila, November, 1910, *Purpus* 4728 (type collection; B, G, K, N).

This species, the type collection of which was distributed as *F. laurifolia*, is easily distinguished from that and from the other discoid species by its narrowly lanceolate, very glutinous leaves.

3. *Flourensia cernua* DC. Prodr. 5: 593. 1836.

Helianthus cernuus Benth. & Hook.; Hook. & Jacks. Ind. Kew. 1²: 1112. 1893, as synonym.

Much-branched shrub, 1 to 2 meters high, erect or procumbent with erect branches, the bark gray, the heads and young branches resinous; branches strigillose; leaf blades 1.7 to 2.5 cm. long, 6.5 to 11.5 mm. wide, ovate to oval, acute at both ends, mucronulate, entire, pale green, somewhat resinous, obscurely reticulate-veined, with one or two pairs of the lateral nerves sometimes conspicuous; petioles slightly strigillose, 1 to 2.5 mm. long; heads nodding, solitary in the leaf axils, forming long leafy inflorescences; peduncles short, curved, with 1 to 3 ovate or elliptic bracteoles at apex; disk subturbinate, 12 to 20-flowered, 9 to 11 mm. high; involucre 2 or 3-seriate, subequal, 4.5 to 5 mm. high, the phyllaries oblong-lanceolate, acutish, resinous; disk corollas resinous-dotted, 3.5 mm. long (tube 1 mm.); pales rather thin, scarcely nerved, widened upwardly, then abruptly pointed, yellowish with a blackish keel above, 6 to 6.5 mm. long; achenes narrowly cuneate, thickened, villous, 6 mm. long, 2 mm. wide; awns 2, ciliolate, unequal, 2.5 to 3.2 mm. long; squamellae none.

TYPE LOCALITY: Between Monterey and Lampasos, Nuevo León, Mexico.

SPECIMENS EXAMINED:

TEXAS: Big Springs, 1899, *Bray* 401 (N). El Paso, 1885, *Gray* (G). Prairies east of El Paso, 1849, *Wright* 355 (G, K). Valley of the Pecos, and hills between the Mimbres and the Rio Grande, 1851, *Wright* 1229 (B, G, K). Along the Pecos, 1850, *Thurber* 115 (G). Sierra Blanca, 1913, *Rose & Fitch* 17933 (N). Presidio and foothills of Guadalupe Mountains, 1881, *Havard* 83 (G, N). Valentine, 1904, *Bailey* 917 (N). Chenate region, 1889, *Nealley* 533 (N). Without definite locality, *Mexican Boundary Survey* 563 (N); in 1851, *Wright* 299 (G).

NEW MEXICO: Pecos Valley near Texas line, 1901, *Bailey* 722 (N). Tularosa, 1904, *Gaut* 20 (N). San Andreas Mountains, 1902, *Gaut* 29 (N). Pena Blanca, Organ Mountains, 1906, *Wootton & Standley* (N). Mesa west of Organ Mountains, Dona Ana County, 1903 and 1904, *Wootton* (N). Lake Valley, 1914, *Beals* (N). Hachita, 1908, *Goldman* 1306 (N). Las Palomas, altitude 1,280 meters, 1909, *Goldman* 1792 (N).

ARIZONA: Portal to Paradise, Cochise County, altitude 1,600 to 1,730 meters, 1914, *Eggleston* 10667, 10668 (N). About Portal, 1914, *Eggleston* 10916 (N). Mesas, Bowie Station, October, 1882, *Pringle* (G, N). Near Fort Huachuca, 1894, *Wilcox* 413, 503 (N).

SONORA: Near Monument No. 26, 1892, *Mearns* 1142 (N). San Bernardino Ranch, 1892, *Mearns* 831 (N).

CHIHUAHUA: Hills and plains near Chihuahua, 1885, *Pringle* 292 (B, G, K, N). El Paso to Chihuahua, *Thurber* 788 (G). Candelaria, 1911, *Stearns* 281 (N).

COAHUILA: Parrás, 1880, *Palmer* 740 (G, K); in 1898, *Palmer* 434 (G, N). Saltillo, 1902, *Palmer* 286 (G, N). Pena, 1905, *Purpus* 1011 (G).

NUEVO LEÓN: Monterrey, *Weber* (G). Hills near Doctor Arroyo, 1904, *Pringle* 13053 (G, N). From Monterrey to Lampasos, 1828, *Berlandier* 141 (G), 1401 (type collection; B, G, K, Prod.).

DURANGO: Mapimi, 1898, *Palmer* 434 (K, N).

SAN LUIS POTOSÍ: Foot of mountains, Real de Coutorie (?), 1827, *Berlandier* 1348 (G), 1354 (G, N). Without definite locality, 1878, *Parry & Palmer* 469 (B, G, K).

ZACATECAS: Plains and low ridges, Cedros, 1907, *Lloyd* 16 (N), 30 (G).

MEXICO (Republic of): Without definite locality, *Gregg* 421, 527 (G).

This species, the only one known to occur north of the Mexican border, is easily told by its discoid nodding heads and small ovate or oval leaves. It is sometimes called "varnish bush" or "tar bush" in the Southwest. It has a hoplike odor and a bitter taste. The leaves and heads are commonly sold in the drug markets of northern Mexico, and are taken in the form of a decoction for indigestion. The native name is "hojasé" or "hojasén." Palmer notes that it is also employed as a remedy for female diseases.

4. *Flourensia ilicifolia* T. S. Brandeg. *Zoe* 5: 238. 1906.

Erect much-branched shrub, with grayish brown bark, the young branchlets slightly pubescent, resin-encrusted; leaves mostly crowded toward the ends of the branchlets, their blades 1.6 to 2.4 cm. long, 1 to 1.7 cm. wide, yellowish green, rhombic-ovate, repand-dentate with 3 to 6 pairs of stiffly mucronate teeth, acute at each end, mucronate, coriaceous, glutinous, obscurely reticulate, the veins not prominulous, the lateral veins about 3 to 6 pairs; petioles flattened, puberulous and resinous, often purplish-tinged, 1.5 to 5 mm. long; heads solitary or 2 or 3 together at tips of branchlets, about 22-flowered, on puberulous, resinous, about 3-bracted peduncles 1 cm. long; disk 1.3 to 1.6 cm. high; involucre 2-seriate, subequal, 6 to 6.5 mm. high, the phyllaries oblong to oblong-ovate, obtuse, coriaceous, yellowish green, resinous and ciliate, not striate; pales broadened below the subtruncate apex, yellowish, with brown or purple-tinged apex, scarious-margined, nearly glabrous, nerved, 9 to 10.5 mm. long; disk flowers 5 or rarely 4-toothed (the teeth oblong, obtusish, 2 to 3 mm. long), 6 to 7 mm. long, the tube 1.5 to 1.8 mm. long, the throat campanulate-funnelform; achenes narrowly cuneate, blackish, silky-villous, with white crustaceous base and very narrow border, 8 to 9.5 mm. long; awns 2, broadly lanceolate, attenuate, villous-ciliate, 2.5 to 4.5 mm. long, separate or united at base by a low crown which usually develops one or two lacerate squamellæ (2 to 3 mm. long) on each side of achene.

TYPE LOCALITY: Sierra de Parrás, Coahuila, Mexico.

SPECIMENS EXAMINED:

COAHUILA: Sierra de Parrás, March, 1905, *Purpus* 1150 (type collection; B, G).

This very distinct species is unique in the genus in its strongly mucronate-dentate, rhombic-ovate, short-petioled leaves.

5. *Flourensia glutinosa* (Robins. & Greenm.) Blake, Proc. Amer. Acad. 49: 374. 1913.

Encelia glutinosa Robins. & Greenm. Amer. Journ. Sci. III. 50: 155. 1895.

Shrub, 3 to 5 meters high, the bark gray, furrowed, the young branches more or less pilose-lanate with whitish hairs, the axis and branches of inflorescence resinous, pubescent, striate; leaf blades 6.5 to 9 cm. long, 1.8 to 3.8 cm. wide, ovate to ovate-lanceolate, acuminate, narrowed to the base, entire, mucronate, minutely scabrous above, scabrous-pubescent along the veins beneath, pale green, rather coarsely prominulous-reticulate (the prominent lateral veins 7 to 13 pairs); petioles lanate-pilose or merely pilosulous, 4 to 12 mm. long; heads about 2.5 cm. wide, 6 to 26 in cymose panicles at ends of branches, the 1 to 5-headed peduncles leafy-bracted at base, 2 to 5 cm. long, the bracts of inflorescence oval to ovate, 6 to 12 mm. long; disk very resinous, 1.4 to 1.8 cm. high, 9 to 11.5 mm. wide; involucre 3 or 4-seriate, strongly graduated, 5 to 6.5 mm. high, often calyculate with a few bractlets at apex of peduncle, the phyllaries lanceolate, obtusish, resinous, striate, fuscous, subherbaceous-tipped; rays about 8, golden-yellow, oblong-oval, barely emarginate, glabrous but the tube pilose, 1.5 to 1.7 cm. long, 5 to 7 mm. wide; pales subcoriaceous, enlarged and crested with two scarious wings at apex, resin-encrusted, 11 mm. long; disk flowers yellow, blackish green on the teeth, slenderly funnelliform, at apex resinous, 7 to 8 mm. long (tube 1.5 mm.); achenes narrowly cuneate, sometimes quadrangular, silky-pilose, 6.5 to 11 mm. long; awns 2, or rarely 4, rather easily deciduous, 7 mm. long; squamellae none, or sometimes 2 or 3 present between each pair of main awns, and about half as long.

TYPE LOCALITY: Las Hoyas Canyon, Oaxaca, Mexico.

SPECIMENS EXAMINED:

PUEBLA: Limestone hills, near Tehuacán, 1895, *Pringle* 7023 (G).

OAXACA: Las Hoyas Canyon, altitude 1,370 meters, November 2, 1894, *Pringle* 6024 (type collection; B, G, K, N). About 9.6 kilometers above Domin-guillo, altitude 1,370 to 1,675 meters, 1894, *Nelson* 1832 (G. N).

Flourensia glutinosa is readily distinguished by its many-headed cymose panicles and pilose-lanate branches.

6. *Flourensia collodes* (Greenm.) Blake, Proc. Amer. Acad. 49: 373. 1913.

Encelia collodes Greenm. Proc. Amer. Acad. 39: 110. 1903.

Slightly resinous shrub; branches striate, angled, rather sparsely sordid-puberulous and resin-dotted; leaf blades 6 to 10 cm. long, 2.2 to 3.8 cm. wide, ovate, long-acuminate, falcate, at base inequilaterally rounded, firm but scarcely coriaceous, entire, puberulous on costa and main veins below, otherwise nearly glabrous, finely reticulate, only the chief veinlets prominulous, the 9 or 10 pairs of lateral veins prominent; petioles puberulous above, slender, 7 to 15 mm. long; heads in cymose panicles of 4 or 5 at ends of branches, terminal and axillary, 4 cm. wide, very resinous, on sparsely sordid-puberulous pedicels 8 cm. long or less, usually bracteate; disk 1.4 to 1.6 cm. high, 1.7 to 2 cm. thick; involucre 3-seriate, graduated, 1 cm. high, the phyllaries lance-ovate, acuminate to a glandular-callous tip, subherbaceous, thickened, striate, with narrow yellowish glandular-erose margin; receptacle flattish; rays about 14, narrowly elliptic, rarely bearing a short included style, 1.5 cm. long, 5 mm. wide; disk corollas 7 mm. long (tube 1 mm.), resinous; pales blunt, subcucullate at the fuscous apex, 12.5 mm. long; immature achenes pilose-ciliate, otherwise practically glabrous, 6 mm. long; awns 2, slender, 6 mm. long; squamellae 2 pairs, free from each other but united to awns at base, linear-lanceolate, attenuate, deeply and irregularly lacinate, 3 mm. long.

TYPE LOCALITY: Between Ocuilapa and Tuxtla, Chiapas, Mexico.

SPECIMENS EXAMINED:

CHIAPAS: Along road from Ocuilapa to Tuxtla, altitude 335 to 915 meters, August 29, 1895, *Nelson* 3071 (type collection; G, N).

The structures described as squamellae in this species are evidently strictly homologous with the lateral lobes of the awns found in many other species, representing the latter in their extreme development. *F. collodes* differs from the other Mexican species in its comparatively large, ovate, obscurely reticulate leaves and few large heads.

7. *Flourensia pringlei* (A. Gray) Blake, Proc. Amer. Acad. 49: 375. 1913.

Helianthella pringlei A. Gray, Proc. Amer. Acad. 21: 389. 1886.

Encelia oblonga Robins. & Fern. Proc. Amer. Acad. 30: 118. 1894.

Stems numerous, suffrutescent, erect from a woody base, 30 to 40 cm. high, nearly simple or much branched, leafy, yellowish green becoming grayish, striate, glabrous; leaf blades 3.2 to 10 cm. long, 1.4 to 4.3 cm. wide, nearly uniform, elliptical-oblong to oblong-lanceolate, from round-tipped to acute, cuneate at base, with narrow crustaceous tuberculate-hispidulous margin, somewhat resinous, often strigillose on margin, otherwise glabrous, venose, the lateral veins 7 to 11 pairs; petioles broad, flat, 1 to 2 mm. long; heads solitary at tips of stems and branches, 2.5 to 4 cm. wide, on striate glabrous peduncles 6 to 13.5 cm. long; disk 1.3 to 1.5 cm. high, 1.5 to 2.5 cm. wide (in fruit 3 cm. wide); involucre 2-seriate, subequal or the outer phyllaries longer and overtopping the disk, often with some similar calyculate bracts at apex of peduncle, 1.3 to 2.3 cm. high, the phyllaries linear-attenuate from a thickened, ovate or lanceolate base, resinous and sparsely ciliolate; rays 14 to 20, golden-yellow, oval or oblong-oval, glabrous, 1 to 1.3 cm. long, 3.5 to 6 mm. wide; disk flowers glabrous, resinous, with short tube and long cylindrical throat, 5.5 mm. long (tube 0.8 mm.); pales broadened upwardly, resinous toward the obtuse apex, 11 mm. long; achenes at maturity strongly thickened, densely villous, striate, 11 mm. long, 3.7 mm. wide; awns 2, ciliolate, firm, often somewhat recurved, 5 mm. long, often deciduous at maturity; squamellae none.

TYPE LOCALITY: Rocky hills near Chihuahua City, Chihuahua, Mexico.

SPECIMENS EXAMINED:

CHIHUAHUA: Rocky hills near Chihuahua City, September 7, 1885, *Pringle* 646 (type collection of *H. pringlei*; B, G, K, N). Plains near Casas Grandes, October 10, 1891, *Hartman* 812 (type collection of *E. oblonga*; G, K).

DURANGO: Santiago Papasquiario, altitude 2,045 meters, 192 kilometers west of north from Durango City, 1896, *Palmer* 425 (B, G, K). El Oro to Guanacevi, 1898, *Nelson* 4730 (N).

Flourensia pringlei, the least shrubby member of the genus, is unique in its numerous low stems, its oblong subsessile leaves, and particularly in its characteristic phyllaries.

8. *Flourensia resinosa* (T. S. Brandeg.) Blake, Proc. Amer. Acad. 49: 375. 1913.

Encelia resinosa T. S. Brandeg. *Zoe* 5: 240. 1906.

Branching shrub, vernicose-resinous, the branches striate, brown, simple or again branched; leaf blades 3.3 to 6.5 cm. long, 1 to 1.8 cm. wide, narrowly oblong-elliptic, lance-elliptic, or lanceolate, acute at each end, mucronate, entire, resinous-punctate, pale green with yellowish costa, densely prominulous-reticulate, with about 18 pairs of weak lateral veins; petioles flattened, 2 to 4 mm. long; heads 1 to 4, terminal and axillary, 3.5 to 5.3 cm. wide, on peduncles 6 to 7 cm. long; disk 1.1 to 1.4 cm. high, 1.3 to 1.7 cm. thick; involucre 3-seriate, 7 to 9 mm. high, scarcely graduated, the phyllaries narrowly lanceolate, acuminate, herbaceous, infusate below, very resinous, slightly ciliolate; rays 10, oblong, golden, 1.3 to 2.2 cm. long, 5.5 to 9 mm. wide; disk corollas glabrous, 5.6 mm. long (tube 1 mm.); pales subacute, resinous at apex, 8.5 mm. long; immature achenes silky, 5 mm. long; awns 2, unequal, slender, at base strongly ampliate and more or less trifid, about 4.5 mm. long; squamellae none.

TYPE LOCALITY: Ixmiquilpan, Hidalgo, Mexico.

SPECIMENS EXAMINED:

HIDALGO: Near Ixmiquilpan, 1831, *Schiede & Deppe* 1564 (Ber., photo. and fragm. G). Ixmiquilpan, *Ehrenberg* 35 (Ber.). Mountains, Ixmiquilpan, August, 1905, *Purpus* 1458 (type collection; G). Ixmiquilpan, 1905, *Rose, Painter & Rose* 9025 (N).

This apparently local species is distinguished from all except *F. heterolepis* by its narrowly oblong-elliptic to lanceolate, very glutinous, entire leaves and few long-peduncled, rather large heads. Ehrenberg's plant in the Berlin Herbarium was labeled by Schultz Bipontinus more than sixty years ago as a new species of *Flourensia*, under a name which has already been used three times for true *Flourensias* originally published under other generic names.

The number of the type collection is given as 1456 in the original description, but Mr. Brandege informs me that the correct number is 1458.

9. *Flourensia heterolepis* Blake, Contr. Gray Herb. n. ser. 54: 186. 1918.

Viguiera (?) *glutinosa* Rusby, Mem. Torrey Club 4: 211. 1895. Not *F. glutinosa* Blake, 1913.

Shrub; stem (or branch) slender, remotely leafy, olivaceous, round-angled, strongly resinous; leaf blades 7.5 to 13 cm. long, 1.4 to 2.5 cm. wide, lanceolate or narrowly elliptic-lanceolate, acuminate or acute at both ends, mucronate, resinous, entire, densely prominulous-reticulate, with about 13 pairs of lateral nerves and yellowish white costa; petioles marginless, 6 to 16 mm. long; heads 3 or 4, terminal and axillary toward ends of branches, about 4.5 cm. wide, on sparsely linear-bracted peduncles 3 to 8 cm. long; disk 1 to 1.2 cm. high, 1.5 to 1.7 cm. wide; involucre 3-seriate, very glutinous, 11 to 12 mm. high, the outer phyllaries somewhat shorter, lanceolate, acuminate to a callous apex, herbaceous, the inner longer, with a rhombic-obovate body (3.5 mm. wide), laterally chartaceous-coriaceous and glandular-fimbriatulate, and an abruptly narrowed lanceolate herbaceous tip; rays about 14, oblong, glutinous, glabrous, 2.2 cm. long, 7 mm. broad; disk corollas 5 mm. long (tube 0.6 mm.); pales scarious-margined and lacerate above, with slightly widened deltoid cuspidulate erose apex, 8 mm. long; achenes (immature) cuneate, densely silky-pilose, 3.5 mm. long; awns 2, 2.7 mm. long; squamellae none.

TYPE LOCALITY: Cochabamba, Bolivia.

SPECIMENS EXAMINED:

BOLIVIA: Cochabamba, 1891, *Bang* 977 (type collection; B, G, N).

This species, curiously similar in general features to the Mexican *F. resinosa*, is readily separated from it by its broad-based inner phyllaries.

10. *Flourensia microphylla* (A. Gray) Blake, Proc. Amer. Acad. 49: 374. 1913.

Encelia microphylla A. Gray, Proc. Amer. Acad. 15: 37. 1879.

Much-branched shrub, about 1 meter high, with grayish brown bark, the young branchlets purplish brown, striate, subcanescently hispid-pilose with incurved hairs; leaf blades 1.5 to 2.5 cm. long, 5 to 10 mm. wide, ovate to elliptic-ovate, acute at both ends, cuspidate, entire but somewhat wavy-margined, more or less scabrous-pubescent, particularly beneath and on margin, somewhat resinous, densely and finely prominulous-reticulate, with about 7 to 9 pairs of obscure lateral veins; petioles pubescent, 1.5 to 4 mm. long; heads solitary at tips of branches, 2.5 to 2.8 cm. wide, on bracteate peduncles 3 to 12 cm. long; disk 11 to 14 mm. high, 12 to 15 mm. thick; involucre 2 or 3-seriate, equal or the inner phyllaries elongate, 10 to 15 mm. high, the phyllaries ovate-lanceolate to narrow-lanceolate, acuminate, herbaceous, rather densely and subcanescently hispid-pilose, more or less glabrate in age; rays about 10, golden-yellow, oval, emarginate at apex, glabrous, 1 cm. long, 4 mm. wide; disk flowers glabrous, 6 mm. long (tube 1 mm.), the throat cylindrical or cylindrical-funnelform; pales rather thin, narrowed toward the blackish green apex, glandular on the keel, ciliate at apex, 7 to 11 mm. long; achenes oblong-obovate, flattish, densely pilose, subglabrate below,

4 to 5 mm. long; pappus of 2 slender, strigose, easily deciduous awns 3 mm. long, or sometimes wanting.

TYPE LOCALITY: Saltillo, Coahuila, Mexico.

SPECIMENS EXAMINED:

COAHUILA: Saltillo, August, 1878, *Parry & Palmer* 462 (type collection; G, K).

Shady arroyos and hill slopes, Saltillo, 1898, *Palmer* 795 (G, N). Limestone hills, Carneros Pass, 1889, *Pringle* 2392 (B, G, K). Without definite locality, 1878, *Parry* 26 (G); in 1880, *Palmer* 589 (G, K).

Like *Flourensia resinosa*, this apparently local species finds its closest ally in a species of South America, in this case *F. suffrutescens*, from which it differs in its smaller, densely prominulous-reticulate leaves. From all other Mexican species with radiate heads, *F. microphylla* is at once distinguishable by its small leaves and usually subcanescent involucre. The awns of the pappus are often or usually deciduous at maturity, as in *F. pringlei*.

11. *Flourensia suffrutescens* (R. E. Fries) Blake, Proc. Amer. Acad. 49: 376. 1913.

Encelia suffrutescens R. E. Fries, Nov. Act. Soc. Sci. Upsal. IV. 1¹: 83. pl. 6, f. 1-3. 1903.

Shrub, 20 to 30 cm. high, with decumbent-ascending branches about 30 cm. long; stem woody, thick, clothed with a grayish bark; branchlets fuscous, terete, rather densely spreading-pilose, the hairs with slightly enlarged glandular-tuberculate bases; leaf blades 2 to 4.2 cm. long, 8 to 12 mm. wide, narrowly elliptic or lanceolate to ovate, acute or subacuminate, mucronulate, at base cuneate to acuminate, entire, rigidly membranaceous, rather densely pilose on both sides with loose hairs slightly glandular-tuberculate at base, above bright green, beneath paler, obscurely triplinerved (the main veins about 4 pairs, obscurely distinguished from the intermediate veins), loosely prominulous-reticulate especially beneath; petioles pilose, 1 to 2.5 mm. long; heads solitary at apex of branches, 3.5 cm. wide; peduncles 7 to 11 cm. long, bearing one or two leaves, rather densely spreading-pilose, the hairs with slightly glandular-tuberculate bases; disk 9 mm. high, 12 mm. thick; involucre 2-seriate, equal, 12 to 13 mm. high, the phyllaries narrowly oblong-lanceolate or lanceolate, acuminate, herbaceous, not striate (at least when young), callous-mucronulate, loosely subcanescent-pilose outside, the hairs with slightly enlarged bases, within glabrous, 1-nerved; rays 12, linear-oblong or linear-elliptic, bidentate or often deeply and unequally 2-lobed, gland-dotted but subglabrous on back, 17 mm. long, 4 mm. wide; disk corollas glabrous, 5.2 mm. long (tube 1 mm.); pales gland-dotted and sparsely hispid-pilose at the blackish green, blunt or acutish, mucronulate apex, 9.5 mm. long; achene (very immature) densely silky-pilose, especially above, about 2.5 mm. long, the hairs at apex of achene simulating squamellae; awns 2, sometimes 3-cleft, unequal, slender, 3.5 mm. long or less; squamellae none.

TYPE LOCALITY: Moreno, Province of Jujuy, Argentina.

ILLUSTRATION: Nov. Act. Soc. Sci. Upsal. IV. 1¹: pl. 6, f. 1-3.

SPECIMENS EXAMINED:

ARGENTINA: Rocky mountain slope, altitude 3,600 meters, Moreno, Province of Jujuy, December 16, 1901, *Fries* 926 (type collection; N).

Unique among South American species in its subcanescently pilose involucre.

12. *Flourensia hirta* Blake, sp. nov.

Divergently branched shrub, the younger branchlets purple-brown, hirtous, resinous-granular, the older gray, glabrate; leaf blades 3.5 to 4.3 cm. long, 4.5 to 9.5 mm. wide, narrowly lanceolate or linear-lanceolate, acuminate at each end, mucronate, entire, strongly prominulous-reticulate, scabrous-hirtous on both sides with ascending tuberculate-based hairs and more densely hirtous-ciliate; petioles scabrous-hirtous, 2 to 3 mm. long; heads 1 to 4 at apex of branches, 2 cm. wide, on

peduncles 1 to 5.5 cm. long, nodding in fruit; disk 9 mm. high, 8 mm. thick; involucre about 2-seriate, 7 mm. high, the phyllaries subequal, few (about 14), the outer linear-lanceolate, the inner ovate-lanceolate, obtuse or acute, slightly resinous-granular and very sparsely ciliolate; rays about 8, oblong, 6 to 7 mm. long, 2.5 mm. wide; disk corollas glabrous, 4 mm. long (tube 0.6 mm.); pales obtuse, resinous at apex, 6.5 mm. long; immature achenes silky, 3.5 mm. long; awns 2, slender, unequal, ciliolate, about 4 mm. long; squamellae none.

Type in the Berlin Herbarium, collected in the vicinity of Los Corrales, Sierra Famatina, Province Rioja, Argentina, February 7, 1879, by G. Hieronymus and G. Niederlein (no. 635). Photograph and fragments in the Gray Herbarium.

ADDITIONAL SPECIMENS EXAMINED:

ARGENTINA: Between El Jaguel and Los Cortaderos, Cordillera de la Rioja, February 21, 1879, *Hieronymus & Niederlein* 264 (Ber., fragm. G).

Readily separated from all other species of the genus by its hirtous leaves and branches.

13. *Flourensia fiebrigii* Blake, Bot. Jahrb. Engler 54: Beibl. 119: 47. 1916.

Branching shrub, probably erect, the younger branchlets brown, resinous-granulose, loosely puberulous, the older ones gray-brown, glabrate; leaf blades 2.7 to 5 cm. long, 8 to 14 mm. wide, lanceolate or elliptic-lanceolate or slightly obovate, acute to acuminate at each end, mucronate, entire, prominulous-reticulate with 10 to 12 pairs of lateral veins, resinous and especially in youth loosely hispid-pilose; petioles narrowly margined, 1.5 to 6 mm. long; heads 1 to 3 at ends of branches, 3 to 4 cm. wide; peduncles about 1.5 cm. long; disk 8 mm. high, 8 to 10 mm. thick; involucre 2 to 3-seriate, 5 mm. high, scarcely graduated, the phyllaries resinous-granular and more or less loosely pubescent and ciliate, the outer lanceolate or lance-ovate, acute or acutish, the inner oblong-ovate; rays about 10, golden, oblong-oval, 1.2 to 1.6 cm. long, 6 to 7.5 mm. wide; disk corollas glabrous, 4 mm. long (tube 0.7 mm.); pales truncate, mucronate, colorate and resinous at apex, 6 mm. long; immature achenes silky, 3.8 mm. long; awns 2, subequal, slender, ciliolate, 2 to 2.2 mm. long, sometimes unequally bifid; squamellae none.

TYPE LOCALITY: Near Paicho, west of Tarija, Bolivia.

SPECIMEN EXAMINED:

BOLIVIA: Slope, summit of pass, altitude 3,200 meters, near Paicho, west of Tarija, February 5, 1904, *Fiebrig* 3050 (type collection; Ber., photo. and fragm. G).

Flourensia fiebrigii is distinguished from other South American species by its narrow entire medium-sized prominulous-reticulate leaves and short involucre.

14. *Flourensia polyclada* Blake, sp. nov.

Low shrub, from a thick woody root, the short ascending or procumbent stems much branched; internodes short; branchlets short, resinous, pilose above, monocephalous; leaf blades 1.5 to 3.8 cm. long, 0.4 to 1 cm. wide, narrowly oblong or elliptic, acute at each end, mucronate, entire, with about 4 pairs of inconspicuous lateral veins, not reticulate, tuberculate-strigose especially on margin, scarcely revolute; petioles obsolete; peduncles terminating branchlets, 1.5 to 4.5 cm. long; heads 2.8 cm. wide; disk 8 to 12 (in fruit 16) mm. high, 10 to 12 (in fruit 20) mm. thick; involucre about 3-seriate, 6 to 8 mm. high, the phyllaries subequal or the inner slightly longer, narrowly lanceolate, subacute, resinous, rather sparsely pilose; rays 10, oblong-oval, 13 mm. long, 4.5 mm. wide; disk corollas somewhat resinous on tube and teeth, 4.5 mm. long (tube 1.1 mm.); pales obtuse, resinous on back, 9.8 mm. long; achenes cuneate-obovate, silky, 8.5 mm. long, 3.7 mm. wide; awns 2, unequal, lacerate, 3 to 4.7 mm. long; squamellae none.

Type in the Berlin Herbarium, collected between La Cueva and La Incrucijada, Sierra Famatina, Province Rioja, Argentina, January 31, 1879, by G. Hieronymus and G. Niederlein (no. 541). Photograph and fragments in the Gray Herbarium.

ADDITIONAL SPECIMEN EXAMINED:

ARGENTINA: La Incrucijada, January 29 to February 3, 1879, *Hieronymus & Niederlein* (Ber.).

From *F. niederleinii*, its only near relative, this species differs in its narrow leaves and narrowly lanceolate phyllaries, these not dilated at base.

15. *Flourensia niederleinii* Blake, sp. nov.

Branching shrub, probably procumbent or ascending, the younger branchlets resinous-granular, sparsely setose-hispidulous, the older ones gray, glabrate; leaf blades 2.3 to 3.5 cm. long, 1.1 to 1.8 cm. wide, ovate to oblong-ovate, acute, mucronate, cuneate or rounded at base, entire, with 7 to 10 pairs of lateral veins, not reticulate, resinous-granular and rather sparsely strigillose on both sides, along costa beneath sparsely hispid-pilose; petioles resinous-granular, more or less hispid, 3 to 8 mm. long; heads 1 to 3 at apex of branches, 2.5 to 3.3 cm. wide, on peduncles 2 to 4 cm. long; disk 8 to 11 mm. high, 1 to 1.3 cm. thick; involucre 2-seriate, 7.5 to 9 mm. high, the phyllaries subequal or the outer frequently longer, linear-lanceolate or linear-spatulate from a short, lance-ovate, blackish green base, resinous-granular and sparsely hispidulous; rays about 8, oblong-oval, 1.2 to 1.6 cm. long, 4.5 to 6.5 mm. wide; disk corollas glabrous, 4 mm. long (tube 0.5 mm.); pales subacute, at apex colorate, resinous, and minutely erose, 6.5 mm. long; achenes cuneate-obovate, silky, 5 mm. long, 2.5 mm. wide; awns 2, ciliolate, at base strongly ampliate and deeply lacerate, unequal, about 3 mm. long; squamellæ none.

Type in the Berlin Herbarium, collected at Cuesta Miranda, Sierra Famatina, Province Rioja, Argentina, March 10, 1879, by G. Hieronymus and G. Niederlein (no. 876). Photograph and fragments in the Gray Herbarium.

Flourensia niederleinii is distinguished from *F. polyclada* by its ovate or oblong-ovate leaves, and by its phyllaries, which are linear-lanceolate or linear-spatulate from an ovate-lanceolate base; from *F. campestris* and *F. riparia* by its characteristic phyllaries and its much smaller leaves.

16. *Flourensia campestris* Griseb. Abh. Ges. Wiss. Göttingen 19: 184. 1874.

Helianthus campestris Kuntze, Rev. Gen. Pl. 3²: 157. 1898.

Branching shrub, about 2 meters high; branches resinous-granulose, somewhat hispidulous, the older gray, glabrate; leaf blades 5 to 9 cm. long, 1.3 to 3.4 cm. wide, lanceolate to ovate or oblong-lanceolate, acuminate, mucronate, cuneate to rounded at base, entire or rarely slightly denticulate with appressed teeth, usually resinous-granulose, with about 13 pairs of lateral veins, prominulous-reticulate especially beneath; petioles 3 to 13 mm. long; heads in cymose panicles of 5 to 15 at ends of branches, on terminal and axillary leafy-bracted peduncles; pedicels 0.8 to 2.5 cm. long; heads 2.5 cm. wide; disk 8 to 11 mm. high, 7 to 10 mm. thick; involucre 2-seriate, 4 to 5 mm. high, the phyllaries lance-subulate, subobtuse, loose, resinous-granulose; rays about 8, oval to oblong-oval, 7 to 10 mm. long, 3.3 to 4.3 mm. broad; disk corollas about 16 to 23, resinous on the teeth, 4.5 mm. long (tube 0.9 mm.); pales truncate-mucronulate, resinous at apex, 8 mm. long; achenes blackish, ciliate on the whitish margin, pubescent on the sides, 5 to 6.5 mm. long; awns 2, ciliolate, 3.5 mm. long; squamellæ none.

TYPE LOCALITY: Field southeast of Córdoba, Argentina.

SPECIMENS EXAMINED:

ARGENTINA: Abundant in field southeast of Córdoba, 1871, *Lorentz* 245 (type; Ber., fragm. G). Puesto de San José, upper side of the Caleras Sierra near Córdoba, 1876, *Hieronymus* 276 (Ber., N). Sierra Chica de Córdoba, la Falda de la Pumilla, 1876, *Hieronymus* 623 (Ber., N). Between San Rouque

and Malagueña, Sierra Chica, January 13, 1871, *Hieronymus* (Ber.). Río Zeballos, Sierra Chica, January 13, 1878, *Galander* (B, Ber.). Córdoba, *Schuyder* (Ber.); September, 1892, *Kuntze* (Ber., N); *Lorentz* 664 (Ber.).

Distinguished from *F. riparia* chiefly by the smaller heads with fewer disk florets (29 to 40 in *F. riparia*). Furthermore, *F. riparia* has looser panicles with longer-peduncled heads.

17. *Flourensia riparia* Griseb. Abh. Ges. Wiss. Göttingen 24: 196. 1879.

Helianthus riparia Kuntze, Rev. Gen. Pl. 3²: 157. 1898.

Branching shrub; branches somewhat resinous, the youngest striate, puberulous; leaf blades 6 to 13 cm. long, 1.5 to 5 cm. wide, oblong-lanceolate to oblong-ovate or elliptic-ovate, acute to acuminate, acute at base, entire, rather thin, minutely puberulous, resinous-granulose, at length subglabrate, somewhat prominulous-reticulate beneath; petioles hirsutulous, 3 to 8 mm. long; heads cymose-paniculate at ends of branches, 3.6 to 4 cm. wide, nodding in fruit; pedicels resinous, puberulous, bracteate, 3 to 5.6 cm. long; disk 1 to 1.2 cm. high, 1.1 to 1.5 cm. wide; involucre 3-seriate, 5 to 6 mm. high, the phyllaries lance-subulate to lance-ovate, loose, resinous, ciliolate, subequal; rays about 10, oblong, 1.4 to 2 cm. long, 3.6 mm. wide; disk corollas 29 to 40, resinous on the teeth, 5 mm. long (tube 0.8 mm.); pales resinous at apex, subtruncate, 7 mm. long; achenes flattish, striate, villous-ciliate, sparsely puberulous above, 6 to 6.5 mm. long, 2.8 to 3 mm. wide; awns 2, ciliate, slightly widened below, unequal, 4 to 4.2 mm. long; squamellae none.

TYPE LOCALITY: Passage of the Río Turamento, Province of Salta, Argentina.

SPECIMENS EXAMINED:

ARGENTINA: Passage of the Río Turamento, Province of Salta, February, 1873, *Hieronymus* & *Lorentz* 268 (type; Ber., N, photo. and fragm. G). Sierra between El Rincón and Clavisan, fluvial district of the Río del Tala, Province of Salta, 1873, *Lorentz* & *Hieronymus* (Ber.).

This species is very closely related to *F. campestris*, but may be distinguished by its larger heads and more numerous disk florets.

18. *Flourensia tortuosa* Griseb. Abh. Ges. Wiss. Göttingen 19: 184. 1874.

Branching shrub, about 2 meters high; younger branches more or less flexuous, resinous-granulose, more or less pubescent, 1 to 3-capitate; leaf blades 3.2 to 10.5 cm. long, 1.3 to 3 cm. wide, lanceolate to ovate-lanceolate, ovate, or oval, acute to acuminate or obtuse, sharply mucronate, cuneate or rounded at base, entire, prominulous-reticulate (lateral veins 5 to 11 pairs), sparsely resinous-granulose, slightly puberulent especially when young, narrowed into scarcely margined petioles 2.5 to 15 mm. long; peduncles 1 to 3.8 cm. long; heads 6 to 7 cm. broad; disk 10 to (fruit) 15 mm. high, 11 to 18 mm. wide; involucre 3-seriate, 7 to 11 mm. high, the phyllaries variable, equal or unequal, broadly ovate to oblong, at least the outer with gradually or abruptly narrowed lanceolate tips, the inner acute or rarely obtusish, all striate, resinous-granular, ciliolate, the inner thinner, erose-ciliate; rays 10, broadly oblong, minutely emarginate to deeply bilobed, 1.8 to 3 cm. long, 7 to 10 mm. broad; disk corollas glabrous, 4.2 mm. long (tube 0.7 mm.); pales ampliate and resinous above, truncate and erose-ciliolate at apex, 1 cm. long; achenes (immature) silky-villous, 6 mm. long; awns 2, unequal, slender, sometimes unequally bifid, up to 3.5 mm. long; squamellae none.

TYPE LOCALITY: Between Belén and Yacutula, Province Catamarca, Argentina.

SPECIMENS EXAMINED:

ARGENTINA: Fields between Belén and Yacutula, *Lorentz* 479 (type collection; Ber., fragm. G). Yacutula, 1878, *Schickendantz* 166 (Ber., photo. G); in 1879, *Schickendantz* 4 (Ber., fragm. G). Quebrada de Villavil, 1876, *Schickendantz* 166 (Ber.). Catamarca, 1896, *Bettfreund* 1125 (Ber.). Department of Andalgalá, 1916, *Jørgensen* 1273 (G).

This species and the next are distinguished by their broadly ovate or oval phyllaries. In the present plant these are provided with abruptly narrowed tips which are wanting in *F. oolepis*.

19. *Flourensia oolepis* Blake, sp. nov.

Branching shrub; branchlets densely resinous-granular, 1 or 2-headed; leaf blades 5.5 to 8.5 cm. long, 2 to 3.2 cm. wide, elliptic-lanceolate or elliptic, acuminate at each end, entire or with a few acute teeth above, reticulate-venulose with about 12 pairs of lateral veins, resinous-granular and minutely puberulous with several-celled hairs chiefly along veins and veinlets; petioles about 1 cm. long, marginate above, resinous; peduncles resinous, minutely puberulous at apex, 4 to 6 cm. long; heads 3 to 3.5 cm. wide; disk 1 to 1.2 cm. high, 1.7 to 2.1 cm. thick; involucre 4-seriate, 7 to 8 mm. high, graduated, the outer phyllaries broadly ovate (5 to 5.5 mm. long, 2.5 to 4 mm. wide), the inner gradually more oblong, all more or less striate, acutish, mucronate, densely resinous-granular, ciliolate; rays 12 to 16, linear-oblong, 12 mm. long, 2.5 mm. wide; disk corollas sparsely resinous, 4.5 mm. long (tube 1 mm.); pales widened above, subtruncate and resinous at apex, strongly striatulate, 7 mm. long; achenes obovate, silky except toward margin, 5.5 to 6.5 mm. long; awns 2, strongly ampliate and deeply lacerate at base, 4 mm. long; true squamellae none.

Type in the Berlin Herbarium, collected at Cuesta de la Oyada, Sierra Achala de Córdoba, Argentina, March 22, 1876, by G. Hieronymus. Photograph and fragments in the Gray Herbarium.

ADDITIONAL SPECIMEN EXAMINED:

ARGENTINA: Foot of the Cuesta de la Chacras, near Devisaderos, Tanninga, etc., west side of the Sierra de Córdoba, February 14, 1876, *Hieronymus* (Ber.).

Flourensia oolepis is distinguished from its only near relative, *F. tortuosa*, by the acutish, not abruptly narrow-tipped, phyllaries.

20. *Flourensia leptopoda* Blake, sp. nov.

Branching shrub; younger branchlets purplish, resinous-granulose, the older ones brown; leaf blades 3 to 4.5 cm. long, 1.3 to 2.5 cm. wide, rhombic-ovate, acuminate, mucronate, cuneate at base, deeply and irregularly repand-dentate with 4 to 6 pairs of cuspidate teeth, lucid, reticulate-venose with about 10 pairs of lateral veins, glabrous or beneath resinous-granular and very slightly hispidulous; petioles slender, 8 to 12 mm. long; heads 1.5 cm. wide, racemose-paniculate on 1 to 3-headed terminal and axillary peduncles; disk 8 mm. high, 8 mm. thick; involucre 2-seriate, 4 to 5 mm. high, the phyllaries equal, lanceolate or lance-subulate, subobtuse, resinous-granular and very sparsely strigillose; rays oval, tridenticulate, 7 mm. long, 4.5 mm. wide; disk corollas glabrous, 4.5 mm. long (tube 1.2 mm.); pales resinous, obtuse, 5.5 mm. long; immature achenes silky, 3.5 mm. long; awns 2, ciliate, slightly flattened, 3 mm. long; squamellae none.

Type in the Berlin Herbarium, collected at Farrecillas (?), Province Rioja, Argentina, March 5, 1906, by J. S. Urriche. Photograph and fragments in the Gray Herbarium.

Readily distinguished by its deeply dentate rhombic-ovate leaves on long slender petioles. Like others of the same genus, this species bears the vernacular name "maravilla."

21. *Flourensia thurifera* (Molina) DC. Prodr. 5: 592. 1836.

Helianthus thurifer Molina, Sagg. Stor. Nat. Chil. 160. 1782.

Helianthus glutinosus Hook. & Arn. Bot. Beechey Voy. 32. 1830.

Tithonia glutinosa Collie; Hook. & Arn. Bot. Beechey Voy. 32. 1830, as synonym.

Diomedea thurifera Bertero; Colla, Mem. Accad. Sci. Torino 38: 37. pl. 31. 1835.

Flourensia besseriana Meyen & Walp. Nov. Act. Acad. Caes. Leop. Carol. 19: Suppl. 1: 270. 1843.

Flourensia thurifera γ *lanceolata* Remy; Gay, Fl. Chil. 4: 288. 1849.

Helianthus besseriana Benth. & Hook.; Hook. & Jacks. Ind. Kew. 1²: 1112. 1893, as synonym.

Erect resinous shrub, 2 meters high, the branches striate, greenish brown or yellowish brown, the young branchlets purplish brown, sparsely pubescent; leaf blades 5.5 to 10 cm. long, 1.5 to 3.5 cm. wide, elliptic or ovate to oblong-elliptic, subacuminate to obtuse at apex, mucronate, cuneate at base, shallowly repand-dentate with 4 to 7 pairs of coarse depressed-triangular mucronate teeth or rarely subentire, thickish, resinous, with a few loose hairs on midvein beneath, prominulous-reticulate with 7 to 12 pairs of conspicuous lateral veins; petioles 2 to 5 mm. long; upper leaves reduced and often entire; heads 3.5 to 7 cm. wide, 2 to 6 at ends of branches on naked or linear-bracted, terminal and axillary, 1-headed peduncles 3 to 13 cm. long; disk 10 to 14 mm. high, 1.4 to (fruit) 2.5 cm. wide; involucre 2 or 3-seriate, subequal or with the outer phyllaries shorter, 1 to 2 cm. high, the phyllaries oblong-lanceolate or lanceolate to oblong-spatulate, acute, loose, herbaceous, thickish, slightly ciliate; rays about 12, oval to oval-oblong, golden-yellow, barely emarginate, glabrous, 1.4 to 2.6 cm. long, 5 to 10 mm. wide; disk corollas 5.5 mm. long (tube 1 mm.), the throat slender-funnel-form; pales widened upwardly, scarious-margined, obtuse, often mucronate, blackish green at apex, 9 to 10 mm. long; achenes oblong-obovate, thickened, villous, 6.5 to 7.5 mm. long, 3 to 3.6 mm. wide; awns 2, stoutish, ciliate, somewhat flattened, 3 to 3.5 mm. long, one or both often split nearly or quite to base, forming 1 or 2 lateral squamelloid awns.

TYPE LOCALITY: Vicinity of Valparaiso, Chile.

ILLUSTRATION: Mem. Accad. Sci. Torino 38: pl. 31.

SPECIMENS EXAMINED:

CHILE: Coquimbo, *Gaudichaud* 84 (G). Valparaiso or vicinity, 1825, *Macrae* (K); in 1830, *Bertero* 954 (B); in 1830, *Bridges* (B, G, K); in 1831, *Cuming* 631 (B, K); in 1832, *Bridges* 234 (B, K); in 1856, *Harvey* (G, K); in 1882, *Philippi & Borchers* (B); in 1914, *Rose* 19113 (N); *Gaudichaud* 153 (G); *Wilkes Exploring Expedition* (G, N); *Moseley* (B); *Reed* (B). Santiago, 1855, *Germain* (B, K); *Philippi* 592 (B), 560 (Ber.). San Cristóbal, near Santiago, 1900, *Hastings* 137 (N). Las Esmeraldas, Department Melipilla, October, 1867, *Reed* (K). Common on hills about Llaillai, 1904, *Scott Elliot* 357 (B). Commonest shrub of foothills, Los Andes, 1904, *Scott Elliot* 415 (B). Without definite locality, *Besser* (type of *F. besseriana*; Ber., photo. and fragm. G); *Cruikshanks* 155 (K); *Gay* (G, K).

Flourensia thurifera, the commonest South American species in herbaria, is usually readily recognized by its large, elliptic to oblong-elliptic, coarsely but shallowly dentate leaves and large involucre of oblong-lanceolate to oblong-spatulate phyllaries. Although Molina's original account¹² of the species is very short, and his description of the leaves decidedly unsatisfactory, his general account of the plant and its habitat is sufficient to justify the retention of the name in the sense in which it has been used by all subsequent authors. The species bears the vernacular name "maravilla," like others of the genus, and its resin is used for incense in the churches.

22. *Flourensia angustifolia* (DC.) Blake.

Flourensia thurifera β *angustifolia* DC. Prodr. 5: 592. 1836.

Glutinous branching shrub, 0.5 meter high; younger branches and peduncles somewhat sordid-puberulous; leaf blades 3.5 to 7.2 cm. long, 7 to 13 mm. wide, narrowly

¹² "Nelle colline adiacenti al porto de Valparaiso si trova una specie di Girasole *Helianthus thurifer*(*) di consistenza legnosa, dal quale scola ancora una sostanza resinosa, che simiglia per la forma, e per l'odora al vero incenso." (Molina, loc. cit. in text.) "(*)*Helianthus caule fruticoso, foliis lineari-lanceolatis*." (Footnote, loc. cit.)

oblong-lanceolate or lanceolate, acute to acuminate at both ends, slightly repand-denticulate or subentire, resinous-granulose, reticulate, the 15 to 22 pairs of lateral veins scarcely prominulous; petioles margined, 2 to 3 mm. long; heads 3 to 6 at ends of branches, 3 to 4 cm. broad; peduncles axillary and terminal, 1.5 to 6.5 cm. long; disk 8 to 10 mm. high, 8 to 15 mm. thick; involucre 2 or 3-seriate, 6 to 8.5 mm. high, the phyllaries linear-lanceolate (0.8 to 1 mm. wide), subequal, subacute, gradually narrowed from base to apex, resinous-granulose, sparsely ciliate; rays 8, oblong, 1.2 to 1.9 cm. long, 4 to 7 mm. broad; disk corollas somewhat resinous-granulose, 4.5 to 5 mm. long (tube 1 to 1.2 mm.); pales obtuse, resinous-granulose, 8 mm. long; achenes scarcely thickened at maturity, densely silky-villous, 8 mm. long; awns 2, slender, subequal, 4 mm. long; squamellae none.

TYPE LOCALITY: Tarma, Peru.

SPECIMENS EXAMINED:

PERU: Tarma, *Dombey* 24 (cotype collection; Ber., photo. G., Prod.). Abundant, dry slopes, Tarma, Department of Junin, altitude 3,000 to 3,500 meters, 1903, *Weberbauer* 2385 (Ber., fragm. G).

Dombey's plant is labeled "Chile" in the Prodromus Herbarium, but a specimen from *Dombey* in the Berlin Herbarium, presumably of the type collection of DeCandolle's variety, is marked as from Tarma, whence also comes *Weberbauer* 2385, the only other collection of this species examined. *Flourensia angustifolia* is distinguished from *F. thurifera* by its narrowly oblong-lanceolate or lanceolate, denticulate or subentire leaves and shorter involucre of linear-lanceolate phyllaries.

23. *Flourensia macrophylla* Blake, Bot. Jahrb. Engler 54: Beibl. 119: 47. 1916.

Branching shrub, the younger branchlets resinous, slightly puberulous; leaf blades 5 to 8.3 cm. long, 2 to 4 cm. wide, oval or oblong-oval, acute or subobtuse, mucronate, broadly cuneate at base, shallowly cuspidate-denticulate above the entire lower third with 11 to 17 pairs of teeth, strongly prominulous-reticulate with 12 to 16 pairs of lateral veins, shining, resinous-granular; petioles narrowly margined, 1.5 to 3 mm. long; heads 2 cm. wide, in cymose panicles of 1 to 3, at apex of terminal and axillary peduncles 3 to 5.5 cm. long; disk 7 to 7.5 mm. high, 8 to 11 mm. thick; involucre 3-seriate, 7 to 8 mm. high, the phyllaries subequal, lanceolate or oblong-lanceolate, not widened above, subacute, resinous-granular and very sparsely ciliate, the outer loose; rays about 8, oval, 8 mm. long, 3.5 mm. wide; disk corollas resinous on teeth, 3.5 mm. long, the tube 0.8 mm. long, gradually widened into the throat; pales colorate and resinous at apex, scarcely mucronate, 6.5 mm. long; immature achenes silky, 3.5 mm. long; awns 2, slender, ciliate, 2.2 mm. long; squamellae none.

TYPE LOCALITY: Between Matucana and Tambo de Viso, Peru.

SPECIMENS EXAMINED:

PERU: Stony places, altitude 2,370 to 2,650 meters, along Lima-Oroya Railroad, between Matucana and Tambo de Viso, December 26, 1901, *Weberbauer* 119 (type, Ber., photo. and fragm. G).

This species may be separated from *F. thurifera* and *F. angustifolia* by its oval or oblong-oval, regularly denticulate leaves, small heads, and small rays.

EXCLUDED SPECIES.

FLOURENSIA ATACAMENSIS (Phil.) Reiche, Anal. Univ. Chile 112: 146. 1903.

Helianthus atacamensis Phil. Anal. Mus. Nac. Chile Bot. 1891: 48. 1891.

This species, of which I have examined authentic material in the Berlin Herbarium, is identical with *Viguiera pazensis* Rusby.¹³

FLOURENSIA CORYMBOSA DC. Prodr. 5: 592. 1836.

This species is properly known as *Viguiera revoluta* (Meyen) Blake.¹⁴

¹³ See Blake, Contr. Gray Herb. n. ser. 54: 142. 1918.

¹⁴ Contr. Gray Herb. n. ser. 54: 121. 1918.

FLOURENSIA CORYMBOSA ARAUCANA (Phil.) Reiche, Anal. Univ. Chile 112: 145. 1903.

Helianthus araucanus Phil. Anal. Univ. Chile 90: 39. 1895.

Identical with *Viguiera revoluta* (Meyen) Blake.

FLOURENSIA CORYMBOSA LANCEOLATA (Meyen) Reiche, Anal. Univ. Chile 112: 144. 1903.

Helianthus lanceolatus Meyen, Reise um die Erde 1: 311. 1834.

A synonym of *Viguiera revoluta* (Meyen) Blake.

FLOURENSIA GAYANA (Phil.) Reiche, Anal. Univ. Chile 112: 145. 1903.

Helianthus gayanus Phil. Anal. Univ. Chile 90: 39. 1895.

Apparently this plant is identical with *Viguiera revoluta* (Meyen) Blake, in which the phyllaries are sometimes appressed as here described by Philippi.

FLOURENSIA HISPIDA Phil. Anal. Univ. Chile 36: 186. 1870.

Identical with *Viguiera gilliesii* (Hook. & Arn.) Hieron.¹⁵

FLOURENSIA NAVARRI (Phil.) Reiche, Anal. Univ. Chile 112: 145. 1903.

Helianthus (Flourensia) navarri Phil. Anal. Univ. Chile 90: 37. 1895.

From Philippi's and Reiche's descriptions this is probably a *Wedelia*, but no specimen has been seen by the writer and the status of the species is uncertain. It can not be a *Flourensia* in any case.

¹⁵ See Blake, Contr. Gray Herb. n. ser. 54: 120. 1918.

REVISION OF THE GENUS OYEDAEA.

By S. F. BLAKE.

INTRODUCTION.

In 1836 De Candolle¹ proposed the genus *Oyedaea*, named for the early Spanish navigator Alphonso Oyeda, and based on the two new species *O. verbessinoides* and *O. buphthalmoides*, the first of which was figured soon afterward in Delessert's *Icones*. In 1848 Gardner² published *O. angustifolia* from Brazil, and described under *Viguiera* two species which were later referred to *Oyedaea* by Bentham and Hooker. He also described³ the genus *Serpaea* with two species, one of which, *S. oblonga*, wrongly referred to *Viguiera* by Bentham and Hooker, was placed in *Aspilia* by Baker in 1884, while the other, *S. ovata*, which must be considered the type of his genus, was referred with three new species to *Oyedaea* by Baker, under the subgeneric name *Serpaea*. In 1858 two new species were published from Colombia by Triana,⁴ *O. cuerviana* (*Triana* 1520, specimen no. 4), and *O. helianthoides* (*Triana* 1520, specimen no. 5). The types of these species I have not been able to examine, but from description the former seems correctly referred to this genus. *O. helianthoides*, however, with a pappus of numerous caducous awns, must belong to *Perymenium* or more probably to *Steiractinia*. It is said by Triana to be identical with *Helianthus scaber* of the Willdenow Herbarium.

In the *Genera Plantarum* of Bentham and Hooker⁵ the genus *Oyedaea*, distinguished from *Zexmenia* solely by its neutral rays, was divided into the three sections, *Wedelioides*, *Serpaea* (Gardn.), and *Verbesinoides*, and the number of species was estimated at 22. Hoffman⁶ in 1890 gave the number of species as 15. The present writer,⁷ when revising the genus *Dimerostemma* Cass. (*Serpaea* Gardn.) in 1917, estimated the number of species of *Oyedaea* at about 20, but subsequent study has reduced this to 13.

¹ Prodr. 5: 576. 1836.

² Lond. Journ. Bot. 7: 293, 398-399. 1848.

³ Lond. Journ. Bot. 7: 296. 1848.

⁴ Ann. Sci. Nat. IV. 9:39. 1858.

⁵ Gen. Pl. 2: 374. 1873.

⁶ In Engl. & Prantl, Pflanzenfam. 4⁵: 238. 1890.

⁷ Contr. Gray Herb. n. ser. 52: 8. 1917.

The genus *Oyedaea* is closely related to *Zexmenia*, *Dimerostemma*, and *Aspilia*. From *Zexmenia* it is readily if somewhat artificially distinguished by its neutral rays. From *Dimerostemma* it differs in its round-sided achenes (four-angled and four-winged only in *O. humboldtiana*), in its lack of a secondary external foliaceous involucre, and in its pappus. The pappus of *Dimerostemma* is composed of two awns only, without intermediate corona, although the lateral angles of the achenes are sometimes produced into short teeth or rarely into awns nearly or quite as long as those of the main angles. In a single species of *Dimerostemma* (*D. asperatum*) the awns are connected at base by their lacerate decurrent bases, but there is no true corona, constricted at base, such as is found in *Oyedaea*. The genus *Aspilia* is distinguished from *Oyedaea* by the fact that its achenes are not winged, although in some species there is a corneous auriculiform appendage on each of the upper angles of the achene. *Oyedaea angustifolia* and *O. bonplandiana*, possessing these appendages but lacking the continuous wing of *Oyedaea*, are here placed in *Aspilia*.

SYSTEMATIC TREATMENT.

OYEDAEA DC.

Oyedaea DC. Prodr. 5: 576. 1836.

Shrubs or herbaceous perennials, with opposite, entire to serrulate leaves and medium-sized yellow heads; heads heterogamous, radiate, the ray flowers 1-seriate, ligulate, neutral, those of the disk numerous, tubular, fertile; involucre 2 to 5-seriate, graduated, subequal, or with the outer phyllaries longer, the phyllaries lanceolate to oval or oblong, indurate at base or essentially throughout, usually with herbaceous tips, or the outer sometimes foliaceous; receptacle flattish or slightly convex; pales firm, concave, persistent; rays oval to linear-oblong, neutral; disk corollas with slender tube, cylindric or cylindric-funnelform throat, and 5-toothed limb; anthers sagittate at base, with ovate terminal appendages; style branches slender, dorsally hispid or hispidulous above, with short, lanceolate, hispid or hispidulous sterile appendages; disk achenes somewhat thickened but distinctly compressed, oblong or rarely cuneate-obovate, 2-winged (in one species 4-angled and 4-winged), the wings narrow or sometimes rather broad, usually united above to the awns or corona; pappus of 2 slender persistent awns and a corona of about 6 to 12 narrow, fimbriate or lacerate, more or less united squamellae.

Type species, as here selected, *Oyedaea verbesinoides* DC.

KEY TO SPECIES.

Phyllaries oval or oblong to lanceolate, with indurate base and herbaceous, loose or reflexed tip.

Plants frutescent.

Phyllaries oval or broadly obovate, with indurate base and herbaceous, usually rounded apex, the innermost in fruit somewhat elongate and with membranous-chartaceous rounded apex.....1. *O. bupthalmoides*.

Phyllaries ovate or oblong to lanceolate, rarely obovate-lanceolate, acute to acuminate or rarely obtuse, the inner not elongate and membranous-chartaceous at apex.

Involucre 4 to 9.5 mm. high, the phyllaries with indurate base and shorter, usually deltoid, mostly reflexed apex.

Leaves feather-veined or sometimes obscurely triplinerved.

Outer phyllaries linear-lanceolate; leaves lanceolate or ovate-lanceolate, obscurely reticulate beneath 2. *O. scaberrima*.

Outer phyllaries ovate-lanceolate to ovate; leaves strongly reticulate beneath.

Leaves rather densely hispid-pilose or pilosulous between the veins on lower surface.

Leaves hispid-pilose beneath; involucre 5.5 to 8 mm. high, the phyllaries acute, scarcely reflexed.

Leaves oblong-ovate to ovate, obscurely serrulate, rounded at base. 3. *O. wedelioides*.

Leaves lance-ovate, distinctly serrulate, cuneate at base.

4. *O. reticulata*.

Leaves hispidulous-pilosulous beneath; involucre 4 to 5 mm. high, the phyllaries acutish or obtusish, with strongly reflexed tips.

5. *O. rusbyi*.

Leaves hispidulous beneath, lanceolate or ovate-lanceolate. Involucre, 4.8 to 6 mm. high, the phyllaries mostly with obtuse reflexed tips.

6. *O. lanceolata*.

Leaves distinctly triplinerved 7. *O. boliviana*.

Involucre 11 to 16 mm. high, the phyllaries with short indurate base and longer, lanceolate to ovate, loose, herbaceous tip 8. *O. verbesinoides*.

Plants herbaceous.

Leaves linear 9. *O. bahiensis*.

Leaves oblong to ovate.

Head solitary; leaves 1.5 to 3.5 cm. long 10. *O. humboldtiana*.

Heads several; leaves 7.5 to 9 cm. long 11. *O. trachyphylla*.

Phyllaries ovate to oval, indurate, without distinct herbaceous tips. 12. *O. ovalifolia*.

1. *Oyedaea bupthalmoides* DC. Prodr. 5: 577. 1836.

Shrub; stem terete, brown, striate, densely hispid-pilose with loose curly hairs with scarcely enlarged bases, subcanescent above; branches erect, 3 to 18-headed at apex; leaf blades 7.5 to 13 cm. long, 2 to 5.3 cm. wide, ovate or ovate-lanceolate, acuminate, cuneate at base, crenate-serrate with 17 to 27 pairs of mucronate teeth, triplinerved 1 to 3 cm. above the base, above dark green, pubescent with incurved, rather soft, long and short hairs with scarcely enlarged bases, or tuberculate-hispid with short incurved hairs, beneath densely grayish-tomentulose or pilosulous, the veins brownish; petioles rather softly hispid-pilose, 1 to 1.3 cm. long; pedicels 2.4 to 7 cm. long, canescently hispid-pilose; heads 2.9 to 3.8 cm. wide; disk 8 to 10 mm. high, 11 to 16 mm. wide; involucre 3 to 4-seriate, graduated, 9 to 11 mm. high; outermost phyllaries 3 or 4, oblong to oval-oblong or obovate-oval, acutish to obtuse, herbaceous, in age strongly indurate and subcoriaceous below, spreading at apex, rather softly hispid-pilose with ascending hairs, and ciliate (6.5 to 7.5 by 2 to 3.5 mm.); the next series about 4, oval-oblong or obovate-oval, with somewhat indurate base and narrow scarious margin, herbaceous above, obtusish; the innermost in fruit somewhat elongate, exceeding disk, membranous-chartaceous above, strigillose or subglabrate on back, pilose-ciliate, 4.3 to 6 mm. wide toward the rounded, slightly broadened tip; rays 8 or more (?), oblong, 1.1 to 1.9 cm. long, 3 to 5.5 mm. wide; disk corollas glabrous except on teeth, 6 to 6.5 mm. long (tube 2 to 2.5 mm.); pales narrow, acute, appressed-denticulate toward apex, about 1 cm. long; achenes blackish or mottled, oblong, winged, sparsely appressed-pubescent, 4.5 to 6.5 mm. long, 1 to 2 mm. wide; awns 2, spinulose-ciliolate, unequal, 2.5 to 4.5 mm. long; squamellae

about 6 to 8, acuminate, ciliate, 0.4 to 1.3 mm. long, united at base into a cup adnate to the awns, and to the narrow prolongation of the wings.

TYPE LOCALITY: Peru. Types collected by Poeppig (nos. 22 and 1624).

SPECIMENS EXAMINED:

PERU: *Poeppig* 1624 (cotype collection; B). Chachapoyas, *Mathews* 1382 (K), 3058 (B, G, K). Without definite locality, *Mathews* 1735 (K).

Readily distinguishable by its leaves, which are grayish-tomentulose or densely pilosulous beneath, and by its broad, mostly rounded phyllaries, the inner with submembranaceous tips.

2. *Oyedaea scaberrima* (Benth.) Blake.

Lipochaete scaberrima Benth.; Hook. Journ. Bot. 2: 43. 1840.

Zexmenia scaberrima Benth. & Hook.; Hook. & Jacks. Ind. Kew. 2²: 1250. 1895.

Shrubby, the branches apparently drooping; stem ashy brown, slender, in youth densely tuberculate-hispidulous with ascending hairs, in age subglabrate but densely brownish-tuberculate; leaf blades 6 to 7.5 cm. long, 1.6 to 2.5 cm. wide, lanceolate or lance-ovate, acuminate, cuneate at base, obscurely serrulate with 8 to 10 pairs of appressed mucronate teeth, dull green above, tuberculate-strigillose, lepidote in age, beneath slightly paler, rather sparsely tuberculate-hispidulous, pinnate-veined (veins 6 to 9 pairs), finely and obscurely reticulate; petioles densely tuberculate-hispidulous, unmarginated, 4 to 6 mm. long; heads about 6 in a terminal narrow panicle, about 2.5 cm. wide, on densely tuberculate-hispidulous pedicels 1.1 to 1.4 cm. long; disk 9 to 10 mm. high, 1.2 cm. wide; involucre 4-seriate, somewhat graduated, 7 to 8 mm. high; outermost phyllaries linear-lanceolate, strongly indurate at base, rather densely hispidulous-strigillose, the herbaceous apex loose, mucronate; the next series similar but ovate-lanceolate, acuminate, with broad indurate base and narrow herbaceous apex; the next similar but merely acute, the innermost oblong and obtuse, with scarcely herbaceous tip; rays pale yellow, narrowly oblong, sparsely puberulous and gland-dotted on veins of back, 1 cm. long, 3.5 mm. wide; disk corollas sparsely hispidulous on teeth; pales narrow, barely keeled, acute, minutely strigillose toward apex, 8 mm. long; achene blackish, oblong, strongly compressed, narrowly winged on each side, 5 mm. long, 1.8 mm. wide; awns 2, unequal, slender, minutely ciliate, 3 to 4 mm. long; squamellae about 8 to 10, fimbriate, united below into a cup nearly 1 mm. high.

TYPE LOCALITY: Mount Roraima, British Guiana.

SPECIMEN EXAMINED:

BRITISH GUIANA: Mount Roraima, 1839, *Schomburgk* (type; K, fragm. G).

Although included in *Zexmenia* by W. W. Jones⁸ in his revision of that genus, this species has neutral rays and is a true *Oyedaea*. It is distinguished from related species by the narrow leaves and phyllaries.

3. *Oyedaea wedelioides* (Klatt) Blake.

Zexmenia wedelioides Klatt, Abh. Naturf. Ges. Halle 15: 328. 1881.

Shrub about 3 meters high; stem dull brown, subterete, tuberculate-strigose, glabrate but persistently tuberculate below, the inflorescence densely strigillose-hispidulous or shortly hispid-pilose with erect hairs; leaf blades 4.2 to 12.5 cm. long, 2.2 to 5 cm. wide, ovate or oblong-ovate to oval-ovate, acute or acuminate, at base broadly rounded, obscurely serrulate with 15 to 18 pairs of appressed mucronulate teeth, above dark green, impressed-nerved, tuberculate-strigose and strigillose, beneath scarcely paler, rather densely hispid-pilose with spreading hairs longer along the veins, sparsely gland-dotted, penninerved with 9 to 12 pairs of lateral veins and strongly prominulous-reticulate; petioles densely hispid-pilose, 4 to 15 mm. long; heads 1.7 to 3 cm. wide, ternately arranged in cymose panicles of 5 to 21 at ends of

⁸ Proc. Amer. Acad. 41: 146. 1905.

stem and axillary flowering branches, the ultimate bracts of inflorescence lanceolate, with indurate base and herbaceous tip, 3 to 6 mm. long; pedicels densely hispidulous-pilosulous, 7 to 25 mm. long; disk 9 to 14 mm. high, 6 to 13 mm. thick; involucre 4-seriate, graduated, 5.5 to 8 mm. high, the one or two outermost series of phyllaries ovate-lanceolate, acuminate, narrowed nearly from base to apex, the inner acute, ovate-oblong to oblong, all with strongly indurate, subcoriaceous, yellowish white, usually 1-vittate lower portion and lanceolate (outermost) to deltoid, loose or reflexed, herbaceous apex (the innermost with an appressed subherbaceous tip), more or less densely strigose and strigillose on the herbaceous apex, the outermost so nearly throughout; receptacle slightly convex; rays 12 to 18, linear-oblong, barely emarginate, 7 to 13 mm. long, 2 to 3 mm. wide; disk corollas glabrous except for the hispidulous teeth, slender, 4.5 to 6.8 mm. long (tube 1.5 to 2.2 mm.); pales narrow, carinate, acute to acuminate, hispidulous-ciliolate at apex, 6 to 9 mm. long; achenes oblong, blackish, sparsely strigillose, winged, 3.5 to 4.5 mm. long, 0.7 to 1.5 wide; awns 2, fragile, unequal, minutely ciliolate, slender, 3.5 to 4.5 mm. long; squamellae 6 to 12, subequal, 0.6 to 1.2 mm. long, lacerate, united below into a cup on the somewhat constricted achene apex.

TYPE LOCALITY: Moyobamba, Peru.

SPECIMENS EXAMINED:

PERU: Moyobamba, 1835, *Mathews* 1383 (type collection; B, G, K). Lamas, 1835, *Mathews* 1384 (K). Sandy plains near Tarapoto, 1855, *Spruce* 3922 (B, G, K).

Like the last, this species has neutral rays and is a true *Oyedaea*, although included in *Zexmenia* by W. W. Jones. It is distinguished from *O. reticulata*, its closest ally, by its broadly round-based leaves and looser inflorescence.

4. *Oyedaea reticulata* Blake, sp. nov.

Shrub or "herb"; stem brown, densely and somewhat harshly appressed-pilose and glandular; leaf blades 8.5 to 10.5 cm. long, 2.5 to 4.3 cm. wide, ovate-lanceolate or ovate, acuminate, at base cuneate, regularly crenate-serrate with 17 to 20 pairs of depressed mucronulate teeth, penninerved with about 8 pairs of veins and obscurely triplinerved, reticulate beneath, above dull green, harshly tuberculate-strigillose, below rather harshly pilose-hispid and glandular; petioles flattened, subappressed-pilose and glandular, 0.8 to 1.2 cm. long; heads several at apex of branches, on terminal and axillary 1 to 5-headed peduncles 2.5 cm. long or less, 2.3 to 3 cm. wide; disk 1.2 cm. high, 1 to 1.5 cm. thick; involucre 4-seriate, slightly graduated, 8 to 9.5 mm. high, the outer phyllaries triangular-ovate, acute, ciliate and glandular-pilose, below indurate and coriaceous, the 1-nerved herbaceous apex spreading, the inmost phyllaries subobtuse, submembranaceous; rays about 12, yellow, oblong, glandular-pubescent on back, 7.5 to 12 mm. long, 3 to 3.5 mm. wide; disk corollas yellow, puberulous on teeth, 5.3 mm. long (tube 0.8 mm.); pales firm, subscarios, very acute, narrowly carinate, more or less puberulous, 9 to 9.5 mm. long; achenes black, sparsely pubescent, narrowly oblong, rugulose, very narrowly winged, 5.7 to 6 mm. long, 1.1 to 1.5 mm. wide; awns 2, fragile, unequal, spinulose, 4.5 to 5.5 mm. long; squamellae about 12, unequal, about 1.4 mm. long, lacerate, united to middle into a corona.

Type in the British Museum, collected at Caqueza, Colombia, at an altitude of 1,800 meters, by J. Triana (no. 1383); also in the Kew Herbarium; photograph and fragments in the Gray Herbarium.

ADDITIONAL SPECIMEN EXAMINED:

COLOMBIA: Moist bank, altitude 1,400 to 1,500 meters, Monte Redondo to Quetame, Cundinamarca, 1917, *Pennell* 1860 (N. Y. Bot. Gard.).

This species is distinguished from *O. wedelioides* by its narrower cuneate-based leaves and often crowded heads; from *O. rusbyi* and *O. lanceolata* by its larger involucre and the longer pubescence of its leaves.

5. *Oyedaea rusbyi* Blake, sp. nov.

Shrub with erect branches; stem terete, pale brown, densely tuberculate-strigillose and hispid-strigose with tuberculate-based hairs, at length glabrate; leaf blades 4.5 to 9.5 cm. long, 1.8 to 3.5 cm. wide, oblong-ovate to lance-ovate, acute to acuminate, mucronate, at base rounded, obscurely appressed-serrulate, slightly revolute, penninerved with 10 to 15 pairs of lateral veins, above dull green, rugulose and impressed-nerved, densely and very harshly tuberculate-strigillose, beneath scarcely paler, venose-reticulate, densely, nearly uniformly, and somewhat harshly pilosulous-hispidulous with spreading hairs, along the veins strigillose-hispidulous with subtuberculate-based hairs; petioles unmarginated, densely tuberculate-strigose, 4 to 10 mm. long; heads 1.8 to 2.1 cm. wide, numerous, cymose-panicled at tips of branches; pedicels densely hispidulous, 7 to 14 mm. long; disk 8 to 10 mm. high, 8 to 12 mm. thick; involucre 4 to 5-seriate, strongly graduated, 4 to 5 mm. high, the phyllaries triangular-ovate to (innermost) oblong-ovate, below strongly indurate and subcoriaceous, ciliate, on back sparsely strigillose or glabrous, the short, abruptly herbaceous, reflexed or spreading, deltoid apex subacute or obtuse; rays about 12, yellow, narrowly oblong, 9 to 10 mm. long, 1.8 to 2.5 mm. wide; disk corollas yellow, puberulous on teeth, with very slender tube and cylindrical-funnelform throat, 5.7 mm. long (tube 1.8 to 2 mm.); pales narrow, carinate, acuminate, at apex minutely ciliolate, 8 to 8.5 mm. long; achenes (very immature) appressed-pubescent; awns 2, equal, 1.8 mm. long; squamellae about 8, lanceolate, acuminate, lacerate, united to middle into a cup.

Type in the United States National Herbarium, no. 26728, collected at Reis, Bolivia, at an altitude of 455 meters, June, 1886, by H. H. Rusby (no. 2138). Also in the British Museum, the Gray Herbarium, and the Kew Herbarium.

The type collection of this species was originally recorded by Britton⁹ as a "*Calea* probably undescribed," and has generally been referred in herbaria to *Zexmenia* or *Viguiera*. It represents, however, a typical species of *Oyedaea*, distinguished from *O. lanceolata*, its nearest ally, by its smaller involucre and by having its leaves densely hispidulous-pilosulous beneath.

6. *Oyedaea lanceolata* (Rusby) Blake.

Calea lanceolata Rusby, Bull. N. Y. Bot. Gard. 8: 132. 1912.

Shrub, 1.3 to 6.6 meters high, the trunk 6.5 cm. in diameter or less; stem lepidote-tuberculate below, above tuberculate-hispid-strigose and finely hispidulous; leaf blades 3.3 to 11 cm. long, 1 to 3.5 cm. wide, lanceolate or ovate-lanceolate, acuminate, at base cuneate or rounded-cuneate, entire or obscurely serrulate, somewhat revolute, penninerved with about 12 pairs of veins, green on both sides, above very harshly tuberculate-strigose and strigillose, in age tuberculate, beneath spreading-hispidulous and gland-dotted, along the veins hispid; petioles slender, densely tuberculate-hispidulous and glandular, 3.5 to 12 mm. long; heads numerous, cymose-paniculate, 2.1 to 2.8 cm. wide; pedicels densely hispid and hispidulous, 2 to 20 mm. long; disk 10 to 11 mm. high, 8 to 10 mm. thick; involucre 4-seriate, graduated, 4.8 to 6 mm. high, the outer phyllaries oblong-ovate, the inner oblong, obtuse or rounded, rarely subacute, ciliate or ciliolate and above more or less glandular-strigillose, below indurate, yellowish, with subherbaceous, usually spreading, triangular apex, the inner scarcely at all herbaceous; rays 10 to 12, golden, oblong, 2 or 3-denticulate, 7 to 10 mm. long, 2.8 to 3.5 mm. wide; disk corollas yellow, puberulous on teeth, with cylindrical-funnelform throat, 4 to 5.3 mm. long (tube 1 to 2 mm.); pales acute, strigillose, 5.8 to 7 mm. long; achenes oblong, appressed-pubescent, 4.8 mm. long, narrowly winged; awns 2, unequal, 1.8 to 3.5 mm. long, united at base with about 12 unequal squamellae into a corona about 0.8 mm. long.

TYPE LOCALITY: Apolo, Bolivia.

⁹ Bull. Torrey Club 19: 151. 1892.

SPECIMENS EXAMINED:

BOLIVIA: Apolo, altitude 1,465 meters, 1902, *Williams* 317 (B, N, photo. and fragm. G); July 9, 1902, *Williams* 1408 (type; N. Y. Bot. Gard.).

This species is distinguished from *O. rusbyi*, its nearest relative, by its more lanceolate leaves, which are less densely pubescent beneath.

7. *Oyedaea boliviana* Britton, Bull. Torrey Club 19: 149. 1892.

Helianthus mandonii Schultz Bip. Bull. Soc. Bot. France 12: 79. 1865, nomen nudum.

Oyedaea pearcei Rusby, Mem. Torrey Club 3: 59. 1893.

Evergreen shrub, 2 to 2.6 meters high, much branched; stem stout, terete, fuscous-brown, rather densely hispidulous or hispid-pilose with spreading or incurved hairs and sordid-glandular, especially on the younger parts, in age subglabrate but tuberculate below; leaf blades 8.5 to 17 cm. long, 1.3 to 7.5 cm. wide, ovate or broadly ovate to lance-ovate or the uppermost lanceolate, acuminate, cuneate to rounded-cuneate at base, triplinerved (sometimes obscurely so) and rather veiny, obscurely appressed-serrulate (the teeth mucronate, 29 pairs or less) or the upper subentire, above dark green, hispidulous and hispid with incurved hairs with tuberculate persistent bases, in age subglabrate, beneath slightly paler, rather densely hispidulous-pilosulous with incurved-spreading, harsh or soft hairs with scarcely swollen bases, more or less hispid along the veins, and gland-dotted; upper leaves much reduced; petioles 4 to 18 mm. long, pubescent like the stem and distinctly ciliate; heads rather numerous, 1.8 to 3 cm. wide, ternately arranged at ends of branches and branchlets, on pedicels 2 to 28 mm. long or less; disk 7.5 to 10 mm. high, 7 to 10 mm. thick; involucre 3 to 4-seriate, graduated, 4.5 to 7 mm. high; phyllaries ovate to oblong-ovate, with pale, strongly indurate and thickened, mostly 1-vittate base, more or less hispidulous and hispid with appressed hairs chiefly along middle and on margin (where the hairs are spreading) or sometimes all over, and shorter, acute or acuminate, deltoid or triangular, loose or reflexed, herbaceous apex, the innermost with drier paler tips; receptacle flattish; rays about 12, oval to linear-oblong, hispidulous on nerves of back, 8 to 18 mm. long, 2.5 to 4 mm. wide; disk corollas slender, puberulous on teeth, otherwise glabrous, 4.5 to 6.8 mm. long (tube 1.5 to 2.2 mm.); pales narrow, carinate, puberulous and gland-dotted at apex, acutish to acuminate, 7 to 8 mm. long; achenes (nearly mature) flattish, blackish brown, sparsely strigose on sides, ciliate on the narrow wings, 3.5 mm. long, contracted above into a more broadly winged short neck; awns 2, unequal, 3.7 mm. long or less, decurrent into the wings; corona 0.7 mm. high, of about 4 pairs of squamellae united to above the middle.

TYPE LOCALITY: Yungas, Bolivia.

SPECIMENS EXAMINED:

BOLIVIA: Yungas, altitude 1,830 meters, 1885, *Rusby* 2143 (type of *O. boliviana*; herb. Columb. Coll.); in 1890, *Bang* 546 (type collection of *O. pearcei*; B, G, K, N). Santa Cruz, July, 1865, *Pearce* (B, K, fragm. G.). Vicinity of Yungas, altitude 2,100 meters, 1906, *Buchtien* 190 (N. Y. Bot. Gard.). Polo-polo near Coroico, altitude 1,100 meters, 1912, *Buchtien* 3945 (N. Y. Bot. Gard.). Near Ananea, Province of Larecaja, January, 1860, *Mandon* 37 (type collection of *Helianthus mandonii*; B, fragm. G.). Near Sorata, Province of Larecaja, *Mandon* (G).

This species is usually readily distinguishable from its relatives by its distinctly triplinerved leaves. Although it is somewhat variable in leaf shape, it is impossible to recognize more than one species in the moderately extensive material I have examined. The reference of this species to *Helianthus* by Schultz Bipontinus, in his enumeration of Mandon's Bolivian Compositae, is an indication of the haste or carelessness with which that usually well-informed specialist must have made his determinations of those plants.

8. *Oyedaea verbessinoides* DC. Prodr. 5: 577. 1836.

Viguiera acuminata Benth.; Oerst. Naturhist. For. Kjöbenhavn Vid. Medd. 1852: 91. 1852.

Viguiera macrophylla Benth.; Oerst. Naturhist. For. Kjöbenhavn Vid. Medd. 1852: 92. 1852.

Oyedaea acuminata Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 176. 1881.

Oyedaea macrophylla Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 176. 1881.

Viguiera drymonia Klatt, Leopoldina 1895: Bot. Beibl. 5. 1895.

Stout branched shrub or tree, 3 to 8 meters high; branches terete or striatulate, densely and usually canescently lanate-pilose or hispid-pilose with incurved hairs, their tuberculate bases persistent; leaf blades 7 to 22.5 cm. long, 2 to 9.5 cm. wide, ovate to ovate-lanceolate, long-acuminate, cuneate at base, crenulate-serrulate with 18 to 40 pairs of mucronulate appressed teeth, triplinerved and reticulate-venose, above dull green, often rugulose, somewhat impressed-veined, harshly strigose-pilose or tuberculate-strigose, the tuberculate bases of the hairs persistent, beneath rather densely and often subcanescently short-pilose or hispid-pilose with soft or roughish, spreading to appressed hairs; petioles lanate-pilose to hispid-pilose, 3 to 30 mm. long; heads about 2 to 16 at apex of branches, 3.8 to 5.5 cm. wide, irregularly cymose-panicled, on densely pilose or tuberculate-hispid-pilose and hispidulous pedicels 3 to 38 mm. long; disk 1.1 to 1.7 cm. high, 1.3 to 1.7 cm. wide; involucre 3 to 4-seriate, graduated, 1.1 to 1.6 cm. high, the phyllaries oblong-lanceolate to lanceolate, or the inner rarely obovate-lanceolate, acute to acuminate, at base strongly indurate and often costate, pale, ciliate and more or less strigillose or tuberculate, the usually much longer apex herbaceous, lanceolate to ovate-lanceolate, tuberculate-strigose and strigillose or appressed-pilose, loosely spreading or reflexed; receptacle flat; rays 8 to 14, oblong, bidentate or shortly bilobed, pubescent on back, 1.3 to 2.3 cm. long, 4 to 7 mm. wide; disk corollas very slender, hispidulous on the teeth, 6.5 to 10 mm. long (tube 2.5 to 4 mm.); pales narrow, with slightly erose or denticulate sides above and narrowed acuminate strigillose apex, 8.5 to 14 mm. long; achenes obovate-oblong to cuneate-obovate, blackish or mottled, nearly glabrous or sparsely pilose or strigose, narrowly or sometimes rather broadly winged, 3.5 to 6.2 mm. long, 1 to 3.5 mm. wide; awns 2, sometimes with a pair of shorter ones at base, fragile, slender, unequal, spinulose, 2.5 to 6.5 mm. long; squamellae about 8 to 12, linear-lanceolate, acuminate, lacerate-fimbriate, united below into a cup, 0.8 to 2 mm. long.

TYPE LOCALITY: Vicinity of Caracas, Venezuela. Type collected by Vargas.

ILLUSTRATION: Deless. Icon. Sel. 4: pl. 34. 1839.

SPECIMENS EXAMINED:

COSTA RICA: San José, altitude about 1,300 meters, 1916, *Holway* 356 (G). Tres Ríos, altitude about 1,500 meters, 1915, *Holway* 274 (G). Rodeo de Pacaca, 1891, *Pittier* 3300 (G, K, N). Mount Aguacate, altitude 610 meters, 1851, *Oersted* 104 (type of *V. macrophylla*; K, fragm. G). Irazú, altitude 2,745 meters, 1851, *Oersted* 96, 106 (types of *V. acuminata*; K). Hills above Belmira, near Santa María de Dota, altitude 1,500 to 1,600 meters, 1898, *Tonduz* 11644 (G, K, N). Savannas of Boruca, 1891, *Pittier* 4523 (G). Forests of Boruca, 1891, *Pittier* 4528 (N). Border of forests, Cañas Gordas, altitude 1,100 meters, 1893, *Pittier* 7351 (type of *V. drymonia*; G); in 1897, *Pittier* 11044 (G, N), 11047 (G).

PANAMA: Boquete, 1849, *Seemann* 1590 (K, fragm. G). Among bushes, pastures around El Boquete, altitude 1,000 to 1,300 meters, 1911, *Pittier* 2948 (N).

COLOMBIA (?): "New Grenada," 1842-43, *Linden* 1511 (B, fragm. G).

VENEZUELA: Caracas, *Burchell* (G, K). Savannas, altitude 1,000 to 1,400 meters, Middle Cotiza, near Caracas, 1917, *Pittier* 7048 (N). Savannas, Upper Cotiza, above 1,400 meters, near Caracas, 1917, *Pittier* 7561 (N). Lower Catuche,

altitude 1,000 to 1,200 meters, 1917, *Pittier* 7545 (N). Tovar, *Moritz* (G, K); 1854-55, *Fendler* 680 (G, K). Frequent in subalpine region, 1865, *Ernst* 726 (B). Without definite locality, 1842-43, *Funck* 364 (B, K); in 1865, *Moritz* 1990 (B).

TRINIDAD: *Botanic Garden Herbarium* 3388 (N).¹⁰

Oyedaea verbesinoides, the commonest of this genus in herbaria, is a somewhat variable species, as might be expected from its comparatively wide range. The material from Costa Rica and Panama commonly has leaves more softly and densely pubescent beneath, and broader phyllaries, but the differences between the Central and South American specimens are neither constant nor of much importance, and after study of all the material available I have found it necessary to unite with *O. verbesinoides* both of Bentham's species as well as two manuscript segregates of my own. As thus constituted, the species is readily recognized by its usually large, triplinerved leaves, comparatively large heads, and phyllaries with long herbaceous tips. In Venezuela it is known as "tarilla" and "tara amarilla," according to Pittier.

9. *Oyedaea bahiensis* Baker in Mart. Fl. Bras. 6³: 206. 1884.

Herbaceous perennial; stems decumbent, at apex assurgent, sparsely branched, 30 to 45 cm. long, hispid; leaf blades numerous, linear, acuminate, sessile, narrowed to base, entire, the middle ones 7.5 to 10 cm. long, 6 to 8 mm. wide, the lowest much shorter, oblong, acute, rather firm, green and hispid on both sides; heads 1 to 4, terminal on hispid peduncles 5 to 10 cm. long; involucre campanulate, 1 to 1.2 cm. high, the phyllaries 2-seriate, lanceolate, acute, hispid, foliaceous, the outer longer; rays oblanceolate, 2.5 cm. long, 6 mm. wide; achenes obovate, compressed, 4 mm. long, narrowly winged, the wings produced above into lanceolate teeth; awns about 1 mm. long, twice as long as the minute pappus cup.

TYPE LOCALITY: Bahia, Brazil.

SPECIMEN EXAMINED:

BRAZIL: Province of Bahia, in grassy places, *Martius* (sketch of type; K).

This species, of which I have seen only the sketch of the type in the Kew Herbarium, is distinguished from all other species of the genus by its linear leaves. It may yet prove to belong to *Aspilia*. The description given above is translated from Baker's original.

10. *Oyedaea humboldtiana* (Gardn.) Benth.; Baker in Mart. Fl. Bras. 6³: 206. 1884.

Viguiera humboldtiana Gardn. Lond. Journ. Bot. 7: 398. 1848.

Herbaceous perennial; stems several, erect from a woody root, slender, subsimple or with a few short branches above, strigillose and shortly strigose-pilose, subglabrate below, sparsely leafy, monocephalous, 25 to 35 cm. high; leaves 3 to 5 pairs, remote (the lower smaller), the blades 1.5 to 3.5 cm. long, 7 to 10 mm. wide, oblong to ovate, acute to subobtuse at apex, sharply serrulate above the cuneate-rounded base, appressed-pubescent chiefly along the veins and margin and gland-dotted on both sides, triplinerved; petioles 1.5 mm. long or less, appressed-pubescent; peduncle 3 to 20 cm. long, naked or 1-bracteate, strigillose and strigose; head 4 to 5.8 cm. wide; disk 9 to 11 mm. high, 12 to 17 mm. wide; involucre 2-seriate, the other phyllaries foliaceous, oblong or oblong-spatulate, acutish, denticulate above the middle, appressed-pubescent and gland-dotted, 1.2 to 2.4 cm. long, the inner much shorter, indurate below, herbaceous above, appressed-puberulous, acuminate; rays about 14, oblong, tridenticulate, pubescent on tube, 1.2 to 2.3 cm. long, 5 to 7 mm. wide; disk corollas glabrous, 4.2 mm. long (tube 0.7 to 1 mm.), the throat subcampanulate-funnelform; pales subscarious, narrow, nearly glabrous, abruptly short-acuminate, spinulose-denticulate near apex, 7.5 to 10 mm. long; achenes at full maturity cuneate-obovate, thickened, 4-angled, 4-winged, crustaceous-bullate on the sides, 4.5 to 4.8 mm. long, 3 to 4 mm. wide; awns

¹⁰ Perhaps not a native specimen.

2, unequal, 1.5 to 2 mm. long, united into a cup at base with the 8 to 10 irregularly lacerate, much shorter squamellae.

TYPE LOCALITY: Near Chapadao de Nostra Senhora d'Abadia, Goyaz, Brazil.

SPECIMENS EXAMINED:

BRAZIL: Arid upland campos near Chapadao de Nostra Senhora d'Abadia, Province of Goyaz, May, 1840, *Gardner* 4239 (type collection; G, K). Between Bom Jesus and Fazenda Seca, Province of Goyaz, *Burchell* 7553 (G, K).

Oyedaea humboldtiana is distinct in its herbaceous habit, solitary head, and few small leaves.

11. *Oyedaea trachyphylla* Blake, sp. nov.

Herbaceous (?), trichotomous, leafy; stem stoutish, striate, densely hispid-pilose with loose spreading hairs with persistent tuberculate bases; leaf blades 7.5 to 9 cm. long, 4 to 5.5 cm. wide, ovate or broadly ovate, acuminate, at base broadly cuneate, obscurely serrulate with depressed teeth, slightly revolute, obscurely triplinerved above the base, above dull green, rugulose, harshly tuberculate and tuberculate-strigose, the tubercles thick and persistent, beneath slightly paler, reticulate-venose, scabrous, along the larger veins tuberculate-hispid and hispidulous, gland-dotted, along the ultimate veinlets minutely tuberculate-hispidulous; petioles densely tuberculate-hispid and minutely granulose, scarcely margined, 3 to 7 mm. long; heads 2.5 cm. wide, solitary at tips of branches and in the forks of the stem, on tuberculate-hispid and glandular striate peduncles 2.5 to 4.5 cm. long; disk 9 to 10 mm. high, 9 to 11 mm. thick; involucre 3-seriate, scarcely graduated, 9 to 11 mm. high, the phyllaries oblong, acute, about 3.5 mm. wide, below more or less indurate, pale, subcostate, tuberculate-strigose or strigose-hispid and granular, the apex shorter, loose, rather abruptly herbaceous, tuberculate and tuberculate-strigose; rays yellow, neutral, oblong, hispidulous on back, 6 mm. long, 1.5 mm. wide; disk corollas yellow, strigillose on teeth and at base of throat, 5.5 mm. long (tube 2 mm.); pales narrow, carinate, acute, minutely spinulose-ciliolate at apex, 8 mm. long; achenes fuscous, somewhat thickened, sparsely pilose, 4 mm. long, 2.2 mm. wide, the wings narrow, subauriculate at apex of achene, united with the corona; awns 2, linear-lanceolate, about equaling the squamellae and united with them below; squamellae about 12, fimbriate-lacerate, subequal, united into a corona 0.6 mm. high.

Type in the Kew Herbarium, collected near Rio de Janeiro, Brazil, 1878 or 1879, by A. Glaziou (no. 10985). Fragments in the Gray Herbarium.

This species is readily distinguished by its inflorescence.

12. *Oyedaea ovalifolia* A. Gray, Proc. Amer. Acad. 5: 183. 1861.

Oyedaea ampeloides Hemsl. Biol. Centr. Amer. Bot. 2: 176. 1881.

Reclining or climbing shrub, 3 to 6 meters long or more; stem striate, strigillose, in age glabrate but tuberculate; leaf blades 8 to 18.5 cm. long, 5 to 8 cm. wide, oval to ovate, acute or rarely obtuse, apiculate, at base cuneate or rounded, crenate-mucronulate, firmly pergamentaceous, harshly tuberculate-strigillose above, in age lepidote, beneath scarcely paler, sparsely strigillose, with the hairs longer along the veins, triplinerved above the base, reticulate on both sides with even the tertiary veins prominulous; petioles tuberculate-strigillose and sparsely ciliate, 5 to 17 mm. long; heads 3 to 5.5 cm. wide, several or numerous in an open panicle (its spreading branches usually exceeding the leaves), on tuberculate-strigillose pedicels 1.5 to 7 cm. long; disk 9 to 13 mm. high, 11 to 20 mm. wide; involucre 3-seriate, graduated, 4 to 5.5 mm. high, the phyllaries triangular-ovate to oval, obtuse to rounded or the outermost acutish, appressed, strongly indurate, with narrow subherbaceous or subscarios margin, finely tuberculate-strigillose and ciliolate; rays about 12 to 15, narrowly elliptic-oblong, emarginulate, 9 to 24 mm. long, 2 to 5 mm. wide; disk corollas glabrous except for the finely hispidulous teeth, 6 to 6.5 mm. long (tube 1.6 to 1.8 mm.); pales lacerate above, cuspidate-acuminate, strigillose at apex, 7 to

10 mm. long; achenes strongly compressed, cuneate-obovate, blackish, nearly glabrous, the 2 wings usually aristate-dentate at apex, sometimes spinulose-lobulate on margin, 4 to 5.2 mm. long, 2 to 3.2 mm. wide; awns 2, slender, fragile, unequal, 2.5 mm. long or less, each often with 2 much shorter ones at base; squamellae about 10, lanceolate, acute, unequal, united at base into a cup, 0.3 to 0.5 mm. long.

TYPE LOCALITY: On the road to Huaulta, Puebla. Mexico.

SPECIMENS EXAMINED:

SAN LUIS POTOSÍ: Tamasopo Canyon, 1890, *Pringle* 3212 (G, N).

PUEBLA: On the road to Huaulta, October, 1858, *Ervendberg* 97 (type; G).

Orizaba, *Botteri* 619 (G). Valley of Orizaba, September 8, 1865-1866, *Bourgeau* 2994 (type collection of *O. ampeloides*; G, K, N).

Oyedaea ovalifolia, the only Mexican species of the genus, may be distinguished by its oval or ovate, thickish, merely strigillose leaves, and short involucre of broad blunt phyllaries without distinct herbaceous tips.

DOUBTFUL SPECIES.

OYEDAEA CUERVIANA Triana, Ann. Sci. Nat. IV. 9: 39. 1858.

Stem fruticose, branching; branches appressed-villous-canescens; leaves ovate-lanceolate, acute, triplinerved, remotely and minutely serrulate, with revolute margin, above scabrous-hirtellous, beneath villous, attenuate into the petiole, the petioles pubescent above; heads corymbose, peduncled, the peduncles rather long, naked or usually leafy; involucreal scales pilose without, the outer foliaceous, linear-lanceolate, acute, entire, the inner submembranaceous, obtuse, ciliate; ligules linear; achenes of disk winged, black-dotted.

Grows between Ubala and Gachala in temperate places, in the Province of Bogotá (Colombia), at an altitude of 1,500 meters.

The above translated description represents all that is known of this plant. The type, according to Triana's catalogue in the British Museum, was numbered 1520 (specimen no. 5).

EXCLUDED SPECIES.

OYEDAEA ANGUSTIFOLIA Gardn. Lond. Journ. Bot. 7: 293. 1848.

This species, based on a collection made by Gardner (no. 2216) between the Rio Camde and Oeiras, Piahy, Brazil, has a cuneate thickened achene with narrow pale but not truly winged margins produced into slight ears at the truncate apex of the achene, and a very narrow cupuliform pappus of united squamellae and two awns. On each side of the achene at base is a subcrustaceous, slightly two-lobed, appressed appendage such as is found in various species of *Aspilia*, to which genus this species clearly belongs. As the name *angustifolia* has already been used twice in the latter genus, the present plant may take the name of *Aspilia cupulata*. Fragments of the type collection are in the Gray Herbarium.

OYEDAEA BONPLANDIANA (Gardn.) Benth.; Baker in Mart. Fl. Bras. 6³: 206. 1884.

Viguiera bonplandiana Gardn. Lond. Journ. Bot. 7: 399. 1848.

This species, based on Gardner 2217 and 2218 from the Province of Piahy, Brazil, has a wingless, cuneate, somewhat 4-angled achene auriculate at apex and cucullate-appendaged at base, as in the preceding species, and must likewise be referred to *Aspilia*, as *Aspilia bonplandiana* (Gardn.) Blake.

OYEDAEA HELIANTHOIDES Triana, Ann. Sci. Nat. IV. 9: 39. 1858.

This species, the type of which I have never seen, is, from description, a species of either *Steiractinia* or *Perymenium*.

OYEDAEA LIPPIOIDES Baker in Mart. Fl. Bras. 6³: 208. 1884.

A Brazilian species, *Dimerostemma lippioides* (Baker) Blake.¹¹

¹¹ Contr. Gray Herb. n. ser. 52: 15. 1917.

OYEDAEA OVATA (Gardn.) Benth.; Baker in Mart. Fl. Bras. 6³: 207. 1884.

Serpaea ovata Gardn. Lond. Journ. Bot. 7: 296. 1848.

Gardner's *Serpaea ovata* is identical¹² with the earlier, long problematical *Dimerostemma brasilianum* Cass.¹³

OYEDAEA ROTUNDIFOLIA Baker in Mart. Fl. Bras. 6³: 208. 1884.

Serpaea rotundifolia Schultz Bip.; Baker in Mart. Fl. Bras. 6³: 208. 1884, as synonym.

This plant is properly known as *Dimerostemma rotundifolium* (Baker) Blake.¹⁴

OYEDAEA SEEMANNII (Schultz Bip.) A. Gray, Proc. Amer. Acad. 19: 10. 1883.

Viguiera seemannii Schultz Bip.; Seem. Bot. Voy. Herald 305. 1856-57.

Dr. Gray's reference of this species to *Oyedaea* was an error, due to the fact that achenes belonging to this genus had become mixed with the type material in the pocket of the sheet in the Gray Herbarium.¹⁵

The plant is properly known as *Viguiera seemannii* Schultz Bip., and is still known only from the original collection by Seemann (no. 2005) in the Sierra Madre of north-western Mexico.

OYEDAEA VESTITA Baker in Mart. Fl. Bras. 6³: 207. 1884.

This is *Dimerostemma vestitum* (Baker) Blake.¹⁶

¹² See Blake, Contr. Gray Herb. n. ser. 52: 15. 1917.

¹³ Bull. Soc. Philom. 1818: 58. 1818.

¹⁴ Contr. Gray Herb. n. ser. 52: 13. 1917.

¹⁵ See Blake, Contr. Gray Herb. n. ser. 54: 78. 1918.

¹⁶ Contr. Gray Herb. n. ser. 52: 11. 1917.

REVISION OF THE GENUS TITHONIA.

By S. F. BLAKE.

INTRODUCTION.

The genus *Tithonia*, originally described in 1789 in Jussieu's *Genera*¹ without citation of species, was adopted by J. F. Gmelin² two years later, and the single known species was given the binomial *T. uniflora*, a name which has been universally displaced by the later *Tithonia tagetiflora*, published by Desfontaines in 1802 with a full description and plate. The same plant, grown by Philip Miller in his Chelsea garden from seed sent presumably from Veracruz by William Houstoun, had been described in the eighth edition of the *Gardeners' Dictionary* in 1768 as *Tagetes rotundifolia*, and as this is the earliest binomial given the species it must now be known as *Tithonia rotundifolia*. It is a showy annual with large, orange or golden-yellow heads, much like the common sunflower in appearance except for the yellow disk, and seems worthy the attention of horticulturists.

As here recognized, the genus *Tithonia* includes ten species, native from northern Mexico to Panama. One species, *T. rotundifolia*, occurs also in the Greater and Lesser Antilles, and in Venezuela (where certainly introduced), and another, *T. diversifolia*, has become a weed in Ceylon and Burma and at Singapore. As the relationships of the genus to *Helianthus* and *Viguiera* have already been considered in some detail by the writer in another publication,³ only brief notice of them is necessary here. The typical pappus-bearing members of the genus are separated from *Helianthus* by their persistent pappus of awns and squamellae, and from *Viguiera* chiefly by their fistulose peduncles and by certain details of involucre. The four species in which the achene is always glabrous and the pappus wanting, together with *T. brachypappa*, in which glabrous epappose achenes occur in the same head with pubescent pappiferous ones, are to be distinguished from the species of *Viguiera* in which the pappus is likewise absent chiefly by their fistulose peduncles.

Tithonia, being originally based on a species with pappiferous achenes, has by Bentham and Gray been restricted to such species, the plants of similar habit but with epappose achenes being referred to *Gymnolomia*. Schultz Bipontinus, describing *Tithonia calva* in

¹ Desf.; Juss. Gen. Pl. 189. 1789.

² Syst. Nat. 1259. 1791.

³ Contr. Gray Herb. n. ser. 54: 8-10, 19, 21. 1918.

the Botany of the Herald, founded on it the subgenus *Mirasolia*, characterized by its glabrous epappose achenes. In Bentham and Hooker's *Genera Plantarum* *Mirasolia* was raised to generic rank, and included Schultz's species and one earlier described by Bentham as *Tithonia scaberrima*. Schultz's name *Perymeniopsis*, published only in synonymy by Klatt, was, if Klatt's disposition may be trusted, based on the latter species. *Tithonia* was taken by O. Hoffmann in the *Pflanzenfamilien* to include both pappose and epappose species, and the propriety of this treatment has been shown by the writer in the introduction to his Revision of *Viguiera* cited above.

The name *Tithonia*, from Tithon, consort of Aurora, was given by Desfontaines in allusion to the orange rays of his species. Otto Kuntze, rejecting *Tithonia* because of the use by Linnaeus in 1735 of the name *Tithona* for the genus later named by him *Rivina*, proposed *Urbanisol* as a substitute, a name which may be relegated to synonymy under both the American and the International Codes of Nomenclature.

SYSTEMATIC TREATMENT.

TITHONIA Desf.

Tithonia Desf. (Juss. Gen. Pl. 189. 1789, hyponym); Gmel. Syst. Nat. 1259. 1791.

Tithonia subgenus *Mirasolia* Schultz Bip.; Seem. Bot. Voy. Herald 305. 1856-57.

Mirasolia Schultz Bip.; Benth. & Hook. Gen. Pl. 2: 367. 1873.

Urbanisol Kuntze, Rev. Gen. Pl. 1: 370. 1891.

Herbaceous or shrubby; leaves alternate or sometimes opposite below, linear-lanceolate to ovate, triplinerved; heads medium or large, heterogamous, yellow, the rays neutral, 1-seriate, the disk flowers numerous, fertile; involucre hemispheric or broadly campanulate, 2 to 5-seriate, graduated or subequal, the phyllaries lanceolate to oblong or oval, indurate, ribbed, and vittate below, with herbaceous or membranaceous-chartaceous, rounded to acute tips; receptacle convex, the pales rigid, striate, usually aristate-acuminate, concave and embracing the achenes, persistent; ray corollas 8 to 20, oblong to oval, emarginate or tridenticulate; disk corollas with slender tube, longer cylindric or funnellform throat, and 5-toothed limb; anthers cordate-sagittate at base, with ovate appendages; style branches slender, recurved, dorsally hispid above, with lanceolate or linear-lanceolate, acuminate, hispid sterile appendages; achenes oblong, strongly thickened or subquadrangular, pubescent or glabrous; pappus of one or two paleaceous awns and 4 to 12 free or united squamellae, or of more or less united squamellae only, or entirely wanting.

Type species, *Tithonia uniflora* Gmel., which is *T. rotundifolia* (Mill.) Blake.

KEY TO SPECIES.

Phyllaries 2 or 3-seriate, subequal or the outer longer, all with long loose acute herbaceous tips, or the inner rarely with mucronulate or obtuse membranaceous-chartaceous tips, but then shorter than the outer.

Leaves ovate, long-petioled; involucre 1.3 to 3 cm. high; pappus present.

Involucre and apex of peduncles densely hispid-pilose with long hairs; pale long-aristate; leaves not lobed.....1. *T. tubaeformis*.

Involucre and apex of peduncles pilosulous or rarely short-pilose, in age often glabrate; pales acuminate to short-aristate; leaves often 3-lobed.

2. *T. rotundifolia*.

Leaves linear-lanceolate to narrowly lance-ovate, subsessile by a cordate-auriculate base; involucre 7.5 to 9 mm. high; pappus none.....6. *T. auriculata*.

Phyllaries 3 to 5-seriate, graduated, at least the inner with rounded or rarely acute, broadened, more or less membranaceous-chartaceous or rarely subherbaceous tips.

Petiole bases strongly auriculate-decurrent.....3. *T. brachypappa*.

Petiole bases sometimes auriculate but never decurrent.

Pappus present.

Leaves unlobed.

Plant annual; stem sparsely hispid-pilose.....4. *T. thurberi*.

Plant shrubby; stem densely and canescently pilose-tomentose.

9. *T. fruticosa*.

Leaves 3 to 5-lobed, or the upper sometimes entire.

Leaves densely and usually canescently pilosulous beneath.

10. *T. diversifolia*.

Leaves green beneath, merely sparsely puberulous or nearly glabrous except on the veins.....10a. *T. diversifolia glabriuscula*.

Pappus none.

Innermost phyllaries acute or rarely obtuse at apex.

Leaves lance-ovate to ovate, distinctly petioled.

Stem densely silky-villous with long spreading hairs; disk 2.5 to 3 cm. thick.....5. *T. calva*.

Stem hispid-pilose or pilose with short hairs; disk 1.2 to 2.2 cm. thick.

5a. *T. calva lancifolia*.

Leaves linear-lanceolate to lance-ovate, subsessile, cordate-auriculate at base.....6. *T. auriculata*.

Innermost phyllaries broadly rounded at apex.

Heads medium-sized, the disk 1.1 to 2 cm. thick; stem hispidulous and sparsely hispid-pilose.....7. *T. pittieri*.

Heads large, the disk usually 2 to 3.5 cm. thick; stem usually densely hispid-pilose.....8. *T. scaberrima*.

1. *Tithonia tubaeformis* (Jacq.) Cass. Dict. Sci. Nat. 35: 278. 1825.

Helianthus tubaeformis Jacq. Pl. Hort. Schönbr. 3: 65. pl. 375. 1798.

Tithonia helianthoides Weinm.; Steud. Nom. Bot. ed. 2. 2: 689. 1841, as synonym.

Urbanisol tubiformis Kuntze, Rev. Gen. Pl. 1: 371. 1891.

Tithonia tubaeformis var. *bourgaeana* Pampanini, Bull. Soc. Bot. Ital. 1908: 134. 1908.

Erect branching annual, 1 to 2 meters high; stem densely and rather harshly hispid-pilose with spreading hairs with several-celled subglandular base, in age subglabrate below; leaves alternate, the blades 7 to 18 cm. long, 3.8 to 14.8 cm. wide (excluding the margined apex of the petiole), ovate to deltoid-ovate, not lobed, acuminate, cuneately narrowed from a truncate or subcordate base into the petiole, crenate-serrate or dentate, 3-nerved, deep green above, harshly hispid-pilose with slightly tuberculate-based hairs, beneath paler, densely gland-dotted, canescent or subcanescent with dense incurved hairs, in age often green, subglabrate, and harsh, the uppermost much smaller and lanceolate; petioles hispid-pilose, subglabrate, scarcely margined below, 1.5 to 10 cm. long; peduncles usually strongly clavate above, densely and canescently hispid-pilose near the head, 30 cm. long or less; heads 4 to 9 cm. wide; disk in anthesis 1.2 to 1.8 cm. high, 1.5 to 3.3 cm. wide, in fruit 1.5 to 2.5 cm. high; involucre 2 or 3-seriate, 1.5 to 3 cm. high, densely and canescently pilose or hispid-pilose with long spreading hairs, the phyllaries lanceolate or oblong-lanceolate (1.5 to 4, rarely 5.5 mm. wide), acute or acuminate, subequal or obgraduated, with indurate ribbed base and longer, slightly broader, loose, herbaceous tip; rays 12 to 14, golden-yellow or orange, elliptic, 3.3 cm. long or less; disk corollas yellow, slenderly tubular, hispidulous chiefly on the swollen base of the throat, subglabrous

above except on teeth, 6 to 7 mm. long, the very short tube only 0.5 mm. long; pales finely tuberculate-hispidulous above, long-aristate; achenes strongly thickened, pilose, 4.5 to 5.5 mm. long; awns 2, lanceolate, acute or aristate-acuminate, unequal, 1 to 3.5 mm. long; squamellae about 12 to 14, more or less united, lacerate-fimbriate, 0.3 to 1.2 mm. long.

TYPE LOCALITY: Mexico.

ILLUSTRATIONS: Jacq. Pl. Hort. Schönbr. 3: pl. 375. 1798; Lindl. Bot. Reg. 18: pl. 1519. 1832.

SPECIMENS EXAMINED:

CHIHUAHUA: Valley near Chihuahua, 1886, *Pringle* 768 (N).

DURANGO: Santiago Papasquiaro, 1896, *Palmer* 420 (N). Tepehuanes, 1906, *Palmer* 277 (N). Durango, 1896, *Palmer* 690 (N), 691 (N). Rincón, 1895, *C. & E. Seler* 1145 (N).

SAN LUIS POTOSÍ: Without definite locality, altitude 1,830 to 2,440 meters, 1878, *Parry & Palmer* 456 (N), 459 (N); in 1880, *Schaffner* (K).

TEPIC: In 1892, *Palmer* 1851 (N).

JALISCO: Río Blanco, 1886, *Palmer* 900 (N).

AGUASCALIENTES: Aguascalientes, 1903, *Rose & Painter* 7755 (N).

VERACRUZ: Orizaba, *Botteri* 507 (N); in 1865, *Bourgeau* 3244 (K). Zacuapan, 1916, *Purpus* 7558 (N). Mirador, 1838, *Linden* 1174 (K).

COLIMA: Manzanillo, 1890, *Palmer* 1076 (N). Without definite locality, 1891, *Palmer* 1220 (N).

MEXICO (STATE): Tacubaya, 1865-66, *Bourgeau* 152 (K, N). Near Guadalupe, 1903, *Rose & Painter* 7273 (N). Valley of Mexico, December 20, 1865, *Bourgeau* 1566 (type collection of *T. tubaeformis* var. *bourgaeana*; K).

PUEBLA: Teocalli de Cholula, 1908, *Arsène* (N). Rancho Posadas, near Puebla, 1909, *Nicolas* (N).

MORELOS: Valley, Jojutla, altitude 915 meters, 1901, *Pringle* 9306 (N).

OAXACA: Sierra de San Felipe, altitude 2,135 to 2,440 meters, 1894, *C. L. Smith* 617 (N). Mountain ridge on west side, valley of Cuicatlán, altitude 1,980 to 2,400 meters, 1894, *Nelson* 1899 (N). Maize fields, Cordillera of Oaxaca, 1840, *Galeotti* 2003 (K).

GUATEMALA: Chupadero, altitude 1,525 meters, 1892, *Heyde & Lux* 4204 (N). Pacaya, Department of Amatitlán, altitude 1,765 meters, 1890, *J. D. Smith* 2390 (N). Santa Rosa, Baja Verapaz, 1904, *Cook* 233 (N). Huehuetenango, 1914, *Tejada* 329 (N). Dueñas, 1861, *Salvin & Godman* (K). Without definite locality, 1865, *Bernoulli* 162, 217 (K).

This species is closely related to the next, but is generally easily distinguished by the long dense pubescence of the involucre and peduncles, the long-aristate pales, and the always unlobed leaves. In Oaxaca, according to Galeotti, it is known as "camalote." It is known in Mexico also as "acaute" and "acahuale."

2. *Tithonia rotundifolia* (Mill.) Blake, Contr. Gray Herb. n. ser. 52: 41. 1917.

Tagetes rotundifolia Mill. Gard. Dict. ed. 8. *Tagetes* no. 4. 1768.

Tithonia uniflora Gmel. Syst. Nat. 1259. 1791.

Tithonia tagetiflora Desf. Ann. Mus. Hist. Nat. 1: 49. pl. 4. 1802.

Helianthus speciosus Hook. in Curtis's Bot. Mag. 61: pl. 3295. 1834.

Leighia ? speciosa DC. Prodr. 5: 583. 1836.

Tithonia aristata Oerst. Naturhist. For. Kjöbenhavn Vid. Medd. 1852: 114. 1852.

Tithonia heterophylla Griseb. Bonplandia 6: 9. 1858.

Tithonia speciosa Hook.; Griseb. Cat. Pl. Cub. 155. 1866.

Tithonia macrophylla S. Wats. Proc. Amer. Acad. 26: 140. 1891.

Urbanisol tagetifolius Kuntze, Rev. Gen. Pl. 1: 370. 1891.

Urbanisol tagetifolius α *normalis* Kuntze, Rev. Gen. Pl. 1: 370. 1891.

Urbanisol tagetifolius β *speciosus* Kuntze, Rev. Gen. Pl. 1: 370. 1891.

Urbanisol aristatus Kuntze, Rev. Gen. Pl. 1: 371. 1891.

Urbanisol heterophyllus Kuntze, Rev. Gen. Pl. 1: 371. 1891.

Tithonia vilmoriniana Pampanini, Bull. Soc. Bot. Ital. 1908: 133. 1908.

Stoutish erect branched annual, up to 2 meters high; stem pale or purplish, striatulate, the younger parts densely pilosulous or canescent with rather short soft spreading hairs with slightly enlarged bases, in age subglabrate; leaves alternate, the blades 7 to 27 cm. long (excluding the cuneate decurrent base), 4 to 19.5 cm. wide, ovate to deltoid-ovate, three-lobed near the middle with subcaudate lobes or entire, acuminate, abruptly cuneate-decurrent into the petiole from a rounded or slightly cordate base, serrate with depressed-deltoid teeth, thin, 3-nerved, hispid-pilose on both sides along the veins with slightly harsh hairs and rather densely tuberculate-hispidulous between them, gland-dotted and slightly paler beneath; petioles scarcely margined below, spreading-pilose, 2 to 14 cm. long; peduncles striatulate, pubescent like the stem but in age glabrate except just below the heads, usually fistulose above, naked or with a few leafy bracts, 30 cm. long or less; heads 4 to 8 cm. wide; disk in anthesis 1.5 to 2 cm. high, 2 to 3 cm. thick, in fruit 2 to 3.5 cm. thick; involucre 2-seriate, subequal or obgraduated, 1.3 to 2.8 cm. high, the outer phyllaries ovate to ovate-oblong or sometimes lanceolate, acute or acuminate, finely subcanescent-pilosulous, in age sometimes subglabrate, indurate, pale, and multistriatulate about to the middle, the herbaceous apex reflexed or loose, the inner similar but usually much shorter, and with shorter, less herbaceous apex; rays 9 to 13, golden-yellow or orange, 2 to 2.5 cm. long; disk corollas yellow, slenderly tubular, puberulous especially at base of throat and on the teeth, 9 mm. long, the throat strongly dilated at maturity, the tube 1 to 1.5 mm. long; pales stiff, lanceolate, cuspidate-acuminate, striatulate, hispidulous above, the outer and sometimes the inner becoming purplish above, 1.2 to 1.8 cm. long; achenes subquadrangular, often striate, blackish or mottled, appressed-pilose or ascending-pilose, 6 to 7 mm. long; awns 2, easily deciduous, minutely strigillose, unequal, 4 to 6.2 mm. long; squamellae firm, united nearly or quite to apex, irregularly dentate, spinulose at apex, 2 to 2.2 mm. long.

TYPE LOCALITY: Veracruz.

ILLUSTRATIONS: Lam. Tabl. Encycl. 3: pl. 708. 1798; Ann. Mus. Hist. Nat. 1: pl. 4. 1802; Lindl. Bot. Reg. 7: pl. 591. 1822; Curtis's Bot. Mag. 61: pl. 3295. 1834.

SPECIMENS EXAMINED:

COAHUILA: Vicinity of Saltillo, 1898, *Palmer* 558 (N).

TEPIC: Cuesta de San Luisito, Sierra Madre, altitude 1,370 meters, 1905, *Goldsmith* 168 (G).

JALISCO: Barranca of Tequila, 1893, *Pringle* 4601 (G, N). Barranca near Guadalajara, September 25, 1889, *Pringle* 2798 (type collection of *T. macrophylla*; G, N). Near Guadalajara, 1903, *Rose & Painter* 7405 (N). On road between Bolaños and Guadalajara, 1897, *Rose* 3053 (G, N).

VERACRUZ: *Houstoun* (type of *Tagetes rotundifolia*; B).

COLIMA: Colima, 1891, *Palmer* 1250 (N).

GUERRERO: Plain of Iguala, altitude 730 meters, 1900, *Pringle* 9058 (G, N). Acapulco, *Sinclair* (K); in 1894-95, *Palmer* 631 (N).

YUCATÁN: *Gaumer* 899 (N).

GUATEMALA: Mazatenango, altitude 330 meters, 1905, *Kellerman* 5139 (N). In cultivated field, Gualán, altitude 125 meters, 1905, *Deam* 333 (N). Escuintla, altitude 335 meters, 1890, *J. D. Smith* 2380 (N), 2385 (N). San Sebastián, altitude 305 meters, 1891, *Shannon* (J. D. Smith, no. 596; N).

SALVADOR: Vicinity of Izalco, altitude 400 to 800 meters, 1907, *Pittier* 1976 (N). San Salvador, 1905, *Velasco* (J. D. Smith, no. 8869; N). Without definite locality, *Renson* 19 (N).

NICARAGUA: Granada, 1870, *Lévy* 279 (K). Realejo, *Sinclair* (K).

- COSTA RICA: Nicoya, 1899, *Tonduz* 13614 (N). Ojo de Agua, *Hoffmann* 349 (G). San José, 1851, *Oersted* 107 (K).
- PANAMA: Between Aguadulce and Río Chico, Coclé, altitude 20 meters, 1911, *Pittier* 5009 (N). Taboga Island, 1912, *Celestino* 41 (N).
- CUBA: Without definite locality, *Drummond* (K). Vicinity of Vento, Havana, 1904, *Wilson* 1325 (N).
- SANTO DOMINGO: Without definite locality, 1871, *Wright, Parry & Brummel* 267 (N).
- PORTO RICO: Near Coamo, 1885, *Sintenis* 3179 (N). Coamo Springs, 1899, *Cook & Collins* 707 (N); in 1901, *Underwood & Griggs* 509 (N).
- MONTSERRAT: Roadside near Grove, 1907, *Shafer* 129 (N).
- GUADELOUPE: Rather rare, Désirade, 1892 and 1894, *Duss* 2806 (N).
- MARTINIQUE: Scarce, Rivière-Salée, 1903, *Duss* 4682 (G, N).
- ST. VINCENT: Introduced and sparingly naturalized, *H. H. & W. G. Smith* 1222 (K).
- VENEZUELA: Waste places (introduced), Agua Salud, Caracas, 1917, *Pittier* 7435 (N).
- CULTIVATED: Garden of Montpellier, *Delile* (K). Jardin des Plantes, Paris, October 19, 1839, *J. Gay* (K). Kew Gardens (type of *Helianthus speciosus*; K). Government House Grounds, Trinidad, 1907, *Broadway* 2880 (K).

This species, whose natural range is the widest of any member of the genus, may be separated from *T. tubaeformis*, its only near relative, by the merely canescent or pilosulous involucre and peduncles, the cuspidate-acuminate, not aristate pales, and the often three-lobed leaves. The types of *T. aristata*, *T. heterophylla*, and *T. vilmoriniana* have not been examined, but from description all clearly belong to *T. rotundifolia*. The type of *T. aristata* was collected by Oersted on Mount Aguacate, Costa Rica, and that of *T. heterophylla* by Duchassaing on Taboga Island, Panama. *T. vilmoriniana* was described from specimens grown in the Botanic Garden of Florence from seed received from Vilmorin-Andrieux, said to have been collected at "Jacona, Mexico." Miller's type was grown at Chelsea Garden from seed sent from Veracruz by William Houstoun about 1730; Desfontaines's from seed sent from the same locality by Thiéry in 1778. The species is well worthy of reintroduction into cultivation. Like its close relative *T. tubaeformis*, it is known in Mexico as "acaute."

Some of the second-growth heads of Donnell Smith's no. 2385 show a curious condition of the disk flowers. The apparently infertile ovaries are linear, 9 mm. long, and the awns are replaced by linear-spatulate, very unequal, flat, 1 to 3-nerved, pilose, upwardly subherbaceous appendages 0.8 to 7.5 mm. long, the longer more or less denticulate above; the squamellae are absent. The style branches are 5.3 to 6 mm. long, including the lance-subulate attenuate appendage, which is 1.3 mm. long, and the anther appendages are lance-ovate, acuminate, 1.5 mm. long. The older heads in these specimens are normal.

3. *Tithonia brachypappa* Robinson, Proc. Amer. Acad. 27: 174. 1892.

Stem herbaceous, slender, striatulate, 2 to 3.3 meters high, sparsely hispid-pilose or hispidulous with spreading, slightly tuberculate-based hairs, subglabrate; leaves alternate, the blades 3 to 6.7 cm. long, 1.6 to 4.7 cm. wide, ovate or triangular-ovate, unlobed or deeply three-lobed with attenuate lobes (the lateral ones sometimes again lobed at base on outer side), cuneate or rounded-cuneate at base, dentate-serrate, hispidulous and rather densely gland-dotted on both sides, with stouter glandular-tuberculate-based hairs along the veins beneath, deep green above, slightly paler beneath; petioles hispid-pilose or hispidulous with tuberculate-based hairs, 1 to 5 cm. long, narrowly or rather broadly margined, at base dilated into serrulate or entire auricles decurrent on stem for 4.8 cm. or less; peduncles striate, fistulose, rather densely hispid-pilose or hispidulous, gland-dotted, 22 cm. long or less; heads 3.5 to 5 cm. wide; disk 1.4 to 1.7

cm. high, 2 to 2.4 cm. thick; involucre 3-seriate, strongly graduated, 12 to 16 mm. high, the phyllaries obovate to cuneate-obovate, bluntly rounded or barely acutish, tuberculate-hispidulous chiefly on the exposed portions and gland-dotted, sometimes sparsely hispid, strongly indurate, pale, and vittate to middle, with broader herbaceous apex, the inmost submembranaceous-herbaceous above and 6 to 8 mm. wide; rays apparently about 8, yellow, oblong-oval, 2 cm. long, 6 mm. wide; disk corollas glandular-hispidulous below, 6 mm. long (tube 0.6 to 0.8 mm.); pales subglabrous, abruptly cuspidate-acuminate, with a tooth on each side below the cusp, 8 to 10 mm. long; achenes subquadrangular, blackish or mottled, glabrous or sparsely appressed, pilose, 5 to 6 mm. long; pappus none, or in achenes of the same head of about 6 basally united dentate squamellae 0.6 to 0.8 mm. long.

TYPE LOCALITY: Las Palmas, San Luis Potosí.

SPECIMENS EXAMINED:

SAN LUIS POTOSÍ: Las Palmas, October 15, 1890, *Pringle* 3675 (type; G).
Limestone hills, Las Palmas, 1894, *Pringle* 6143 (K, N).

Tithonia brachypappa is easily recognized by its auriculate-decurrent petiole bases. This species is remarkable in showing in the same heads calvous glabrous achenes and others which are pubescent, and have a pappus of several basally united squamellae without awns.

4. *Tithonia thurberi* A. Gray, Proc. Amer. Acad. 8: 655. 1873.

Tithonia palmeri Rose, Contr. U. S. Nat. Herb. 1: 104. 1891.

Urbanisol thurberi Kuntze, Rev. Gen. Pl. 1: 371. 1891.

Rather slender branching annual, 0.5 to 2 meters high; stem whitish, striate, sparsely or rather densely tuberculate-hispid-pilose with spreading hairs and finely hispidulous, glabrate; leaves opposite below, alternate above, the blades 5 to 28 cm. long, 3 to 27 cm. wide, ovate to broadly triangular-ovate, unlobed, short-pointed to acuminate, cuneately decurrent into the petiole from a cuneate to broadly cordate base, thin, triplinerved, crenate-dentate with low, broadly triangular, mucronulate teeth, above deep green, tuberculate-hispidulous with incurved hairs and especially along the veins tuberculate-hispid-pilose, beneath paler green, rather sparsely granular or hispidulous and along the veins hispid-pilose; petioles margined to the slightly ampliate, not decurrent base, 2 to 10 cm. long, the margin irregularly toothed in the larger leaves; peduncles striate, fistulose, spreading-hispid-pilose and finely hispidulous, 30 cm. long or less; heads 2.5 cm. wide or more; disk 1.5 to 2 cm. high, 1 to 2.4 cm. thick; involucre 3-seriate, graduated or obgraduated, 1 to 2 cm. high, the two outer series of phyllaries lanceolate, oblong-ovate, or obovate, acute to acuminate, tuberculate-hispid-pilose and hispidulous, with indurate vittate base, usually contracted above, and shorter to longer, ovate to triangular-ovate, loose, herbaceous tip, the innermost broadest, with short, triangular-ovate, submembranaceous-herbaceous, merely granular or strigillose, obtuse or mucronulate tip; rays about 8, orange-yellow, oval-oblong, about 7 to 10 mm. long; disk corollas glandular-pilosulous especially below, hispidulous on teeth, 6.2 mm. long (tube 1 mm.); pales nearly smooth, striate-ribbed, with a tooth on each side below the abruptly cuspidate-acuminate tip, 1 to 1.5 cm. long; achenes oblong-obovate, thickened, appressed-pilose, 8.5 mm. long; awn solitary (on outer angle of achene), linear-subulate, 5.8 to 8 mm. long; squamellae about 4 to 8, lanceolate, very unequal (the central shortest), 4 mm. long or less.

TYPE LOCALITY: Magdalena, Sonora.

SPECIMENS EXAMINED:

SONORA: Magdalena, October, 1851, *Thurber* 910 (type collection; G, K). Along watercourses and in canyons, Alamos, September, 1890, *Palmer* 721 (type collection of *T. palmeri*; G, K, N).

This species may be recognized by its usually sparsely hispid-pilose stem, characteristic involucre, and pappose achenes.

5. *Tithonia calva* Schultz Bip.; Seem. Bot. Voy. Herald 305. 1856-57.*Mirasolia calva* Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 168. 1881.*Gymnolomia calva* A. Gray; Hook. & Jacks. Ind. Kew. 1²: 1076. 1893.

Stout branching leafy herb; stem in youth densely silky-villous with wide-spreading hairs 5 to 6 mm. long, tardily subglabrate; leaves alternate, the blades 8 to 14 cm. long, 3.3 to 8.5 cm. wide, ovate or triangular-ovate, acute to acuminate, cuneately or abruptly narrowed into the cuneately margined petiole, somewhat irregularly serrate or serrulate with bluntish teeth, triplinerved, above densely and harshly glandular-tuberculate-hispidulous and rather sparsely hispid-pilose, in age subglabrate and lepidote, beneath slightly paler green, densely and finely glandular-hispidulous and especially along veins hispid-pilose with tuberculate-based spreading hairs; petioles 4 to 6 cm. long, margined nearly or quite to base, there usually widened into auricles; peduncles fistulose, spreading-hispid-pilose and finely glandular-hispidulous, 8 cm. long or less; heads 5.5 to 6 cm. wide; disk 1.7 cm. high, 2.5 to 3 cm. wide; involucre 3-seriate, slightly graduated, 13 mm. high, the two outer series of phyllaries lance-ovate (the outermost narrower), acuminate, tuberculate-hispid-pilose and finely tubercular, with ribbed and vittate, subindurate base and equal or shorter, subherbaceous, appressed apex, the innermost series oval, much broader (5 mm.), acute or obtusish, with appressed, subherbaceous, densely tuberculate or tuberculate-hispidulous and sparsely hispid-pilose apex; rays about 13, golden-yellow, oblong, emarginate, finely glandular-hispidulous on back, 18 mm. long, 7 mm. wide; disk corollas hispidulous chiefly at base of tube and on teeth, 6 mm. long (tube 0.6 mm.); pales firm, minutely hispidulous at the abruptly pointed but not cuspidate apex, 9 to 10 mm. long; achenes thickened, glabrous, blackish, 3 to 3.5 mm. long; pappus none.

TYPE LOCALITY: Sierra Madre of northern Mexico. Type collected by Seemann (no. 2045). Sketch in United States National Herbarium.

SPECIMEN EXAMINED:

DURANGO: Without definite locality, August 15, 1897, *Rose* 2293 (N).

Tithonia calva is easily distinguished from the other epappose species by its usually acutish inner phyllaries and densely silky-villous stem.

5a. *Tithonia calva lancifolia* (Robins. & Greenm.) Blake.*Gymnolomia calva* var. *lancifolia* Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. 29: 103. 1899.

Stem rather sparsely tuberculate-hispid-pilose with ascending hairs 1 to 2.5 mm. long; leaf blades 5 to 12 cm. long, 1.8 to 4.5 cm. wide, lance-ovate to lanceolate or rarely ovate, acuminate, sometimes subentire, usually cuneate into the margined, often auriculate-based petiole, pubescent like the stem but with more incurved hairs; petioles 1.5 to 4 cm. long; peduncles more slender than in the type form, 2.5 to 8.5 cm. long; heads 4.5 to 5 cm. wide; disk 9 to 12 mm. high, 12 to 22 mm. thick; involucre 9 to 12 mm. high, 3 to 4-seriate, often more sparsely pubescent than in the typical form, the outer phyllaries sometimes with loose tips; disk corollas 5 mm. long; achenes as in the typical form.

TYPE LOCALITY: Acaponeta, Tepic.

SPECIMENS EXAMINED:

TEPIC: Tepic, 1892, *Palmer* 1975 (N). Acaponeta, February, 1895, *Lamb* 539 (type collection; G, N).

Distinguished from the typical form of the species chiefly by its smaller leaves, sparsely hispid-pilose stem, and smaller heads.

6. *Tithonia auriculata* (T. S. Brandeg.) Blake, Contr. Gray Herb. n. ser. 54: 9. 1918.*Gymnolomia auriculata* T. S. Brandeg. Zoe 5: 223. 1905.

Herbaceous many-stemmed perennial, 30 to 50 cm. high; stems simple or sparsely branched, pale fuscous, striatulate, densely hispid with tuberculate-based upcurved

hairs and finely hispidulous and gland-dotted; leaves opposite, at least below, usually alternate above, the blades 8.5 to 15.5 cm. long, 8 to 16 mm. wide, linear-lanceolate to narrowly lance-ovate, long-acuminate, at base slightly broadened and cordate-auriculate, obscurely and remotely denticulate, penninerved, rather sparsely hispid-pilose and hispidulous with incurved tuberculate-based hairs on both sides and gland-dotted, slightly paler below; petioles hispid-pilose, 2 mm. long, or obsolete; peduncles naked, slightly fistulose, striate, pubescent like the stem, 8 to 12 cm. long; heads 3.8 to 6 cm. wide; disk 1.2 cm. high, 1.8 to 2.1 cm. thick; involucre 3-seriate, 7.5 to 9 mm. high, the two outer series of phyllaries slightly graduated, lanceolate to oblong, acutish to acuminate, tuberculate-hispid-pilose, toward tip tuberculate-hispidulous, with indurate, ribbed, and vittate base and shorter loose herbaceous apex, the innermost shorter, oblong, indurate to the short deltoid acute mucronulate subherbaceous tip; rays about 15, oval-oblong, emarginate, gland-dotted and finely hispidulous dorsally, 1.4 to 2.4 cm. long, 4 to 6.5 mm. wide; disk corollas pilose or puberulous at base of throat, hispidulous on the teeth, 5 mm. long (tube 0.3 mm.); pales ribbed, abruptly short-pointed, tuberculate-hispidulous above, about 8 mm. long; achenes plump, obscurely quadrangular, blackish, glabrous, 3.5 mm. long; pappus none.

TYPE LOCALITY; Cerro Colorado, Cofradia, Sinaloa.

SPECIMENS EXAMINED:

SINALOA: Cerro Colorado, Cofradia, November 5, 1904, *Brandegee* (type collection; G, N). Openings in woods, road to La Tigre, San Ignacio, 1918, *Salazar* 446 (N).

Tithonia auriculata is easily recognized by its narrowly linear-lanceolate or lance-ovate, subsessile, auriculate-based leaves. It is perhaps most closely related to *T. calva lancifolia*.

7. *Tithonia pittieri* (Greenm.) Blake, Contr. Gray Herb. n. ser. 54: 9. 1918.

Gymnolomia pittieri Greenm. Proc. Amer. Acad. 39: 101. 1903.

Herbaceous, the base not seen; stem slender or stoutish, branched, striatulate, hispid-pilose with short incurved or ascending hairs with slightly enlarged bases and more or less finely hispidulous; leaves opposite below, alternate above, the blades of the middle and upper ones 7.3 to 11 cm. long (including the margined portion of the petiole), 1.5 to 2.3 cm. wide, lanceolate, acuminate, usually oblique or falcate, tapering or somewhat abruptly contracted into a cuneately margined petiole, crenate-serrulate (teeth 5 to 13 pairs, very depressed), above dark green, rather dense, hispidulous with tuberculate-based, more or less persistent hairs and gland-dotted, beneath paler or in youth griseous, rather densely incurved-pilose with short hairs scarcely enlarged at base, or hispidulous-pilosulous, gland-dotted, triplinerved and somewhat veiny; naked portion of petiole hispid-pilose and gland-dotted, 2 to 4 mm. long; peduncles fistulose, striate, 2.5 to 11 cm. long, pubescent like the stem; heads 3.5 to 5.5 cm. wide; disk 8 to 15 mm. high, 1.1 to 2 cm. thick; involucre 4-seriate, strongly graduated, 7 to 14 mm. high, the outermost phyllaries oblong or obovate-oval, 3 to 5 mm. long, obtuse or abruptly subacute, indurate and ribbed below with shorter or longer, subherbaceous, appressed or loose tip, rather densely appressed-hispid-pilose or hispidulous and ciliate or ciliolate; the next series indurate and ribbed to middle or above and sparsely tuberculate-hispidulous, with subherbaceous, densely tuberculate-hispidulous and gland-dotted, obtuse or rounded, more or less spreading tip; the inner obovate, 3 to 7 mm. wide, indurate and vittate to above the middle and there subglabrous, with submembranaceous, densely tuberculate, minutely ciliolate and somewhat gland-dotted, broadly rounded or obtuse tip; rays 12, yellow, narrowly oblong, emarginate or bidenticulate, 2.3 cm. long, 4 to 5 mm. wide; disk corollas yellow, in youth cylindraceous, with very obscure proper tube, hispidulous below and on teeth, 5 mm. long, in age developing a short glabrous tube 0.5 to 0.8 mm. long; receptacle convex, strongly tuberculate; pales firm, abruptly acute, usually with a lateral tooth on each side, ribbed, sparsely tuberculate above, in maturity

purplish, 7 to 8 mm. long; achenes thickened, blackish brown, glabrous, slightly striatulate and pustulose or smooth, 3.3 to 3.8 mm. long, the base inclosed by the conspicuous, whitish or at length brownish, scarious-chartaceous development (0.7 mm. long) of the short carpoid; pappus none.

TYPE LOCALITY: Along the Río Ceiba, Buenos Aires, Costa Rica. The species was based on *Pittier* 3136 (in part), from the Río Tiliri, San José; *Pittier* 3735, from the Río Ceiba at Buenos Aires; and *Pittier* 10631, from Ujarras de Buenos Aires, Costa Rica, the second of which is here selected as the type.

SPECIMENS EXAMINED:

GUATEMALA: Hills between Cajval and Cahabón, Alta Verapaz, altitude 400 meters, 1905, *Pittier* 226 (N). Vicinity of Secanquím, Alta Verapaz, altitude 550 meters, 1905, *Pittier* 201 (N).

COSTA RICA: Along the Río Ceiba, Buenos Aires, altitude 200 meters, February, 1891, *Pittier* 3735 (type; G).

Tithonia pittieri may be distinguished from *T. scaberrima* by its smaller heads and more sparsely pubescent stem and leaves.

8. *Tithonia scaberrima* Benth.; Oerst. Naturhist. For. Kjöbenhavn Vid. Medd. 1852: 91. 1852.

Tithonia platylepis Schultz Bip.; Benth. & Hook. Gen. Pl. 2: 368. 1873, nomen nudum.

Mirasolia scaberrima Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 168. 1881.

Gymnolomia platylepis A. Gray, Proc. Amer. Acad. 19: 5. 1883.

Gymnolomia decurrens Klatt, Leopoldina 23: 90. 1889.

Perymeniopsis perfoliata Schultz Bip.; Klatt, Leopoldina 23: 90. 1889, as synonym.

Tithonia glaberrima Kuntze, Rev. Gen. Pl. 1: 371. 1891.

Gymnolomia scaberrima Greenm. Field Mus. Bot. 2: 268. 1907.

Stout branching herb, 1.3 to 5 meters high; stem usually densely pilose or hispid-pilose with spreading hairs and hispidulous, sometimes incurved-hispid; leaves opposite below, alternate above, the blades 8.5 to 17 cm. long (excluding the margined petiole), 2.5 to 9.8 cm. wide, ovate-lanceolate to broadly ovate, rarely lanceolate, acuminate, cuneately or abruptly contracted into the petiole, thickish, crenate-serrate, above scabrous with short incurved hairs with glandular-tuberculate bases, along the veins hispid-pilose, beneath pale or canescent, densely and softly pilosulous or pilose with more or less spreading hairs, triplinerved and rather veiny; petioles cuneately margined nearly to the base, not auriculate, 1 to 3.5 cm. long; heads few, 5 to 7 cm. wide, on fistulose, sparsely or densely hispid-pilose and hispidulous, naked or bracteate peduncles up to 12 cm. long; disk 1.8 to 2.5 cm. high, 1.3 to 3.5 cm. thick; involucre 4-seriate, strongly graduated, 1.2 to 1.8 cm. high, the phyllaries oval or obovate, broadly rounded at tip, the two outer series indurate-subherbaceous, with thinner tip, rather densely hispid-pilose with subtuberculate-based hairs and ciliate or ciliolate, the inner with indurate, more or less pubescent base and submembranaceous, ciliolate, otherwise subglabrous apex; rays yellow, 14 to 18, 2.5 to 3.5 cm. long; disk corollas yellow, puberulous below and on teeth, 5 to 7 mm. long (tube 0.5 to 1.1 mm. long); pales acute or acuminate, not cuspidate, hispidulous or tuberculate toward tip, 8 mm. long; achenes glabrous, slightly thickened, blackish brown, 3 to 4.3 mm. long; pappus none.

TYPE LOCALITY: Coniferous region, vicinity of Chinotega, Province of Segovia, Nicaragua, altitude 1,525 meters.

SPECIMENS EXAMINED:

VERACRUZ: Valley of Córdoba, 1866, *Bourgeau* 1851 (N). Cerro del Borrego, Orizaba, altitude 1,370 meters, 1895, *Pringle* 6087 (N). Hacienda Mirador, altitude 1,095 to 1,220 meters, 1894, *Nelson* 65 (N). Open forests, Zacuapan, 1907, *Purpus* 2183 (N). Rocky soil, Fortín, Zacuapan, 1907, *Purpus* 2852 (N).

OAXACA: Vicinity of Totontepec, altitude 1,675 to 2,135 meters, 1894, *Nelson* 772 (N).

CHIAPAS: Between San Sebastián and Pantepec, 1907, *Collins & Doyle* 211 (N).

GUATEMALA: Cobán, altitude 1,350 meters, 1908, *Türckheim* II. 2053 (N). Near Santa María, Department of Quezaltenango, altitude 1,500 to 1,800 meters, 1905, *Maxon & Hay* 3595 (N). Quezaltenango, altitude 1,980 meters, 1917, *Holway* 729 (G).

SALVADOR: Opaneca, Department of Ohuachapan, altitude 1,460 meters, 1907, *Pittier* 2007 (N).

HONDURAS: Between Llano de la Puerta and El Salto, Copán, altitude 900 meters, 1907, *Pittier* 1854 (N).

COSTA RICA: Along the Río Tiliri, 1892, *Tonduz* 7196 (N).

Tonduz 7196 is peculiar in having the leaves beneath green, merely hispidulous-puberulous, and rather densely gland-dotted, in this respect approaching *T. calva lancifolia*, but it is otherwise typical of *T. scaberrima* and possesses the characteristic involucre of the latter species. *T. scaberrima* is readily told by its densely pubescent stem and leaves, large heads, and large, broadly rounded phyllaries.

9. *Tithonia fruticosa* Canby & Rose, *Contr. U. S. Nat. Herb.* 1: 104. *pl.* 5. 1891

Stout shrub, 3 to 4 meters high, the woody stem becoming 10 cm. in diameter, glabrate and clothed with a grayish bark; younger branches densely and canescently pilose-tomentose with spreading hairs; leaves opposite below, alternate above, the blades 6.5 to 30 cm. long, 2.2 to 14 cm. wide, ovate or lanceolate, acuminate or attenuate and often falcate, cuneate into the margined petiole, crenate-serrate, triplinerved and veiny beneath, canescent-pilose on both sides but particularly beneath with rather soft incurved tuberculate-based hairs and gland-dotted; petioles 3 to 5 cm. long, margined but not auriculate; heads terminal and axillary, 7 to 9.5 cm. wide, on fistulose striate peduncles shorter than the leaves; disk 2 to 2.5 cm. high, 2.5 to 4.5 cm. thick; involucre 4-seriate, strongly graduated, 2 to 2.8 cm. high, the phyllaries broadly oval or obovate-oval (the median 8 to 12 mm. wide), broadly round-tipped or rarely obtuse, the outer densely canescent-pilosulous with tuberculate-based appressed hairs, the inmost less pubescent and greenish, all with obscurely indurate base and shorter submembranaceous tip, the inmost with submembranaceous-subherbaceous tip; rays about 14 to 20, yellow, narrowly elliptic, 2 to 3.5 cm. long; disk corollas hispidulous throughout, or only below and on the teeth, 8 to 9 mm. long (tube 1 mm.); pales ovate-lanceolate, stiff, abruptly pointed but not cuspidate, finely tuberculate-hispidulous and gland-dotted above or subglabrate, 12 to 14 mm. long; achenes appressed-pilose, 4 to 5 mm. long; squamellae connate into a laciniate-fimbriate paleaceous crown 1 to 1.5 mm. high, the awns obsolete or represented merely by teeth only twice as long as the crown.

TYPE LOCALITY: Alamos, Sonora.

ILLUSTRATION: *Contr. U. S. Nat. Herb.* 1: *pl.* 5. 1891.

SPECIMENS EXAMINED:

SONORA: Among bushes near a watercourse, Alamos, March or April, 1890, *Palmer* 303 (type collection; G. N). Huehuerachi, altitude 1,220 meters, 1890, *Hartman* 301 (G, N). High up on the Sierra de Alamos, 1910, *Rose, Standley & Russell* 13085 (N).

CHIHUAHUA: Near Batopilas, 1898, *Goldman* 232 (N).

DURANGO: San Ramón, 1906, *Palmer* 68 (G, N).

SINALOA: Arroyo de la Labor, San Ignacio, altitude 380 meters, 1918, *Montes & Salazar* 309 (N).

This very distinct species is quickly recognized by its shrubby habit, densely canescent-pubescent stem and leaves, and large rounded phyllaries.

10 *Tithonia diversifolia* (Hemsl.) A. Gray, Proc. Amer. Acad. 19: 5. 1883.*Mirasolia diversifolia* Hemsl. Biol. Centr. Amer. Bot. 2: 168. pl. 47. 1881.*Urbanisol tagetifolius* var. *diversifolius* Kuntze, Rev. Gen. Pl. 1: 370. 1891.*Urbanisol tagetifolius* var. *diversifolius* f. *grandiflorus* Kuntze, Rev. Gen. Pl. 1: 370. 1891.*Urbanisol tagetifolius* γ *flavus* Kuntze, Rev. Gen. Pl. 1: 371. 1891.*Tithonia speciosa* Klatt, Bull. Soc. Bot. Belg. 31¹: 203. 1891, excluding name-bringing synonym. Not *T. speciosa* Hook. 1866.*Tithonia triloba* Schultz Bip.; Klatt, Bull. Soc. Bot. Belg. 31¹: 203. 1891, as synonym.

Stout branching perennial, or perhaps shrubby, 3 to 9 meters high; stem striate, sparsely hispid-pilose to sordidly pilose-tomentose, in age usually glabrate; leaves alternate, the blades 7 to 20 cm. long, 4 to 18.5 cm. wide, ovate or deltoid-ovate, unlobed or usually 3 to 5-lobed, acuminate to attenuate, at base cuneate, rounded, or subtruncate, then cuneately narrowed into the petiole, crenate-serrate, triplinerved, green but rather densely tuberculate-hispidulous with at length deciduous hairs above, beneath paler green or subcanescent, everywhere, but particularly along the veins, pilosulous or pilose with rather soft hairs and gland-dotted; petioles narrowly margined nearly to base, there biauriculate, 2 to 10 cm. long; heads 6 to 14 cm. wide, on fistulose, striate, sparsely hispid-pilose or subglabrous peduncles 27 cm. long or less; disk 1.5 to 2.3 cm. high, 1.5 to 4 cm. wide; involucre 4-seriate, strongly graduated, 2 cm. high or less, the phyllaries broadly oval, or the outer lance-ovate or oval-ovate, broadly round-tipped or the outer acutish or acute, sparsely appressed-hispid-pilose or subglabrous, the outermost indurate and vittate nearly throughout, with short subherbaceous apex and narrow scarious margin, the innermost with ampliate and elongate submembranaceous apex, all appressed or the inner somewhat loose at apex; rays 12 to 14, golden-yellow, elliptic, tridenticulate, 6 cm. long or less; disk corollas hispidulous below, 7.5 to 8 mm. long (tube 0.5 to 0.8 mm.); pales stiff, abruptly pointed, sparsely hispidulous above, 9 to 11.5 mm. long; achenes appressed-pilose, 4.5 to 5.6 mm. long; awns 2, unequal, 2.8 to 4 mm. long; squamellae 6 to 10, connate below, lacerate at apex, 1.5 to 2.5 mm. long.

TYPE LOCALITY: Valley of Orizaba, Veracruz. The species was based by Hemsley on *Bourgeau* 2319, from the Valley of Orizaba; *Bourgeau* 1562, from the Valley of Córdoba; and plants collected by *Fraser* and *Salvin* at Dueñas, Guatemala. Of these the first is here selected as type.

ILLUSTRATION: Hemsl. Biol. Centr. Amer. Bot. pl. 47.

SPECIMENS EXAMINED:

VERACRUZ: Orizaba, *Botteri* 483 (G). Valley of Orizaba, May 12, 1866, *Bourgeau* 2319 (type collection; G, K, N). Orizaba, altitude 1,220 meters, 1891, *Seaton* 462 (G, N). Valley of Córdoba, 1865, *Bourgeau* 1562 (G, K). Mirador, *Liebmann* 603 (sketch, G). Atoyac, 1882, *Kerber* 161 (N).

MICHOACÁN or GUERRERO: El Ocote, Cerro Pedregoso, 1898, *Langlassé* 528 (G, N).

OAXACA: Sierra de Clavellinas, altitude 2,590 meters, 1894, *Pringle* 5806 (G).

YUCATÁN: Mérida, 1896, *Valdez* 93 (G). Without definite locality, *Gaumer* 944 (N).

GUATEMALA: Cubilquitz, altitude 350 meters, 1902, *Türckheim* 8235 (G, N). Bank of Cahabón River, between Cajval and Chimaste, altitude 200 meters, 1905, *Pittier* 223 (N). Cobán, 1907, *Türckheim* II. 1589 (N). Gualán, 1912, *Mrs. W. P. Cockerell* 50 (N). Guatemala City, 1890, *J. D. Smith* 2371 (G, N). Las Cruces, Department of Santa Rosa, altitude 1,830 meters, *Heyde & Lux* 6166 (G, N). Antigua, 1915, *Holway* 65 (G). San Antonio, 1916, *Holway* 526 (G). San Felipe, 1917, *Holway* 701 (G). Volcán Fuego, 1873, *Salvin & Godman* (K).

SALVADOR: San Salvador, 1905, *Velasco* (J. D. Smith, no. 8868) (G, N). Without definite locality, *Renson* 19 (N).

COSTA RICA: San Vicente, altitude 1,200 meters, 1888, *Cooper* (Pittier & Durand, no. 565; G, N). San José, 1889, *Pittier* 1442 (G); in 1893, *Tonduz* 7140 (G, N). San Francisco de Guadalupe, altitude 1,100 meters, 1895, *Tonduz* (J. D. Smith, no. 7066; G, N). Near Guadalupe, 1892, *Tonduz* 7186 (N).

JAMAICA: Introduced, Hope Grounds, altitude 210 meters, 1915, *Harris* 11877 (G).

CEYLON: *Trimen* (G, K).

BURMA: "A plant which is becoming a pest in Burma," 1912, *Lace* (K).

STRAITS SETTLEMENTS: Singapore, 1861, *T. Anderson* (K); in 1875, *Kuntze* 607A (K).

CULTIVATED: Mount Jackson, Fontabelle, Barbados, 1895, *Waby* 116 (K). Government House Grounds, Trinidad, 1909, *Broadway* 3605 (K).

Tithonia diversifolia is easily distinguished from the other species of the genus by its large heads, broadly rounded phyllaries, and usually 3-lobed leaves. It is described on some collectors' labels as a shrub, but is more probably an herbaceous perennial. In spite of its widely different characters, it was treated by Otto Kuntze as a variety of *T. rotundifolia* (*Urbanisol tagetifolius* of Kuntze), with several forms of no real consequence.

The species has become somewhat widely spread as a weed in Ceylon and parts of farther India. *Trimen* has noted on a sheet in the Kew Herbarium: "After *Lantana*, the commonest weed in Ceylon. Originally escaped from Peradeniya, where it is called 'Verbesina.'" In his flora of Ceylon, he says:⁴ "*Tithonia diversifolia*, Gray, a native of Mexico and California, though only introduced as a garden plant so recently as 1851, is now one of the commonest and most conspicuous plants in the island, and is generally known as the 'Wild Sunflower.' It doubtless spread from Peradeniya, but is now completely established by roadsides and waste ground over the whole of the moist region up to 5,000 ft., and in places in the dry region also." In Jamaica, *Harris* speaks of it as "introduced but now widely spreading in gardens and as an escape in waste places." In Salvador, according to *Renson* and *Velasco*, it bears the vernacular names "jalacate" and "guasmará."

10a. *Tithonia diversifolia* *glabriuscula* Blake, subsp. nov.

Stem essentially glabrous; leaves less pubescent above, very sparsely puberulous beneath, especially along the veins, and gland-dotted.

Type in the United States National Herbarium, no. 256799, collected north of Tuxtepec, Oaxaca, Mexico, altitude 90 meters, April 9, 1894, by E. W. Nelson (no. 346).

OTHER SPECIMENS EXAMINED:

VERACRUZ: Tlacotalpam, 1894, *Nelson* 496 (N). Without definite locality, 1910, *Orcutt* 3427 (N).

OAXACA: About Santo Domingo, altitude 275 meters, 1895, *Nelson* 2666 (G, N). Tolosa, 1898, *Deam* (G, N).

Intermediates between this and the typical form are represented by *Langlassé* 528, *Gaumer* 944, and *Holway* 526 and 701.

EXCLUDED SPECIES.

TITHONIA ANGUSTIFOLIA Hook. & Arn. Bot. Beechey Voy. 435. 1841.

This is *Viguiera angustifolia* (Hook. & Arn.) Blake.⁵

TITHONIA ARGOPHYLLA D. C. Eaton; S. Wats. in King, Geol. Expl. 40th Par. 5: 423. 1871.

This is *Enceliopsis argophylla* (D. C. Eaton) A. Nels.

⁴ Hand-book Fl. Ceylon 3: 39. 1895.

⁵ Proc. Amer. Acad. 51: 518. 1916.

TITHONIA DECURRENS A. Gray, Mem. Amer. Acad. n. ser. 4: 85. 1849.

This is *Viguiera decurrens* A. Gray.⁶

TITHONIA EXCELSA DC. Prodr. 5: 585. 1836.

This is *Viguiera excelsa* (Willd.) Benth. & Hook.

TITHONIA GLUTINOSA Collie; Hook. & Arn. Bot. Beechey Voy. 33. 1830, as synonym.

This is *Flourensta thurifera* (Molina) DC.

TITHONIA HUMILIS Kuntze, Rev. Gen. Pl. 2: 552. 1891.

This is *Rivina humilis* L., of the family Phytolaccaceae.

"TITHONIA LACINIATA Raeusch. Nom. ed. 3: 251. 1797."

⁶ Proc. Amer. Acad. 19: 5. 1883.