

STUDIES IN THE SENECTIONEAE (ASTERACEAE). V.

THE GENERA PSACALIOPSIS, BARKLEYANTHUS,

TELANTHOPHORA AND ROLDANA

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The genus name Cacalia has been applied to many Mexican members of the Senecioneae which lack rays and have white corollas. In more recent times there has been a tendency to separate these plants into a group of genera. These "Cacalioid" genera have been reviewed by Pippen (1968). During the last year a more natural and broader concept of the Mexican, southeastern United States and Asian "Cacalioid" genera has been outlined (Robinson & Brettell 1973d).

This study is intended to complete and summarize the generic concepts of the Neotropical "Cacalioid" genera. For this purpose here one genus is resurrected from the synonymy of Senecio and two new genera are described with notes on generic comparisons and trends. The group of genera involved is concentrated in Mexico and includes all the forms there with single fused stigmatic surfaces on each style branch and unenlarged bases on the anther collars. The group shows many members without ray flowers, with white corollas, and with broad often palmately veined leaves as with Cacalioids elsewhere. The Mexican genera have more of a tendency for peltate leaf laminae, for thickenings on the lateral walls of the exothecial cells, for development of ray flowers and for yellow corollas than noted in Cacalioids elsewhere. In spite of the basic unity with other Cacalioids there is some suggestion that in Mexico as in Sinacalia in China there is an infusion of some local Senecioid genes. Some of the cases cited below may or may not be examples of such infusions. Still, the overall view of the group indicates that such wide ranging intergeneric hybridizations must be very rare and that in spite of their profound influence on the overall evolution, they do not prevent the recognition of some very distinctive genera within the complex.

The Mexican and Central American Cacalioid genera treated here can be distinguished by the following key.

Key to Genera:

1. Plants acaulescent, most leaves in basal rosette 2
1. Plants caulescent, having prominent leafy stems 4
 2. Corollas divided to the tube into narrow lobes, rays lacking Psacalium
 2. Corollas with distinct undivided throat, lobes short, rays often present 3
3. Pappus absent Pippenalia
3. Pappus present Psacaliopsis
 4. Corollas divided to the tube into narrow lobes, as long as the tube, exothecial cells with thickenings only on transverse walls Digitacalia
 4. Corolla lobes rarely divided beyond lower third of throat, distinctly shorter than tube 5
5. Plants epiphytic, exothecial cells with thickenings restricted to transverse walls Nelsonianthus
5. Plants terrestrial, exothecial cells with thickenings commonly on lateral walls 6
 6. Stems with resin ducts in cortex; inflorescence abruptly terminating stems, subumbellate 7
 6. Stems without resin ducts in cortex; inflorescence without abrupt clustering of branches, simply paniculate or corymbose 8
7. Leaves palmately nerved, seasonally deciduous Pittocaulon
7. Leaves pinnately nerved, not seasonally deciduous Telanthophora
 8. Plants profusely branched, with small pith, diffuse inflorescence, corymbose Barkleyanthus
 8. Plants with only subfloral branches, with large pith, inflorescence a terminal corymbose or racemose panicle Roldana

The genera in the key might be more conveniently regarded as representing three basic groups. The first group is those with leaves in a basal cluster with a scapose inflorescence, the second group is the profusely branched caulescent type with a diffuse inflorescence, and the third group is the caulescent type with terminal inflorescence with branching only by innovation from below the inflorescence.

The first group includes the genera Psacalium, Pippenalia and Psacaliopsis which have a hirsute pubescence on the leaf bases which is as distinctive as the clustered habit. The basal cluster of leaves is also common in many Senecioid forms but not with the broad often peltate form of leaf seen in this group. The genus Psacalium has been the most significant element of what has been called Cacalia in Mexico and shows the characters that are most consistently regarded as Cacalioid. The three genera are all closely related in spite of the very significant differences involving length of corolla lobes, presence or absence of rays, and presence or absence of pappus.

The second group includes only the new genus Barkleyanthus with its single rather widely distributed species. In superficial traits the genus would never be regarded as Cacalioid but the details of the flowers are in complete agreement with the other Cacalioids of Mexico. A Mexican species of very similar habit, Senecio cinerarioides H.B.K., might indicate a intergeneric hybridization problem such as mentioned above, but the latter is totally different in so many details as to preclude close relationship. Senecio cinerarioides is totally senecioid in its double stigmatic lines and its enlarged anther collar bases. The cells of the carpopodium are even different by lacking the obvious porosity in the walls found in all the Mexican Cacalioid genera. It is notable that here, unlike the case of Sinacalia, there is no mixing of basic Cacalioid and Senecioid characters in the plants. In spite of superficial resemblance the plants are in each case strictly Cacalioid or Senecioid.

The genus Barkleyanthus differs from the related Roldana in habit but can also be told by the nearly always closely and minutely chambered pith of the stems. The pith of Roldana is never chambered.

The third group contains all the remaining genera in the key. Some of the species that lacked rays and had white corollas have been placed in Cacalia but the group has not generally been regarded as Cacalioid. Still, the habit and the often palmate and sometimes peltate leaves distinguish most members from any Senecioids. There are two Cuban species, Senecio plumbeus Griseb. and S. polyphlebius that most noticeably have the habit including leaf form and placement and a rather abrupt though not subumbellate inflorescence very similar to the genus Telanthophora. However, the two Cuban species are Senecioid in stigmatic lines and anther collars as well as being different in phyllary structure and in the lack of distinct resin ducts in the stem. There is no real reason to consider the West Indian plants very closely related.

The third group is certainly Cacalioid and distinct from any associated Senecioid forms but there is involved a considerable extension of the concept of Cacalioid to include many forms with rays with yellow corollas, with strongly caulescent habit sometimes becoming arborescent. Among these various genera are an epiphyte and two genera with resinous stems including some very xeric species.

The generic limits in the third group of Cacalioids are established here on the basis of the most obvious natural groupings distinguished by major discontinuities of characters. Some of the groups closely follow previously recognized generic or subgeneric concepts but both narrower and broader concepts have been necessary in different places. Digitacalia is taken almost as it was established by Pippen (1968) but one of his five species (Senecio heteroidea) which had a much more lax inflorescence and larger heads has exothecial cells with thickenings on the sides. The species is properly placed in Roldana with a number of other similar forms some of which have rather deeply cut corolla lobes. The concept of Roldana itself is rather broad including not only the one Digitacalia but all of Pericalia, the problematical Cacalia suffulta, part of the Senecio sect. fruticosae and all of section palmatinervi. The Senecio section terminales would at first seem a natural group with its resinous stems and abrupt subumbellate inflorescences. The section is nevertheless treated here as two genera on the basis of its two very distinct elements. The two elements are distinct in leaf form and dehiscence as well as in corolla lobing. The two elements are also possibly related to different elements within the genus Roldana. The new genus Telanthophora is particularly close to R. schaffneri which lacks only the generic characters but is otherwise easily confused with the resinous and subumbellate species. On the basis of only its appearance, R. schaffneri would be much better placed with Telanthophora than with the other species of Roldana. Pittocaulon is most similar to Roldana eriophylla which has the same form of palmate seasonally deciduous leaves and very thickened stems unlike other Roldanas. In this case, however, the position of R. eriophylla is reinforced by other characters. Besides its lack of resin and its more paniculate inflorescence, R. eriophylla has long corolla lobes with more prominent median traces and a solid pith, all unlike Pittocaulon. There is enough reason to doubt that the relationship between the two elements of the terminales section is a simple one.

One of the genera in the key, Nelsonianthus, was totally unrecognized until its recent description as a new genus and species. The genus is clearly related to the Roldana group though immediately distinct by its exothecial cells and epiphytic habit. The genus has a somewhat thickened stem but has neither the resin nor inflorescence of Pittocaulon. The pith is never solid as it is in most of Roldana and is sometimes chambered which it never is in Roldana. In terms of the leaf the genus is most like R. schaffneri and thus unlike any other Roldana. Even from R. schaffneri the leaf differs in many details, such as lack of the prominent net-veining and a more trinerved condition at the base.

Some cytological correlations among the Cacalioid Senecioneae of Mexico can be made. With a few obvious exceptions such as the Crocidiinae, a group of Senecio in the western United States, and Arnica, most of the Senecioneae have chromosome counts showing various multiples of ten. The present Cacalioid group is particularly uniform in its chromosome number. The following summary is derived from various papers with particular attention to the tables of Pippen (1968) and Gibson (1969): Barkleyanthus salicifolius (H.B.K.) R. & B. (as Senecio salignus) $n=30$ Sonora Flyr 89 (Turner & Flyr 1966), $n=30$ Hidalgo King 4148, $n=30$ Mexico State King 4149 (Turner et al. 1962); Digitocalia tridactylis (Rob. & Greenm.) Pippen $n=30$ Guerrero McVaugh 21903 (Turner in Pippen 1968); Pittocaulon praecox (Cav.) R. & B. ca. $n=30$ Oaxaca King 2530 (Turner et al. 1961); Psacalium amplum (Rydb.) R. & B. $n=30$ Aguascalientes Pippen 4 (Pippen 1968); P. brachycomum (Blake) R. & B. $n=30$ Michoacán McVaugh 21934 (Turner in Pippen 1968); P. cirsiifolium (Zucc.) R. & B. $n=30$ Michoacán Pippen 52 (Pippen 1968); P. decompositum (A.Gray) R. & B. $n=30$ Arizona Kruckeberg 4644 (Ornduff et al. 1963); P. eriocarpum (Blake) Blake $n=30$ Jalisco Pippen 62 (Pippen 1968); P. holwayana (Rob.) Rydb. $n=30$ Michoacán McVaugh 21953 (Turner in Pippen 1968); P. megaphyllum (Rob. & Greenm.) Rydb. $n=30$ Aguascalientes Pippen 8 (Turner in Pippen 1968); P. multilobum (Pippen) R. & B. $n=30$ Jalisco Pippen 30 (Pippen 1968); P. palmeri (Greene) R. & B. (as Cacalia cf. tussilaginoideus H.B.K.) ca. $n=25$ Jalisco King 3659 (Turner et al. 1962); ca. $n=25$ Nayarit Pippen 12 (Pippen 1968); P. peltatum (H.B.K.) Cass. $n=30$ Michoacán Pippen 49 (Pippen 1968); P. pringlei (S.Wats.) R. & B. $n=30$ Jalisco Pippen 37 (Pippen 1968); P. sinuatum (Cerv.) R. & B. $n=30$ Durango King 3734 (Turner et al. 1962), $n=30$ Jalisco Pippen 9 (Turner in Pippen 1968); Psacalium sp. $n=30$ Guerrero McVaugh 21913 (Turner in Pippen 1968); Roldana angulifolia (DC.) R. & B. $n=30$ Michoacán King 5193 & Soderstrom (Turner & King 1964); R. aschenborniana (S.Schauer) R. & B. $n=30$ Durango Breedlove 4264 (Ornduff et al. 1967), (as Senecio hirsuticaulis) $n=30$ San Luis Potosí Johnson 5104 (Turner et al. 1962); R. donnell-smithii (Coul.) R. & B. $n=30$ Chiapas Breedlove 8020 (Gibson 1969); R. chapalensis (S.Wats.) R. & B. (as Senecio langlassei) $n=30$ Jalisco Cronquist 9797 (Turner & Flyr 1966); R. cristobalensis (Greenm. ex Loesn.) R. & B. $n=30$ Chiapas Breedlove 7319 (Gibson 1969); $n=30$ Chiapas Breedlove & Raven 19859 (Gibson 1969); R. galiciana (McVaugh) R. & B. (as Senecio hederoides) $n=30$ Jalisco Cronquist 9767 (Turner & Flyr 1966); R. jurgensenii (Hemsl.) R. & B. (det. Gibson, specimen not seen in this study) $n=30$ Chiapas Breedlove 7801 (Gibson 1969); R. michoacana (Rob.) R. & B. $n=30$ Jalisco Pippen 63, 65 (Pippen 1968); R. oaxacana (Hemsl.) R. & B. $n=30$ Oaxaca Breedlove 8125 (Gibson 1969); R. petasitis (Sims) R. & B. $n=30$ (Afzelius 1925); $n=30+6$ acc. cultivated Raven 13775 (Ornduff et al. 1963); R. sessilifolia (Hook. & Arn.) R. & B. $n=30$ Jalisco Pippen 61 (Pippen 1968); Telanthophora grandifolia (Less.) R. & B. $n=30$ Puebla Cronquist 930 (Turner & Flyr 1966).

The chromosome count of $n=30$ is not presently known for any Mexican or Central American Senecioneae that do not belong to this complex. The number is recorded from a few unrelated members of the tribe from other parts of the world.

The Cacalioid genera of Mexico and Central America have all been reviewed and keys have been prepared to the species in either this or previous studies. The descriptions and keys or other references are as follows.

BARKLEYANTHUS H. Robinson & R.D. Brettell, genus novum Asteracearum (Senecioneae).

Plantae frutescentes erectae multae ramosae. Caules tenues rigidi lignosi, medullis angustis plerumque septatis interdum solidis, canalibus resiniferis nullis. Folia alternata linearia vel lineari-lanceolata subsessilia fere glabra, pilis glandiferis paucis perminutis. Inflorescentiae diffusae, partibus corymbosis. Capitula campanulata; squamae involucri 1-2-seriatae ca. 8 glabra ovatae; receptacula plana glabra fistulosa. Flores 25-30 radii et disci flavi. Corollae disci in parte superiore ad tertium vel medium lobatae, canalibus resiniferis intermediis distinctis; filamenta in parte superiore non inflata; cellulae exotheciales quadratae vel longiores, parietibus lateralibus noduliferis; lineae stigmaticae connatae. Achaenia setifera; carpopodia breviter subcylindrica, cellulis multiseriatis subquadratis; setae pappi 2-3-seriatae. Species typica: Cineraria salicifolia H.B.K.

The genus includes the one species commonly known under the name Senecio salignus DC. ranging from Mexico south to Honduras. The plants are usually described as glabrous but there are some very minute gland-tipped hairs on most plants at least along the basal margins of the leaf-laminae.

Barkleyanthus salicifolius (H.B.K.) H. Robinson & R.D. Brettell, comb. nov. Cineraria salicifolia H.B.K., Nov. Gen. et Sp., folio ed. 4: 148. 1818.

DIGITACALIA Pippen

The genus was originally established to include five Mexican species. Four of the species have smaller heads and a dense inflorescence and show exothecial cells with thickenings only on the transverse walls. The fifth species, Senecio heteroideus Klatt, has larger heads in a lax inflorescence and exothecial cells with thickenings on the vertical walls. The latter species is transferred here to the Pericalia group of the genus Roldana. For a key to the four remaining species of Digitacalia see Pippen (1968).

NELSONIANTHUS H. Robinson & R.D. Brettell

The genus contains a single species from southern Mexico and Guatemala. For a description of the genus and species see

Robinson and Brettell (1973b).

PIPPENALIA McVaugh

The genus contains a single species of west-central Mexico. For a description and illustration of the genus see McVaugh (1972).

PITTOCAULON H. Robinson & R.D. Brettell

The genus contains five known Mexican species. For a key to the species see Robinson and Brettell (1973a).

PSACALIOPSIS H. Robinson & R.D. Brettell, genus novum Asteracearum
(Senecioneae)

Plantae herbaceae acaulescentes. Folia congesta longe petiolata, petiolis base aliquantum vaginatis pilosis, laminis peltatis. Inflorescentiae scaposae non vel pauca ramosae. Capitula late campanulata; squamae involucris 1-2-seriatae ca. 15-20 oblongae ellipticae breviter vel sparse pubescentes. Flores ca. 25-50 flavi vel purpurascens. Flores radii prominenti vel nulli; corollae disci plerumque breviter lobatae, canalibus resiniferis intermediis distinctis; filamenta in parte superiore non inflata; cellulae exotheciales quadratae vel longiores, parietibus lateralibus noduliferis; lineae stigmaticae connatae. Achaenia glabra; carpophylla breviter subcylindrica, cellulis multiseriatis subquadratis; setae pappi 2-3-seriatae. Species typica: Senecio purpusii Greenm. ex T.S. Brandegee.

The genus contains two species which can be distinguished by the following key.

1. Plants with single unbranched scapes, rays lacking, flowers reddish, leaf blades shallowly lobed P. pudica
1. Plants with sparingly branched scapes, rays present, flowers yellow, leaf blades lobed about half way to center P. purpusii

Psacaliopsis pudica (Standl. & Steyerm.) H. Robinson & R.D. Brettell, comb. nov. Cacalia pudica Standl. & Steyerm., Publ. Field Mus. Nat. Hist., Chicago, Bot. Ser. 23:255. 1947.

Psacaliopsis purpusii (Greenm.) H. Robinson & R.D. Brettell, comb. nov. Senecio purpusii (Greenm. ex Brandegee, Univ. Calif. Publ. Bot. 3:393. 1909.

PSACALIUM Cass.

The genus contains 38 known species mostly in Mexico with one species reaching Arizona and one species endemic to Guatemala. The group was treated by Phippen (1968) as two genera, Psacalium and Odontotrichum, with keys for each genus. For a revised and unified key to the species see Robinson and Brettell (1973c).

ROLDANA La Llave & Lagasca

Plants large herbs or subshrubs, erect with a few subfloral

innovations. Root stocks densely villous especially on younger parts. Stems rather slender with large pith, surface often with linear maculations, cortex without resin canals. Leaves alternate, distinctly petiolate; leaf blades usually palmate or peltate, sometimes pinnately veined. Inflorescence terminal, corymbose to paniculate with or without prominent subinvolucral bracts. Heads cylindrical to narrowly campanulate; phyllaries in 1-2 series 5-13 glabrous to hirsute or glanduliferous. Flowers 5-45 yellow. Rays present or absent. Disk corollas usually divided a fourth to more than halfway to tube, lobes with distinct median resin ducts; collar of the filament without enlarged cells in lower part; exothecial cells with thickenings along lateral walls, not restricted to cross walls; stigmatic lines fused and covering complete inner surface of style branch. Achene glabrous or setiferous; carpopodium short subcylindrical with small mostly quadrate cells in many series; pappus setae present in 2-3 series. Type species: Roldana lobata La Llave & Lagasca.

The present study of the genus has been aided by reference to the unpublished thesis of E.S. Gibson (1969) that has been made available by Dr. T.M. Barkley of Kansas State University. Dr. Barkley indicates that Dr. Gibson has no evident plans to publish his work and we have utilized some of the thesis data here in modified form. The following key is entirely independent of the work of Gibson and recognizes different species concepts and different generic delimitations of the groups treated.

Key to the species of Roldana

1. Pedicels and bases of heads totally glabrous, heads without rays (Pericalia) 2
1. Pedicels and bases of heads sparsely to densely pubescent; heads with or without rays (typical Roldana) 7
2. Leaf blades peltate, fine venation of leaf not prominent
R. subpeltata
2. Leaf blades not peltate, fine venation of leaf very prominent 3
3. Corollas yellow; achenes covered with short setae 4
3. Corollas greenish or white; achenes glabrous 5
4. Phyllaries 5-8; heads without large subinvolucral bracts
R. mexicana
4. Phyllaries 11-15; heads with many large subinvolucral bracts
R. suffulta
5. Leaf blades cleft more than halfway to middle; corolla lobes separate nearly to tube R. heteroidea

5. Leaf blades only shallowly lobed; corolla lobes short 6
6. Heads with 40-50 flowers; lobes of corolla as long as throat; leaf blades broadly ovate or elliptic with margins coarsely toothed or lobulate, lobules broader than long
R. sessilifolia
6. Heads with 25-35 flowers; lobes of corolla less than half as long as throat; leaf blades deltoid or subcircular with 3-7 lobes, lobes longer than broad *R. michoacana*
7. Heads mostly with 10-13 phyllaries 8
7. Heads usually with 5 or 8 phyllaries 24
8. Stems and petioles lanate *R. lanicaulis*
8. Stems and petioles glabrous to densely hirsute, not lanate 9
9. Leaves pinnately dissected *R. ehrenbergiana*
9. Leaves variously toothed or lobed, not pinnately dissected 10
10. Leaves elliptical to obovate with narrowly cuneate bases
R. hintonii
10. Leaves ovate to orbicular with truncate or cordate bases 11
11. Achenes covered with short setae *R. hartwegii*
11. Achenes glabrous 12
12. Leaves orbicular to broader than long, sometimes peltate; veins closely palmate; phyllaries 6-10 mm long 13
12. Leaves broadly ovate to oblong, never peltate; veins subpalmate to nearly pinnate; phyllaries often less than 6 mm long 18
13. Heads without ray flowers, outer disk flowers without stamens (a few specimens of *R. angulifolia* from central Mexico may key here) *R. heterogama*
13. Heads with distinct ray flowers 14
14. Stems and phyllaries essentially glabrous; leaves usually 5-lobed; surface of rays densely papillose with projecting cells *R. glinophylla*
14. Stems and phyllaries distinctly pubescent; leaves usually with 7 or more lobes, surface of rays smooth 15

15. Coarse shrubby plants 1-4 m tall with stems prominently deflected at nodes; inflorescence a broad corymbose panicle 16
15. Low herbaceous plants less than 1 m tall with stems not deflected at nodes; inflorescence rather scapose and elongate 17
16. Stems with prominent red resin; phyllaries broad with dense coarse nonglandular hairs; tubes of ray flowers glabrous; disk flowers 25-40 R. gilgii
16. Stems without red resin; phyllaries narrow with short minutely gland-tipped hairs; tubes of ray flowers puberulous; disk flowers ca. 15 R. langlassei
17. Lower surface of leaves tomentose or flocculent tomentose; inflorescence sparingly branched; heads with 20-25 disk flowers R. pinetorum
17. Lower surface of leaves hirsute, not tomentose; inflorescence an elongate spike or panicle; heads with 25-35 disk flowers R. platanifolia
18. Phyllaries usually 7-10 mm long with mostly broad flattened median surfaces; 16-24 disk flowers R. reticulata
18. Phyllaries usually 3.5-6.0 mm long, at least inner phyllaries with prominent median keel; 9-19 disk flowers, usually less than 16 19
19. Stems usually fistulose, at least in lower parts, straight 20
19. Stems not fistulose, slightly to prominently deflected at nodes 22
20. Phyllaries with dense pubescence; ray flowers sometimes lacking R. lobata
20. Phyllaries glabrous to sparsely pubescent; stems glabrous to slightly tomentulose; ray flowers present 21
21. Lobes of leaves blunt, undersurface subarachnoid-tomentulose R. kerberi
21. Lobes of leaves very sharp, undersurface nearly glabrous with puberulous veins R. galiciana
22. Phyllaries glabrous to sparsely tomentose, tips rather lanceolate R. aschenborniana
22. Phyllaries densely tomentose, tips short-acute 23

23. Leaves ovate with acute or narrowly rounded tips; pappus
setae often distinctly enlarged at the tips; plants of
south-central Mexico R. barba-johannis
23. Leaves oblong with obtuse or broadly rounded tips; pappus
setae not or only slightly enlarged at the tips; plants of
Guatemala and Chiapas R. donnell-smithii
24. Leaf blades pinnately lobed or veined, often elliptical or
oblong-elliptical; blades cuneate or decurrent at base 25
24. Leaf blades palmately veined or lobed; blades mostly truncate
or cordate or peltate at base 28
25. Achenes covered with short setae 26
25. Achenes glabrous 27
26. Leaves long and narrowly elliptical with only serrate
margins R. guadalajarensis
26. Leaves rather ovate and deeply dissected into irregular
broad lobes R. heracleifolia
27. Heads with 5 phyllaries; leaves serrate; stems woody
R. schaffneri
27. Heads with 8 phyllaries; leaves lobed; stems herbaceous
R. lineolatus
28. Heads sessile in numerous small glomerules R. robinsoniana
28. Heads on short to long pedicels, not in glomerules 29
29. Leaves mostly triangular with 3-5 distinct lobes 30
29. Leaves ovate to orbicular with 7 or more lobes 31
30. Rays prominent with long blades; inflorescence with broad
sessile bracts in upper part; heads with 6 or more
distinct subinvolucral bracts R. cronquistii
30. Rays not longer than disk flowers, sometimes lacking;
inflorescence with only minute bracts in upper part; heads
with 1-3 distinct subinvolucral bracts R. hederaefolia
31. Inflorescence with only small bracts, any larger bracts
narrowly petiolate; phyllaries glabrous or sparsely hirsute 32

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31.	Inflorescence with prominent foliaceous bracts at bases of primary and sometimes on secondary branches, bracts mostly sessile; phyllaries usually densely pubescent with short often glandular hairs	37
32.	Stems woody; inflorescence pyramidal-paniculate with spreading branches	33
32.	Stems herbaceous; inflorescence a flat or round-topped paniculate cyme with ascending branches	34
33.	Leaves seasonally deciduous, densely pubescent; heads with 12-15 flowers; corollas with very long lobes 4-5 times as long as wide	<u>R. eriophylla</u>
33.	Leaves not seasonally deciduous, only slightly pubescent; heads with 7-11 flowers; corollas with short lobes 2-3 times as long as wide	<u>R. albonervia</u>
34.	Heads with 18-20 disk flowers (anther appendages not seen)	<u>R. reglensis</u>
34.	Heads with 4-10 disk flowers; broadly rounded tips on anther appendages	35
35.	Corollas completely glabrous; smaller veins of leaves not raised, surface mostly smooth; plants of Chiapas and Guatemala	<u>R. acutangula</u>
35.	Corollas puberulous on lower part; smaller veins of leaves prominent, mostly raised on lower surface; plants of western Mexico	36
36.	Heads with 8 phyllaries, phyllaries glabrous	<u>R. pennellii</u> var. <u>pennellii</u>
36.	Heads with 5 phyllaries, phyllaries sparsely pubescent	<u>R. pennellii</u> var. <u>durangensis</u>
37.	Stem leaves narrowly cleft about halfway to center; corollas with tubes puberulous	<u>R. greenmanii</u>
37.	Stem leaves shallowly lobed; corollas glabrous	38
38.	Plants from the mountains of central Mexico and westward; outer phyllaries mostly pubescent with short usually glandular hairs	39
38.	Plants of the eastern escarpment of Mexico and Puebla or Oaxaca and southward; phyllaries variously pubescent to glabrous but all usually with distinct scarious margins	41

39. Heads often with 15-40 disk flowers; leaves with lobes usually as long as wide with angulate margins; rays reduced or lacking; inflorescence bracts often very foliaceous R. angulifolia
39. Heads with less than 15 and usually less than 10 disk flowers; leaves very shallowly lobed; rays sometimes very prominent and much longer than disk flowers; distal bracts of inflorescence not prominent 40
40. Leaf blades not peltate; mature phyllaries 8-9 mm long R. gentryi
40. Leaf blades peltate; mature phyllaries usually less than 8 mm long R. chapalensis
41. Lower leaf surfaces very sparsely pubescent 42
41. Lower leaf surfaces puberulous to tomentose 43
42. Phyllaries glabrous; leaves deeply cordate with veins closely palmate; stem smooth; corollas with short lobes R. breedlovei
42. Phyllaries distinctly but often sparsely minutely glandular-puberulent; leaves usually with truncate bases and subpalmate venation; stem with prominent warts; corollas with lobes nearly as long as the throat R. jurgensenii
43. Leaves densely pale tomentose on lower surface; lobes regular and often sharp with numerous callus denticulations on margins R. petasites
43. Leaves only puberulous; lobes sometimes irregular or nearly entire 44
44. Phyllaries 7-10 mm long R. sartorii
44. Phyllaries mostly 4-6 mm long 45
45. Heads without ray flowers R. cristobalensis
45. Heads with ray flowers, rays sometimes reduced 46
46. Leaf blades distinctly but often very slightly peltate, distinctly broader than long; ray flowers rarely longer than disk flowers, sometimes reduced to a short tube R. cordovensis

46. Leaf blades never even slightly peltate, often as long as broad or longer; mature ray flowers prominent, longer than disk flowers 47
47. Mature phyllaries 6-7 mm long; leaves with almost no callus denticulations between lobes R. hederoides
47. Mature phyllaries 4.5-5.5 mm long; leaves with numerous callus denticulations between lobes 48
48. Throat of disk corollas distinctly over twice as long as the lobes; leaves usually drying brownish-green, densely puberulous below R. chiapensis
48. Throat of disk corollas about twice as long as the lobes or shorter; leaves usually drying more yellowish-green, short-puberulous below R. oaxacana

The genus Roldana contains the following 48 species.

Roldana acutangula (Hemsl.) H. Robinson & R.D. Brettell, comb. nov.
Senecio acutangulus Hemsl., Biol. Centr. Am. Bot. 2:235.1881

Roldana albonervia (Greenm.) H. Robinson & R.D. Brettell, comb. nov.
Senecio albonervius Greenm., Ann. Missouri Bot. Gard. 1:275.1914.

Roldana angulifolia (DC.) H. Robinson & R.D. Brettell, comb. nov.
Senecio angulifolius DC., Prodr. 6:431.1837. Additional synonyms: Cacalia berlandieri DC., Senecio desertorum Hemsl., and Senecio prainianus Berger.

Roldana aschenborniana (Schauer) H. Robinson & R.D. Brettell, comb. nov.
Senecio aschenbornianus Schauer, Linnaea 20:698.1847.

Roldana barba-johannis (DC.) H. Robinson & R.D. Brettell, comb. nov.
Senecio barba-johannis DC., Prodr. 6:430.1837.

Roldana breedlovei H. Robinson & R.D. Brettell, sp. nov. (Figure 1)
Plantae suffrutescentes usque ad 4 m altae paucè ramosae. Caules glabri laeves. Folia longe petiolata, petiolis angustis 8-15 cm longis, laminis orbiculatis ca. 10 cm longis 15 cm latis 7-lobatis argute dentatis et multo calloso-denticulatis base cordatis supra et subtus sparse puberulis, nervis arcte palmatis subtus fulvo-puberulis. Inflorescentiae terminales corymboso-paniculatae, pedicellis ultimis 3-8 mm longis dense minute glandulopuberulis, bracteis inferioribus sessilibus foliaceis 2-8 cm longis, bracteis superioribus 2-3 mm longis linearibus, bracteis

subinvolucris 1-2. Capitula cylindrica 13-15 mm longa 3-4 mm lata, squamae involucris 8 lanceolatae 8-10 mm longae 1.5-2.0 mm latae extus glabrae; receptacula breviter spiculata. Flores radii plerumque 5, tubis angustis ca. 6 mm longis glabris, limbis anguste ellipticis ca. 9 mm longis 2 mm latis flavis. Flores disci 6-9; corollae flavae 9-10 mm longae inferne tubulosae superne subcylindricae, tubis ca. 4.5 mm longis glabris, lobis vix 1 mm longis parum longioribus quam latioribus; thecae antherarum ca. 2.5 mm longae, cellulis exothecialibus plerumque breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica glabra; carpodia subcylindrica, cellulis ca. 8-seriatis subquadratis; pappus 6-7 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum non grandioribus argute acutis. Grana pollinis ca. 35 μ diam.

Type: MEXICO: Chiapas: southwest of Mexican highway 190 near Rancho Nuevo, about 9 miles southeast of San Cristobal las Casas, steep slope near crest of ridge with Pinus, Quercus and Chiranthodendron, alt. 9000 ft., flowers yellow, 6 ft. tall. March 5, 1965. D.E. Breedlove 9228 (Holotype US); additional specimen: Chiapas: Municipio of Zinacantan, slope with Quercus below Zinacantan Center along trail to Ixtapa, alt. 6200 ft., flowers yellow; shrub 12 ft. tall. Dec. 5, 1966. R.M. Laughlin 2928 (US).

The new species is in the group with prominent foliaceous bracts in the inflorescence and is most notably distinct from other species in the group by the glabrous phyllaries. The new species is superficially similar to R. jurgensenii of neighboring Guatemala but the latter has more truncate leaf bases and less closely palmate leaf veins while the throats of the corollas are much shorter. The available stem segments of the new species are smooth, showing no sign of the raised lenticels seen in R. jurgensenii. In the length and shape of the phyllaries the new species is more like R. angulifolia and R. gentryi of central and western Mexico.

Roldana chapalensis (S.Wats.) H. Robinson & R.D. Brettell, comb. nov.
Senecio chapalensis S.Wats., Proc. Amer. Acad. 25:155. 1890.

Roldana chiapensis H. Robinson & R.D. Brettell, sp. nov. (Figure 2)

Plantae herbaceae vel suffrutescentes 1-2 m altae paucè ramosae. Caules dense hirtelli sparse vel dense papilloso. Folia longe petiolata, petiolis 3-10 cm longis, laminis oblongo-orbiculatis vel latioribus 6-12 cm longis 7-15 cm latis plerumque leniter 7-lobatis margine mediocriter calloso-denticulatis base truncatis vel parum cordatis non peltatis utrinque dense breviter puberulis, nervis subpalmatis. Inflorescentiae terminales corymboso-paniculatae, pedicellis ultimis 3-10 mm longis dense puberulis vel hirtellis, bracteis inferioribus foliaceis 2-4 mm longis subsessilibus vel petiolatis, bracteis superioribus 1-2 mm longis linearibus, bracteis subinvolucris 1-3 plerumque 1-2 mm longis. Capitula breviter cylindrica 7-9 mm longa 3-4 mm lata, squamae involucris 8 oblongae 4-5 mm longae 1.0-1.5 mm latae obtuse acutae extus dense puberulae

exteriores ad marginem distincte scariosae; receptacula breviter spiculata. Flores radii plerumque 5, tubis angustis 3.0-3.5 mm longis glabris, limbis anguste ellipticis ca. 4 mm longis 1.5-2.0 mm latis flavis. Flores disci ca. 12; corollae flavae ca. 7 mm longae inferne tubulosae superne anguste infundibulares, tubis ca. 3.5 mm longis glabris, lobis ca. 1 mm longis vix duplo longioribus quam latioribus; thecae antherarum 1.5-2.0 mm longae, cellulis plerumque breviter oblongis, parietibus lateralibus saepe nodiferis. Achaenia cylindrica ca. 2 mm longa glabra; carpopodia subcylindrica, cellulis 10-12-seriatis quadratis vel brevioribus; pappus 4-5 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum vix vel aliquantum grandioribus argute acutis. Grana pollinis 33-35 μ diam.

Type: MEXICO: Chiapas: Mt. Pasitar. December 31, 1936. E. Matuda S-34 (Holotype US); additional specimen: Chiapas: Siltepec. January 3, 1937. E. Matuda S-70 (US).

The new species is closely related to R. cristobalensis but differs most obviously by the presence of ray flowers.

Roldana cordovensis (Hemsl.) H. Robinson & R. D. Brettell, comb. nov.
Senecio cordovensis Hemsl., Biol. Centr. Amer. Bot. 2:238. 1881.

Roldana cristobalensis (Greenm.) H. Robinson & R. D. Brettell, comb. nov.
Senecio cristobalensis Greenm., Bull. Herb. Boiss. II. 6:867. 1906.

Roldana cronquistii H. Robinson & R. D. Brettell, sp. nov. (Figure 3)
Plantae suffrutescentes usque ad 1-2 m altae paucae ramosae. Caules et folia glabra vel parce puberula. Folia longe petiolata, petiolis angustis 2.0-4.5 cm longis, laminis triangularibus 5-7 cm longis 4.5-6.0 cm latis prominentiter calloso-denticulatis ad apicem argute acutis base hastatis plerumque bilobatis interdum quadrilobatis, nervis subpalmatis subtus non prominentibus. Inflorescentiae terminales corymboso-paniculatae, pedicellis ultimis 7-25 mm longis dense glandulo-puberulis, bracteis inferioribus sessilibus foliaceis ellipticis 2.0-2.5 cm longis, bracteis subinvoluti ca. 6 linearibus 3-4 mm longis. Capitula subcylindrica 12-14 mm longa ca. 7 mm lata, squamae involucri 8 oblongo-ellipticae ca. 10 mm longae 2.5-3.0 mm latae extus dense glanduloso-puberulae, squamae exteriores ad marginem non scariosae; receptacula breviter spiculata. Flores radii 4-6 plerumque 5, tubis angustis ca. 7 mm longis glabris, limbis lineari-ellipticis ca. 10 mm longis ca. 1 mm latis flavis. Flores disci ca. 15-20; corollae flavae 11-12 mm longae inferne tubulosae superne subcylindricae, tubis ca. 4.5 mm longis glabris, lobis 1.0-1.5 mm longis ca. duplo longioribus quam latioribus; thecae antherarum ca. 3 mm longae, parietibus lateralibus cellularum nodiferis. Achaenia cylindrica glabra; carpopodia subcylindrica, cellulis 6-8-seriatis subquadratis; pappus 6-7 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum vix grandioribus argute acutis. Grana pollinis ca. 35 μ diam.

Type: MEXICO: Oaxaca, in wet forest one mile and less south of the pass between Oaxaca and Tuxtepec, 65 miles north of Oaxaca, Alt. 9300 ft., slender shrub 1-2 m tall, with (4)5(6) rays. Heads yellow. October 11, 1962. A. Cronquist 9648 (Holotype US).

The new species is very closely related to R. hederaefolia which has been interpreted very broadly by Gibson (1969). We agree with Gibson in the reduction of Senecio alienus Rob. & Seaton, S. anisophyllus Klatt and S. chrismari Greenm. The present new species, however, has much more prominent bracts in the inflorescence and under the heads as well as having much larger rays. These and other features result in a very distinctive appearance. The new species is not very geographically isolated from R. hederaefolia but the Sierra Juarez area where the new species was collected is very rich in endemics.

Roldana donnell-smithii (Coul.) H. Robinson & R.D. Brettell comb. nov. Senecio donnell-smithii Coul. in J.D. Smith, Enum. Pl. Guatem. 2:42.1891: et in Bot. Gaz. 16:101.1891.

Roldana ehrenbergiana (Klatt) H. Robinson & R.D. Brettell comb. nov. Senecio ehrenbergianus Klatt, Leopoldina 24:125.1881.

Roldana eriophylla (Greenm.) H. Robinson & R.D. Brettell comb. nov. Senecio eriophyllus Greenm., Field Mus. Bot. 2:282.1907.

Roldana galiciana (McVaugh) H. Robinson & R.D. Brettell comb. nov. Senecio galicianus McVaugh, Contr. Univ. Mich. Herb. 9:473, 1972.

Roldana gentryi H. Robinson & R.D. Brettell sp. nov. (Figure 4)
Plantae herbaceae vel suffrutescentes 1-3 m altae paucae ramosae. Caules teretes minute puberuli sensim glabri. Folia longe petiolata, petiolis 6-13 cm longis, laminis oblongo-orbiculatis 9-15 cm longis 9-18 cm latis plerumque leniter acute 7-lobatis margine parum calloso-denticulatis base cordatis non peltatis utrinque parce puberulis, nervis subpalmatis subtus distincte puberulis. Inflorescentiae terminales corymboso-paniculatae, pedicellis ultimis 5-17 mm longis sparse minute granuloso-puberulis, bracteis inferioribus foliaceis 1.5-3.0 cm. longis subsessilibus vel petiolatis, bracteis superioribus 2-3 mm longis linearibus, bracteis subinvolucris 2-5 usque ad 4 mm longis linearibus. Capitula subcylindrica 12-14 mm longa 3-4 mm lata, squamae involucris 8 oblongo-lanceolatae 7-9 mm longae 1-2 mm latae extus dense minute granuloso-puberulae exteriores ad marginem vix scariosae; receptacula breviter spiculata. Flores radii 4-6 plerumque 5, tubis angustis ca. 5 mm longis glabris, limbis anguste ellipticis ca. 6 mm longis 1.5-2.0 mm latis flavis. Flores disci 6-12; corollae flavae ca. 9 mm longae inferne tubulosae superne subcylindricae, tubis 2.5-3.0 mm longis glabris, lobis ca. 1.5 mm longis ca. duplo longioribus quam latioribus; thecae antherarum ca. 3 mm longae, cellulis

exothecialibus plerumque breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica ca. 3 mm longa glabra; carpopodia subcylindrica, cellulis ca. 8-seriatis quadratis vel brevioribus; pappus 7-8 mm longus facile deciduus 2-3 seriatus, cellulis apicalibus setarum parum grandioribus argute acutis, Grana pollinis 33-38 μ diam.

Type: MEXICO: Sinaloa, above la Jolla, Sierra Surotato, pine-oak zone, Alt. 5,000-6,000 ft. March 17-24 1945. H.S. Gentry 7178 (Holotype US); additional specimens: Mexico: Durango: Sianori. 1924. J.G.Ortega 5271 (US); Sinaloa: Balboa. 1923. J.G. Ortega 5107 (US).

The new species is closest to R. chapalensis from which it differs by the non peltate leaves. The new species differs from the related R. angulifolia by both the larger prominent ray flowers and the smaller number of disk flowers. The species is rather isolated geographically from its closest relatives and occurs farther to the northwest than any members of the genus except R.hartwegii and R. pennellii.

Roldana gilgii (Greenm.) H.Robinson & R.D. Brettell, comb. nov.
Senecio gilgii Greenm., Field Col. Mus. Bot. 2(6): 282. 1907.

Roldana glinophylla H. Robinson & R.D.Brettell, nomen nov.
Senecio acerifolius Heml., Biol. Centr. Amer., Bot. 2:235.
1881. non Senecio acerifolius Koch. The new name Senecio glinophyllus was proposed by Gibson (1969, unpublished).

Roldana greenmanii H. Robinson & R.D.Brettell, sp. nov.(Figure 5)
Plantae herbaceae vel suffrutescentes 1-2 m altae paucе ramosae. Caules hirsuti. Folia longe petiolata, petiolis 10-15 cm longis, laminis orbiculatis ca. 7-30 cm longis 10-25 cm latis 9-13 inciso-lobatis base cordatis vel leviter peltatis supra vix puberulis subtus sparse puberulis, lobis oblongis vel obovatis 1-9 cm longis 1-3 cm latis margine arcte calloso-denticulatis, nervis subpalmatis subtus dense fulvo-puberulis. Inflorescentiae terminales paniculatae, pedicellis ultimis 3-8 mm longis dense puberulis, bracteis inferioribus sessilibus foliaceis 2-4 cm longis, bracteis superioribus ca. 3 mm longis linearibus, bracteis subinvolucris 1-3. Capitula cylindrica 11-15 mm longa 5-6 mm lata, squamae involucri 8 oblongo-lanceolatae 10-13 mm longae 1.5-2.0 mm latae extus fulvo-puberulae exteriores ad marginem anguste scariosae; receptacula breviter spiculata. Flores radii nulli. Flores disci 18-21; corollae flavi 9-10 mm longae inferne tubulosae superne anguste infundibulares, tubis ca. 4.5 mm longis puberulis, lobis ca. 2 mm longis ca. quater longioribus quam latioribus; thecae antherarum ca. 2.5 mm longae, cellulis exothecialibus plerumque breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica glabra; carpopodia subcylindrica, cellulis ca. 8-seriatis

subquadratis; pappus 6-7 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum vix vel non grandioribus argute acutis. Grana pollinis 30-35 μ diam.

Type: GUATEMALA: Pueblo Nuevo: Tetalhuleu, 800 m. "Mano de leon." Edible. March, 1923. R. Stricker 359 (Holotype US); additional specimen: Palencia, Alt. 1,480 m. "Llovizna blanca." February 1928. R. Morales 936 (US).

The new species seems to be a member of the group with foliaceous bracts in the inflorescence and specimens have been referred to R. heterogama. The limited material seen shows the many distinctive features which include the deeply lobed leaves, the eight externally hirtellous phyllaries and the puberulous tubes of the corollas. The new species was evidently known to Dr. Jesse Greenman but no description was ever made.

Roldana guadalajarensis (Rob.) H. Robinson & R.D. Brettell, comb. nov. Senecio guadalajarensis Rob., Proc. Amer. Acad. 26:166. 1871.

Roldana hartwegii (Benth.) H. Robinson & R. D. Brettell, comb. nov. Senecio hartwegii Benth., Pl. Hartw. 18.1839.

Roldana hederaefolia (Hemsl.) H. Robinson & R.D. Brettell, comb. nov. Senecio hederaefolius Hemsl., Biol. Centr. Amer. Bot. 2:241.1881.

Roldana hederoides (Greenm.) H. Robinson & R.D. Brettell, comb. nov. Senecio hederoides Greenm., Bull. Herb. Boiss. II. 6:868.1906.

Roldana heracleifolia (Hemsl.) H. Robinson & R.D. Brettell, comb. nov. Senecio heracleifolius Hemsl., Biol. Centr. Am. Bot. 2:241.1881.

Roldana heterogama (Hemsl.) H. Robinson & R.D. Brettell, comb. nov. Senecio heterogamus Hemsl., Biol. Centr. Am. Bot. 2:242.1881.

Roldana heteroidea (Klatt) H. Robinson & R.D. Brettell, comb. nov. Senecio heteroideus Klatt, Leopoldina 24:125.1888. (Cacalia longipetiolata Rob. & Greenm. Am. Journ. Sci. Ser. III. 1:157. 1895.)

Roldana hintonii H. Robinson & R.D. Brettell, sp. nov. (Figure 6)
Plantae suffrutescentes usque ad 2.5 m altae paucè vel non ramosae. Caules et folia evanide implexè tomentosa vel subglabra. Folia breviter petiolata, petiolis angustis 7-20 mm longis, laminis ellipticis vel obovatis 10-16 cm longis 3-4 cm latis integris vel raro remote serrulatis ad apicem stricte acutis base cuneatis subtus discoloribus, nervis pinnatis. Inflorescentiae terminales corymboso-paniculatae, pedicellis ultimis 4-9 mm longis puberulis, squamis subinvolucris ca. 12 congestis brevibus

ca. 1 mm longis. Capitula cylindrica 11-12 mm longa 6-7 mm lata, squamae involucris 11-13 anguste oblongae 5 mm longae 0.5-1.5 mm latae glabrae; receptacula breviter spiculata. Flores radii 7, tubis angustis ca. 4.5 mm longis glabris, limbis anguste ellipticis ca. 6 mm longis 1.5 mm latis flavis. Flores disci 11-14; corollae flavae 8.0-8.5 mm longae inferne tubulosae superne anguste infundibulares, tubis ca. 3.0-3.5 mm longis glabris, lobis ca. 1 mm longis 1 1/2 - 2 longioribus quam latioribus; thecae antherarum ca. 2 mm longae, cellulis exothecialibus plerumque breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica glabra; carpodia subcylindrica, cellulis ca. 10-seriatis quadratis vel brevioribus; pappus ca. 6 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum non grandioribus argute acutis. Grana pollinis ca. 35µ diam.

Type: MEXICO: Mexico: Temascaltepec, Comunidad, upper oak belt, 1 m high. March 8, 1936. G.B. Hinton et al 8967 (Holotype US); additional specimens: Comunidad, pine forest 1 m high. March 1, 1936. G.B. Hinton et al 8949 (US); Las Creces, Alt. 2900 m., forest, 2.5 m high. February 16, 1933. G.B. Hinton 3284 (US); Las Cruces, Fir belt, Pine-Fir forest, 2 m high. March 8, 1936. G. B. Hinton et al 8966 (US).

The new species is very distinct being one of the few in Roldana with narrow leaves and the only one with entire margins.

Roldana jurgensenii (Hemsl.) H. Robinson & R.D. Brettell, comb. nov.
Senecio jurgensenii Hemsl., Biol. Centr. Am. Bot. 2:242.1881.

Roldana kerberi (Greenm.) H. Robinson & R.D. Brettell, comb. nov.
Senecio kerberi Greenm., Ann. Mo. Bot. Gard. 1:279. 1914.

Roldana langlassei (Greenm.) H. Robinson & R.D. Brettell, comb. nov.
Senecio langlassei Greenm. Field Col. Mus. Bot. 2(6):283.1907.
Additional specimen seen: MEXICO: Mexico: Zacualpan, Cerro de Mamatla, en bosque mixto alto. ladera humeda, elev. 2000-2300 m May 3-4, 1954. E. Matuda 30560 (US).

Roldana lanicaulis (Greenm.) H. Robinson & R.D. Brettell, comb. nov.
Senecio lanicaulis Greenm., Field Col. Mus. Bot. 2(6): 283.1907.

Roldana lineolata (DC.) H. Robinson & R.D. Brettell, comb. nov.
Senecio lineolatus DC., Prodr. 6:427.1837.

Roldana lobata LaLlave & Lex., Nov. Veg. Desc. fasc. 2:10.1825.

Roldana mexicana (McVaugh) H. Robinson & R.D. Brettell, comb. nov.
Senecio mexicanus McVaugh, Contr. Univ. Mich. Herb. 9:473.1972.

Roldana michoacana (Robins.) H. Robinson & R.D. Brettell, comb. nov.
Cacalia michoacana B.L. Robins., Proc. Amer. Acad. 43:46.1907.

Roldana oaxacana (Hemsl.) H. Robinson & R.D. Brettell, comb. nov.

Senecio oaxacanus Hemsl., Biol. Centr. Amer. Bot. 2:244. 1881.

The species is apparently restricted to central Oaxaca. A few specimens under the name from the northeastern escarpment in the state prove to be R. cordovensis.

Roldana pennellii H. Robinson & R.D. Brettell, sp. nov. (Figure 7)

Plantae herbaceae usque ad 1 m altae paucè vel non ramosae. Caules et folia sparse puberula. Folia longe petiolata, petiolis angustis 1-8 cm longis, laminis oblongo-orbiculatis 3-7 cm longis 3-9 cm latis breviter duplo dentatis 7-11 angulatis ad apicem obtuse acutis base cordatis, nervis palmatis vel subpalmatis subtus prominentibus. Inflorescentiae terminales cymoso-paniculatae, pedicellis ultimis 4-9 mm longis sparse puberulis, squamis subinvolucris 3-4 brevibus 1-2 mm longis linearibus. Capitula cylindrica 7-9 mm longa ca. 3 mm lata, squamae involucris 8 anguste oblongae 3.5-4.5 mm longae 0.5-1.5 mm latae extus glabrae; receptacula breviter spiculata. Flores radii 1-3, tubis angustis ca. 3.5 mm longis puberulis, limbis anguste ellipticis ca. 5 mm longis ca. 1.5 mm latis flavis. Flores disci 4-10; corollae flavae 6-7 mm longae inferne tubulosae superne anguste infundibulares, tubis ca. 3 mm longis puberulis, lobis ca. 2 mm longis triplo vel quater longioribus quam latioribus; thecae antherarum ca. 2 mm longae, cellulis exothecialibus plerumque breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica ca. 3 mm longa glabra; carpopodia subcylindrica, cellulis ca. 10-seriatis quadratis vel brevioribus; pappus ca. 4 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum vix grandioribus argute acutis. Grana pollinis ca. 30 μ diam.

Type: MEXICO: Durango, Barranca below Sandia Station, 7000 ft. October 12, 1905. C.G. Pringle 13568 (Holotype US); additional specimens: Chihuahua: Guadalupe y Calvo, 7500 ft. October 14, 1959. Gentry, Correll & Arguelles 17991 (US); near Colonia Garcia in Sierra Madres, Alt. 7500 ft. August 12, 1899. Townsend & Barber 252 (US); road between Guadalupe y Calvo and San Julian, Alt. 7000-8000 ft. September 7, 1898. E.W. Nelson 4923 (US); Slopes of Sierra Madre, September 29, 1887. C.G. Pringle 1317 (US); Barranca Colorad, Sierra Gazachic 35 km southwest of Minaca, Alt. 2300-2400 m. September 16-17, 1934. F.W. Pennell 18912 (US); near Colonia Garcia in Sierra Madre. August 1-20, 1899. E.W. Nelson 6205 (US).

The new species is closely related to and sometimes included in R. hartwegii. Previous authors have noted the variation in R. hartwegii but have not seen the pattern of that variation. All specimens to west from Jalisco in the south to Arizona in the north have linearly maculate stems, 10-13 phyllaries and setiferous achenes. Plants from the interior of Mexico representing the new species have concolorous stems, usually 8 phyllaries and glabrous

achenes. From farther south in the interior of Mexico is the following variety having 5 phyllaries that are sparsely pubescent externally. The name Senecio hartwegii var. calvicarpus Greenm. applies here but was never validly published.

Roldana pennellii var. durangensis H. Robinson & R. D. Brettell, var. nov.

Differt a R. pennellii var. pennellii squamae involucri 5 extus sparse puberulae.

Type: MEXICO: Durango: El Salto, Sierra Madre Occidental, rocky, andesitic, pineland canyon. alt. 2500-2530 m, Herb, flowers yellow. August 31, 1934. F. W. Pennell 18500 (Holotype US); additional specimens: Durango: 10 miles west of El Salto, alt. 8800 ft. October 2, 1962. A. Cronquist 9587 (US); 14.8 mi. s.w. of El Salto on road to Villa Union, alt. 9100 ft. September 30, 1953. F. Ownbey 1996 (US); Metates, north of Cueva, alt. 2800-2900 m, August 29-30, 1934. F. W. Pennell 18419 (US).

Roldana petasitis (Sims.) H. Robinson & R. D. Brettell, comb. nov.

Cineraria petasitis Sims, Curtis's Bot. Mag. pl. 1536. 1813.

The normal range of the species is from Guatemala to Nicaragua but one specimen has been seen from much farther north which has previously been determined as Senecio sartorii: MEXICO: Veracruz: near Jalapa. Rose & Hay 6100 (US).

Roldana pinetorum (Hemsl.) H. Robinson & R. D. Brettell, comb. nov.

Senecio pinetorum Hemsl., Biol. Cent. Am. Bot. 2:245. 1881.

Roldana platanifolia (Benth.) H. Robinson & R. D. Brettell, comb. nov.

Senecio platanifolius Benth., Pl. Hartw. 43. 1840.

Roldana reglensis (Greenm.) H. Robinson & R. D. Brettell, comb. nov.

Senecio reglensis Greenm., Field Col. Mus. Bot. 2(6):283. 1907.

Roldana reticulata (DC.) H. Robinson & R. D. Brettell, comb. nov.

Senecio reticulatus DC., Prodr. 6:431. 1837.

Roldana robinsoniana (Greenm.) H. Robinson & R. D. Brettell, comb. nov.

Senecio robinsonianus Greenm. in Sarg., Trees & Shrubs 1:19. 1902.

Roldana sartorii (Hemsl.) H. Robinson & R. D. Brettell, comb. nov.

Senecio sartorii Sch. Bip. ex Hemsl., Biol. Centr. Am. Bot. 2:247. 1881.

Roldana schaffneri (Klatt) H. Robinson & R. D. Brettell, comb. nov.

Senecio schaffneri Sch. Bip. ex Klatt, Leopoldina 24:126. 1888.
Synonym: Senecio santarosae Greenm.

Roldana sessilifolia (Hook. & Arn.) H. Robinson & R. D. Brettell,

comb. nov. Cacalia sessilifolia Hook. & Arn., Bot. Beech. Voy. 436.1841.

Roldana subpeltata (Sch.Bip.) H.Robinson & R.D.Brettell, comb. nov.
Senecio subpeltatus Sch.Bip. in Seem., Bot. Voy. Herald. 311.1856.

Roldana suffulta (Greenm.) H.Robinson & R.D.Brettell, comb. nov.
Cacalia suffulta Greenm., Proc. Amer. Acad. 32:310.1897.

TELANTHOPHORA H.Robinson & R.D.Brettell, genus novum Asteracearum (Senecioneae)

Plantae suffrutescentes vel arborescentes erectae pauce ramosae. Caules parum incrassati, canales resiniferi corticei uniseriati. Folia alternata, laminis pinnate nervatis. Inflorescentiae terminales abrupte subumbellatae, ramis plerumque corymbosis vel subumbellatis. Capitula anguste campanulata vel cylindrica; squamae involucris glabrae vel hirsutae. Flores 5-18 flavi. Flores radii prominentes vel nulli. Corollae disci in parte superiore minimum ad medium lobatae, canalibus resiniferis intermediis distinctis; filamenta in parte superiore non inflata; cellulae exotheciales quadratae vel longiores, parietibus lateralibus noduliferis; lineae stigmaticae connatae. Achaenia glabra vel raro setifera; carpopodia breviter subcylindrica, cellulis multiseriatis subquadratis; setae pappi 2-3-seriatae. Species typica; Senecio arborescens Steetz in Seemann.

Key to the species of Telanthophora

- | | |
|---|-------------------------|
| 1. Phyllaries 5-6 | 2 |
| 1. Phyllaries usually 8 | 6 |
| 2. Heads without rays | <u>T. cobanensis</u> |
| 2. Heads with rays | 3 |
| 3. Leaves nearly smooth, vein reticulations not prominent, margin with very minute remote serrulations | <u>T. uspantanensis</u> |
| 3. Leaves roughened with reticulate veins | 4 |
| 4. Leaves distinctly serrate distally; stems and lateral buds with dense strigose pubescence | <u>T. molinae</u> |
| 4. Leaves entire; stems glabrous or with only scattered hairs | 5 |
| 5. Stems with numerous stout persistent bases of hairs forming papillae; heads in dense corymbs, pedicels mostly less than 5 mm long; corollae divided to about lower third of throat | <u>T. standleyi</u> |

5. Stems glabrous; heads in lax corymbs, pedicels mostly more than 5 mm long; corollae divided nearly to base of throat
T. jaliscana
6. Leaves lobed halfway or more to midrib 7
6. Leaves sinuately lobed to entire 9
7. Involucre 10-13 mm high T. orcuttii
7. Involucre 4-8 mm high 8
8. Heads without rays T. copayensis
8. Heads with rays T. arborescens
9. Stems glabrous; leaves entire; corolla lobes shorter than the throat T. andrieuxii
9. Stems distinctly pubescent; leaves serrulate to dentate; corolla lobes longer than the throat 10
10. Disk flowers 5-6; leaves remotely serrulate
T. serraquitchensis
10. Disk flowers 8-12; at least some leaves slightly to strongly dentate 11
11. Leaf blades narrowly cuneate at base, petioles 0.5-3.0 cm long 12
11. Leaf blades short-acute to rounded at base, petioles 5-15 cm long 13
12. Leaf blades lanceolate, 1.0-1.5 cm wide, surface strongly reticulate nerved (S.Mex.) T. liebmannii
12. Leaf blades broadly elliptical to obovate, up to 7 cm wide, surface scarcely reticulately nerved (Belize)
T. bartlettii
13. Stems and branches bearing tufts of tomentum mostly in leaf axils, pedicels pubescent only at nodes, phyllaries glabrous (Veracruz, Puebla) T. grandifolia
13. Stems white tomentose distally, pedicels with white-floccose pubescence, phyllaries sometimes sparsely pubescent (Chiapas Guatemala) T. chicarrensii

The 14 species of the genus are as follows.

Telanthophora andrieuxii (DC.) H. Robinson & R.D. Brettell, comb. nov.
Senecio andrieuxii DC. Prodr. 6:430.1837.

Telanthophora arborescens (Steetz) H. Robinson & R.D. Brettell, comb. nov.
Senecio arborescens Steetz in Seem., Bot. Voy. Herald., 162.t.31.1854.

Telanthophora bartlettii H. Robinson & R.D. Brettell, sp. nov. (Figure 8)
Plantae suffrutescentes erectae usque ad 2 m altae non vel pauce ramosae. Caules parum incrassati aliquantum evanide hirsuti, gemmis lateralibus sensim breviter hirsutis. Folia alternata, petiolis 1.5-3.5 cm longis, laminis subcarnosis obovatis 6-15 cm longis 2-6 cm latis plerumque glabris base anguste cuneatis margine plerumque vadosae 4-5 dentatis interdum remote serrulatis ad apicem acutis vel per breviter acuminatis; nervatura secundaria pinnata tertiaria supra aliquantum prominente reticulata subtus sublaevis. Inflorescentiae abrupte terminales subumbellate corymbosae, pedicellis subglabris superne subumbellate ramosis in partem ultimam 2-10 mm longis, bracteis sparse hirsutis. Capitula cylindrica 0.9-1.0 cm alta 4-5 mm lata; bractae subinvolucratae 5-6 triangulares vel lanceolatae 1-2 mm longae; squamae involucri 8 uniseriatae oblongae 7-8 mm longae 1-2 mm latae extus glabrae; receptacula plana spiculifera. Flores radii 4-5, tubis angustis ca. 3 mm longis, limbus ellipticis saepe bi-tri-lobatis ca. 3.5 mm longis ca. 1 mm latis flavis. Flores disci 8-10; corollae flavae 7.5-8.0 mm longae inferne tubulosae superne anguste infundibulares, tubis 2-3 mm longis, lobis ca. 3 mm longis ca. 0.5 mm latis; thecae antherarum ca. 2 mm longae, cellulis exothecialibus breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica glabra; carpopodia subcylindrica, cellulis ca. 10-seriatis quadratis vel brevioribus; pappus ca. 6 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum non grandioribus argute acutis, Grana pollinis ca. 37 μ diam.

Type: BRITISH HONDURAS: El Cayo District. Simple, 10 ft. tall, flowers yellow. Mountain Pine Ridge. February 28, 1931. H.H. Bartlett 11852 (Holotype US); additional specimen: El Cayo District, 4-5 ft. tall, flowers yellow. Ravine, Mountain Pine Ridge. February 25, 1931. H.H. Bartlett 11753 (US).

The obovate to oblanceolate leaves with very shallow lobes are particularly distinctive of the new species. The species differs from most in the genus by the less prominent reticulate venation on the lower leaf surface.

Telanthophora chicharrensis (Greenm.) H. Robinson & R.D. Brettell, comb. nov. Senecio chicharrensis Greenm., Field Col. Mus. Bot. 2(6):285.1907.

Telanthophora cobanensis (Coulter) H. Robinson & R.D. Brettell, comb. nov. Senecio cobanensis Coulter, Bot. Gaz. 16:101-1891.

Telanthophora copeyensis (Greenm.) H. Robinson & R.D. Brettell, comb. nov. Senecio copeyensis Greenm., Field Col. Mus. Bot. 2 (6): 285.1907.

Telanthophora grandifolia (Less.) H. Robinson & R.D. Brettell, comb. nov. Senecio grandifolius Less., Linnaea 5:162.1830.

Telanthophora jaliscana H. Robinson & R.D. Brettell, sp. nov. (Fig. 9)

Plantae frutescentes vel arborescentes 3-5 m altae paucè ramosae. Caules teretes parum incrassati glabri. Folia alternata longe petiolata, petiolis 3-4 cm longis, laminis oblanceolatis 14-24 cm longis 2.5-5.0 cm latis glabris base anguste cuneatis margine integris ad apicem vix breviter acuminatis; nervatura secundaria pinnata tertiaria prominente reticulata. Inflorescentiae abrupte terminales subumbellatae irregulariter laxè corymbosae, pedicellis glabris, ramosis in partem ultimam 2-9 mm longis. Capitula cylindrica ca. 10 mm longa 2-3 mm lata; bractae subinvolucratae 0-2 ca. 0.5 mm longae; squamae involucri 5 elliptico-oblongae ca. 5 mm longae 1.0-1.5 mm latae extus glabrae; receptacula plana spiculifera. Flores radii plerumque 2, tubis angustis ca. 4.5 mm longis, limbis anguste ellipticis ca. 7 mm longis 2 mm latis pallide flavis. Flores disci plerumque 3; corollae flavae ca. 8 mm longae inferne tubulosae superne anguste infundibulares, tubis ca. 3.5 mm longis, lobis ca. 3 mm longis ca. 3-4-plo longioribus quam latioribus; thecae antherarum ca. 2 mm longae, cellulis exothecialibus breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica 2.5-3.0 mm longa glabra; carpodia subcylindrica, cellulis 10-12-seriatis quadratis vel brevioribus; pappus ca. 5 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum non grandioribus argute acutis. Grana pollinis ca. 37 μ diam.

Type: MEXICO: Jalisco: near headwaters of Rio Mascota, alt. 1700-1900 m, abundant, tree-like, 3-5 m high; trunk 2.5 m high, 6-8 cm diam.; branches few, stubby, 1- to 2- forked; flowers yellow. April 3-4, 1965. R. McVaugh 23443 (Holotype US).

The new species seems related to T. standleyi but differs by a number of significant details. The new species lacks the persistent hair bases that form papillae on the stem, the inflorescence is much more lax and the corolla lobes are much more deeply divided. The new species also has much larger leaves according to the limited amount of material seen.

Telanthophora liebmannii (Buchinger ex Klatt) H. Robinson & R.D. Brettell, comb. nov. Senecio liebmannii Buchinger ex Klatt, Leopoldina 24:125.1888.

Telanthophora molinae H. Robinson & R. D. Brettell, sp. nov. (Figure 10)

Plantae erectae suffrutescentes usque ad 4 m altae non vel paucè ramosae. Caules non incrassati dense longe strigose hirsuti, gemmis lateralibus prominentibus; canales resiniferi corticei distincti. Folia alternata, petiolis 3.0-3.5 cm longis, laminis anguste lineari-oblongeolatis 10-23 cm longis 2.0-3.5 cm latis glabris base anguste cuneatis margine supra medium sensim remote serratis ad apicem breviter anguste acuminatis; nervatura secundaria pinnata tertiaria prominente reticulata. Inflorescentiae abrupte terminales subumbellate corymbosae, pedicellis glabris superne subumbellate ramosis in partem ultimam 2-5 mm longis. Capitula cylindrica vel ovata ca. 6-7 mm longa 3-4 mm lata; bractee subinvolutae paucae breviter triangulares 1.0-1.5 mm longae; squamae involucri 5 elliptico-oblongae 6-7 mm longae 2 mm latae extus glabrae; receptacula plana spiculifera. Flores radii 1-2, tubis angustis ca. 5 mm longis, limbis ellipticis 5-6 mm longis ca. 3 mm latis flavis. Flores disci 3; corollae flavae ca. 8 mm longae inferne tubulosae superne anguste infundibulares, tubis ca. 4 mm longis, lobis 1.5-3.5 mm longis 3-6-plo longioribus quam latioribus; thecae antherarum 2.0-2.5 mm longae, cellulis exothecialibus breviter oblongis, parietibus lateralibus nodiferis. Achaenia cylindrica glabra (immatura); carpophodia subcylindrica, cellulis ca. 12-seriatis quadratis vel brevioribus; pappus ca. 5 mm longus facile deciduus 2-3-seriatus, cellulis apicalibus setarum non grandioribus argute acutis. Grana pollinis ca. 35 μ diam.

Type: GUATEMALA: San Marcos: near Aldea Fraternidad, between San Rafael Pie de la Cuesta and Palo Gordo, west facing slope of Sierra Madre Mts., alt. 1800-2400 m, flowers yellow, semishrub 2-4 m tall. Dec. 10-18, 1963. Williams, Molina & Williams 26271 (Holotype US); additional specimen: Williams, Molina & Williams 26080 (US).

The new species is most distinctive in having very dense stringy pubescence on the stem. The species also seems distinct in the very narrow leaves with prominent teeth in the distal half.

Telanthophora orcuttii (Greenm.) H. Robinson & R. D. Brettell, comb. nov. Senecio orcuttii Greenm., Field Mus. Bot. 2:350.1912.

Telanthophora serraquitchensis (Greenm.) H. Robinson & R. D. Brettell, comb. nov. Senecio serraquitchensis Greenm., Field Col. Mus. Bot. 2(6):286.1907.

Telanthophora standleyi (Greenm.) H. Robinson & R. D. Brettell, comb. nov. Senecio standleyi Greenm. in Standley, Contr. U.S. Nat. Herb. 23(5):1634.1926.

Telanthophora uspantanensis (Coulter) H. Robinson & R. D. Brettell, comb. nov. Senecio ghiesbreghtii var. uspantanensis Coulter, Bot. Gaz. 20:52.1895.

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Figure 1. *Roldana breedlovei* H. Robinson & R.D. Brettell, sp. nov. Holotype US. This and following photographs by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

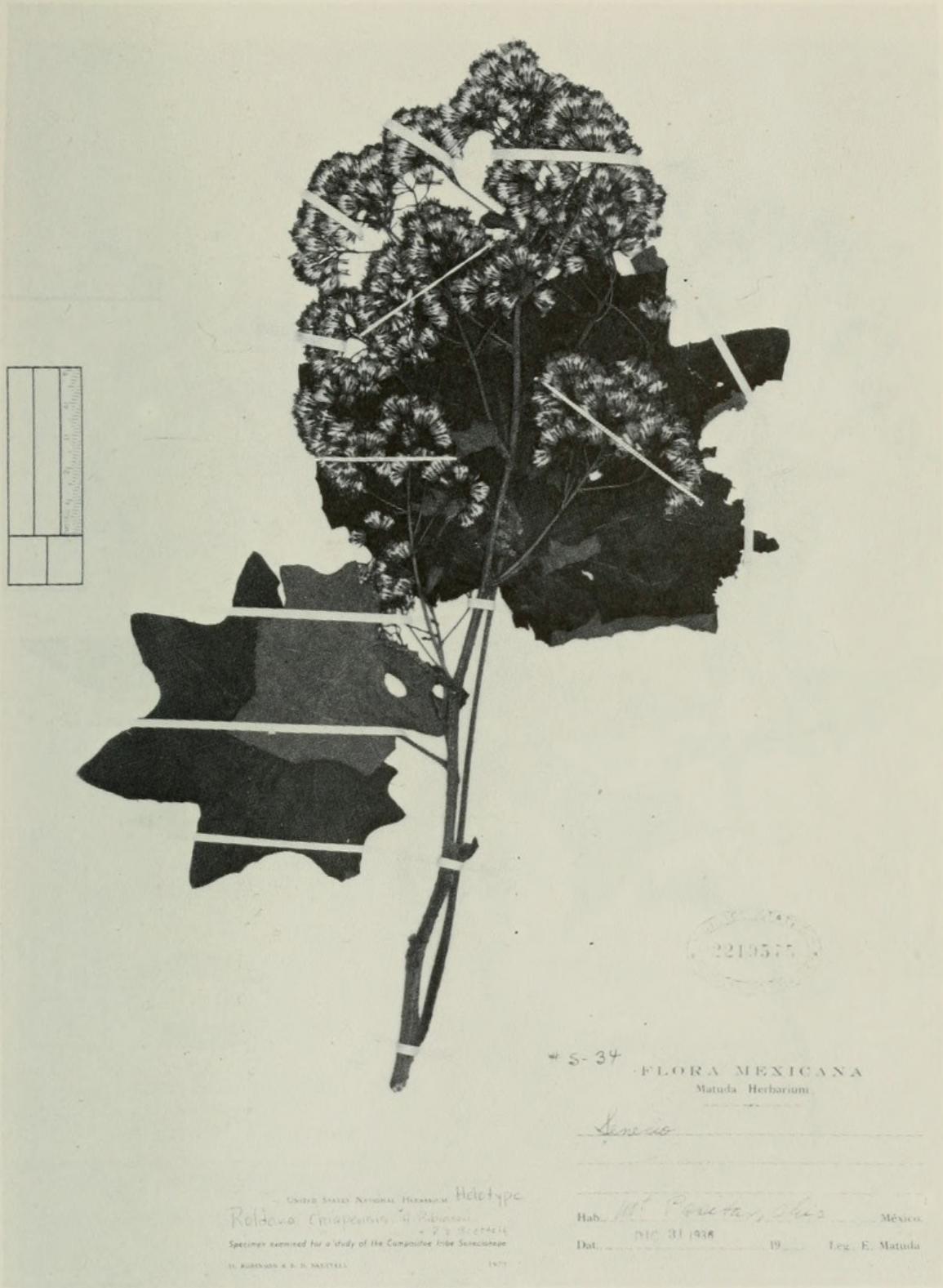


Figure 2. Roldana chiapensis H. Robinson & R.D. Brettell,
sp. nov. Holotype US.



Figure 3. *Roldana cronquistii* H. Robinson & R. D. Brettell, sp. nov. Holotype US.

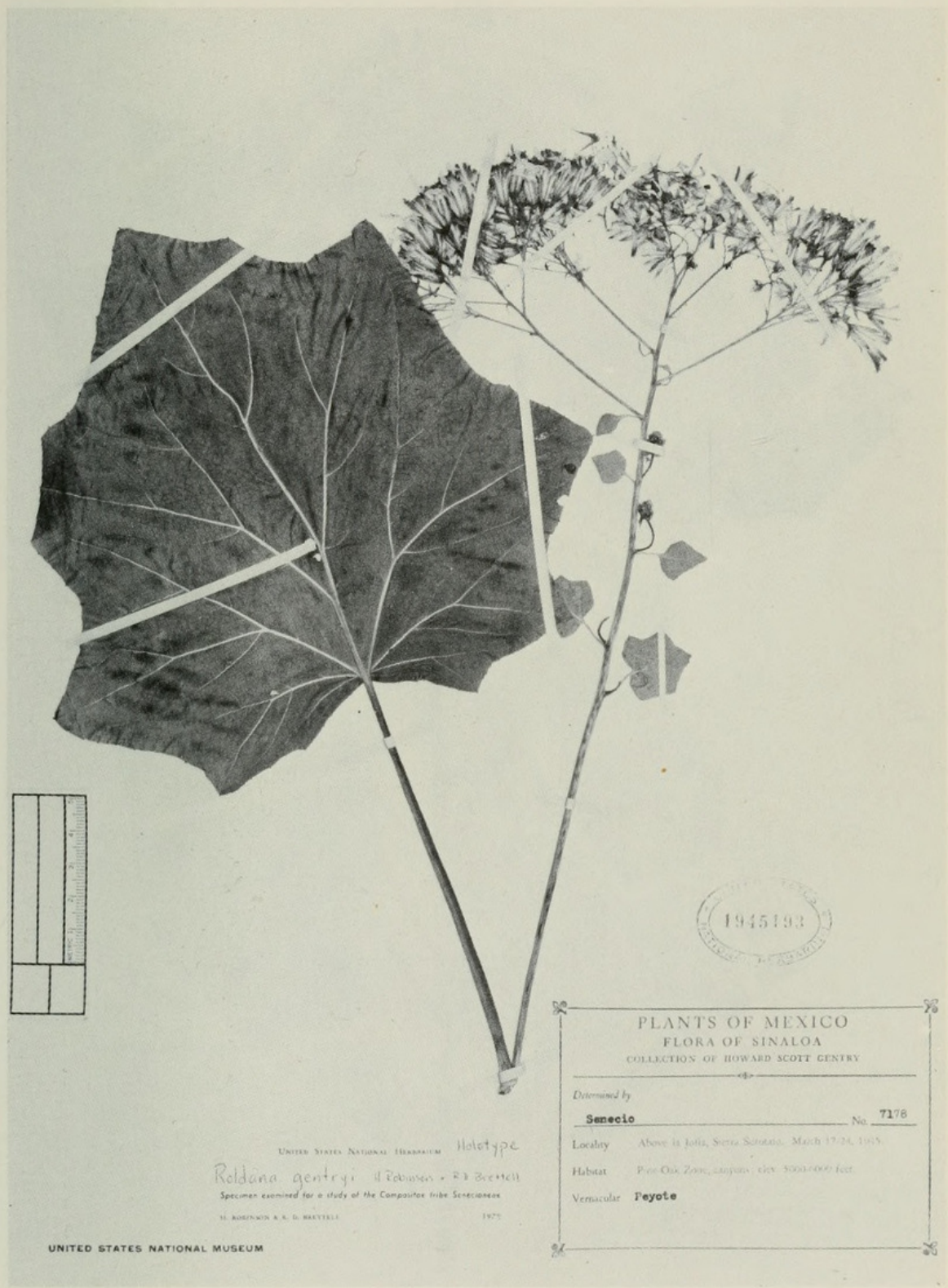


Figure 4. Roldana gentryi H. Robinson & R.D.Brettell,
sp. nov. Holotype US.



Figure 5. Roldana greenmanii H. Robinson & R.D.Brettell, sp. nov. Holotype US.



Figure 6. Roldana hintonii H. Robinson & R.D. Brettell,
sp. nov. Holotype US.

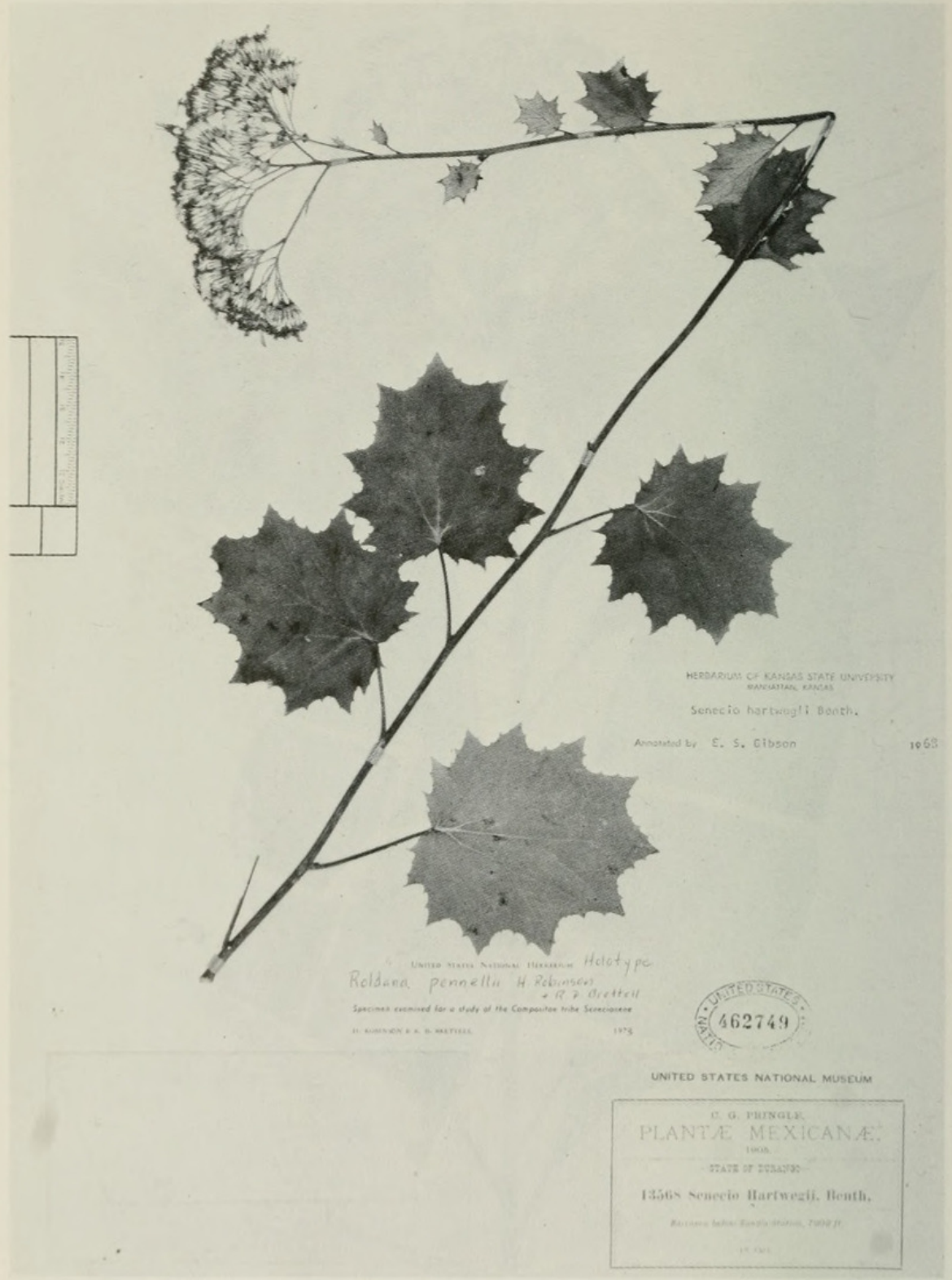


Figure 7. Roldana pennellii H. Robinson & R. D. Brettell, sp. nov. Holotype US.



Figure 8. Telanthophora bartlettii H. Robinson & R.D. Brettell,
sp. nov. Holotype US.

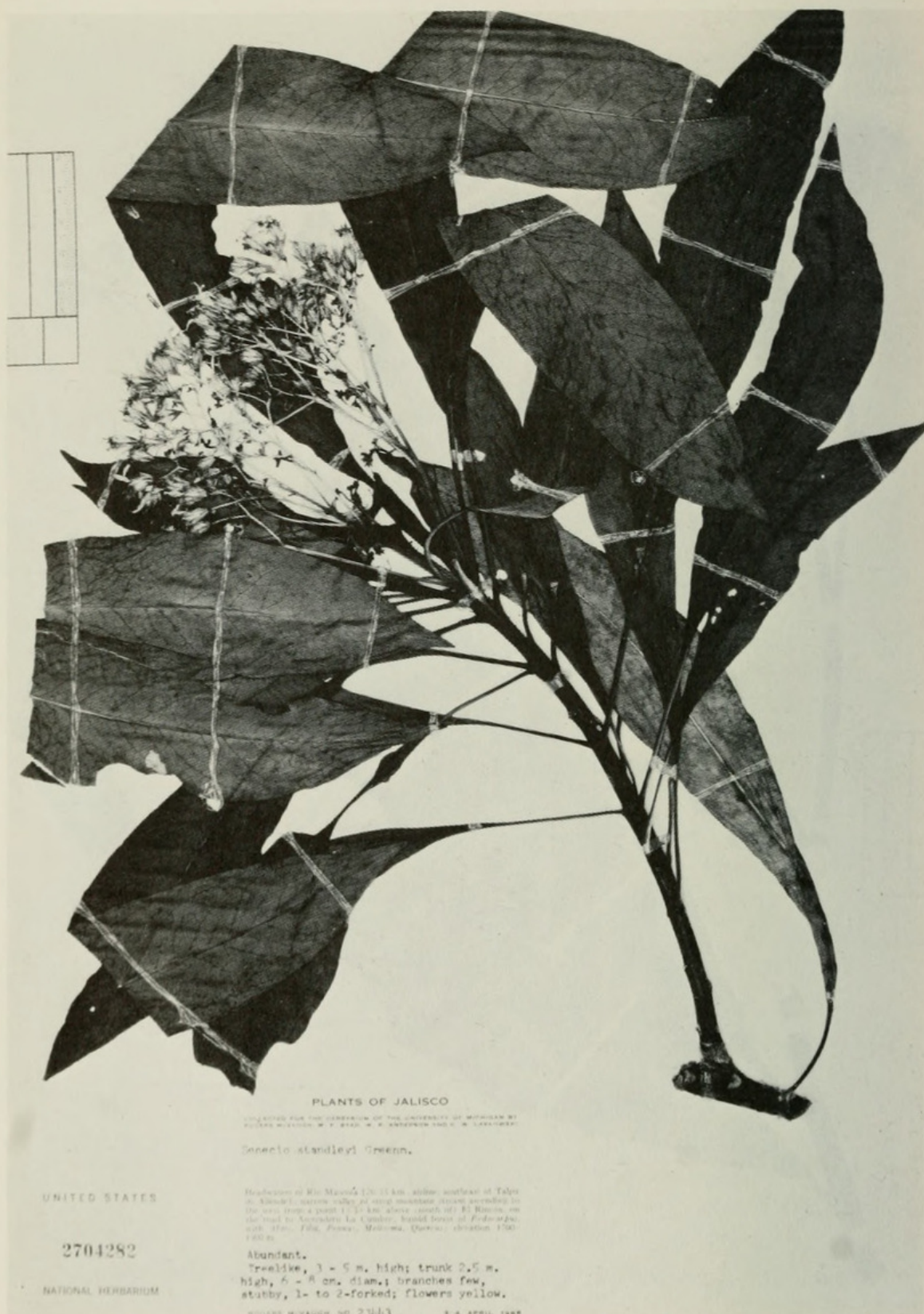


Figure 9. Telanthophora jaliscana H. Robinson & R. D. Brettell, sp. nov. Holotype US.

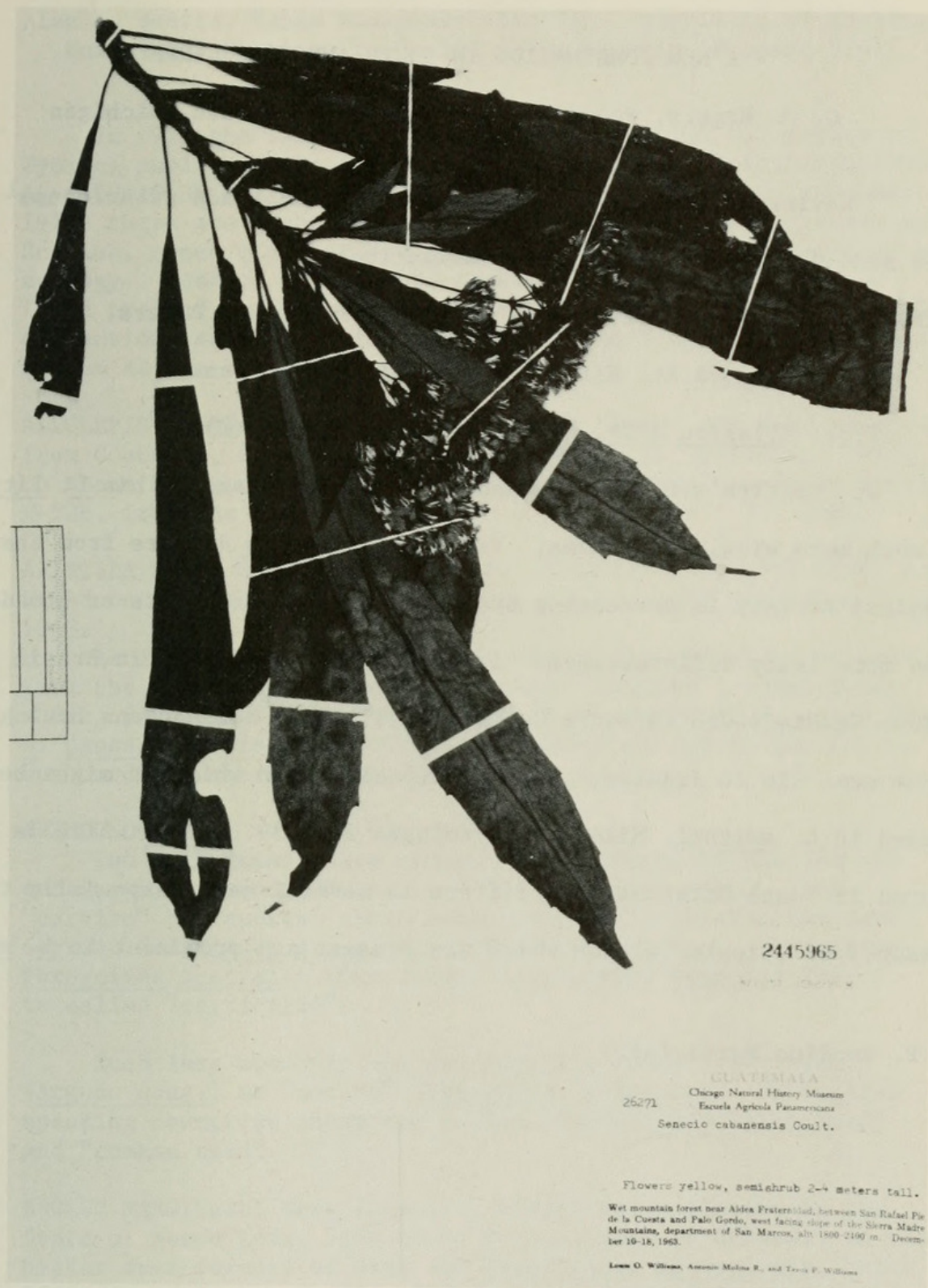


Figure 10. Telanthophora molinae H. Robinson & R.D. Brettell, sp. nov. Holotype US.



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