STUDIES OF MEXICAN AND CENTRAL AMERICAN PLANTS—NO. 5.[a]

By J. N. Rose.

INTRODUCTORY NOTES.

The following studies consist largely of descriptions of new species from the rich gleanings of Dr. C. G. Pringle and Dr. E. Palmer, and of various Government collectors. Of the latter, Messrs. E. W. Nelson and E. A. Goldman continue year after year to send in large accessions. Very large amounts of material have also been obtained by myself and assistants, aggregating now more than 10,000 numbers.

On May 15, 1905, I was authorized by the Assistant Secretary of the Smithsonian Institution to proceed to Mexico for the purpose of making botanical explorations, this being my fifth commission of the kind. Mr. Jos. H. Painter, also of the National Museum, was for the second time sent with me, and his previous experience, together with his enthusiasm for botanical exploration, added greatly to the success of the expedition. My son, Joseph S. Rose, accompanied us as a private assistant. The City of Mexico was made our principal base, and thither we returned repeatedly during the season. We made short trips thence to Tlalpam, San Angel, Santa Fe, Guadalupe, Tlalnepantla, and the Hacienda de la Encarnación, all in the Valley of Mexico; also longer trips to Cuernavaca and Yautepec in Morelos, to Tula, Pachuca, Somoriel, and Tulancingo in Hidalgo, and to Iguala in Guerrero. With Ixmiquilpan, Hidalgo, as a base, work was done on the neighboring mountains and plains, and a side trip was taken to the Sierra de la Mesa, some 20 miles to the east. With San Juan del Rio as a base, a trip was made through the cactus deserts of Querétaro. With Tehuacán, Puebla, as a base, a considerable amount of work was done on the plains and mountains about that town, whence, also, side trips were made to Tomellín and San Sebastián.

[a] Continued from Vol. VIII, p. 339, of the Contributions.

The following table will show in detail the places visited, the date of each visit, and the number of miles traveled in course of this trip:

Itinerary.

1905.		Miles.
June 30.	City of Mexico to Tlalpam, Distrito Federal, and return	15
July 1.	City of Mexico to Guadelupe, Distrito Federal, and return	10
3.	City of Mexico to Tula, Hidalgo, by rail	50
3–4.	Tula to local stations both east and west	10
4.	Tula to City of Mexico, by rail	50
6.	City of Mexico to Tlalnepantla, Distrito Federal, and return, by rail	15
7–8.	City of Mexico to Hacienda de la Encarnación, Mexico and return, by rail	45
9.	City of Mexico to Sierra Guadelupe and return, by trolley	20
9.	City of Mexico to Yautepec, Morelos, by rail	98
11–12.	Yautepec to pedregal	12
13.	Yautepec to City of Mexico, by rail	98
15.	Mexico to Santa Fe, Distrito Federal, and return, by trolley	20
18.	City of Mexico to Pachuca, Hidalgo, by rail	61
19.	Pachuca to Real del Monte and return	10
20.	Pachuca to mountains northwest of the town and return	5
21.	Pachuca to Hacienda Palmar and return	10
22.	Pachuca to Tulancingo, Hidalgo, and return, by rail	102
24.	Pachuca to Sierra de Pachuca and return	10
25.	Pachuca to Tetepango, Hidalgo, by rail	30
25.	Tetepango to Ixmiquilpan, Hidalgo, by stage	42
26.	Ixmiquilpan to chalk plain west of town	10
27.	Ixmiquilpan to mountains on Zimapan road	10
28.	Ixmiquilpan to mountains south of town	6
29.	Ixmiquilpan to mountains south of town	12
30.	Ixmiquilpan to plain south of town	2
31.	Ixmiquilpan to Sierra de la Mesa, Hidalgo	25
Aug. 1.	Sierra de la Mesa to barranca and return	6
1.	Sierra de la Mesa to Ixmiquilpan	25
2.	Along Ixmiquilpan River	2
3.	Ixmiquilpan to limestone mountain south of town	5
4.	Ixmiquilpan to Tetepango, by stage	42
4.	Tetepango to Pachuca, by rail	30
5.	Pachuca to Somoriel, by rail	29
5.	Somoriel to Las Lajas	6
5.	Las Lajas to Pachuca, by rail	35
6.	Pachuca to City of Mexico, by rail	61
9.	City of Mexico to Iguala, Guerrero, by rail	147
10.	Iguala to local stations, both east and west	10
11.	Iguala to Los Amates and return	18
12.	Iguala to mountains west of town and return	10
13.	Iguala to City of Mexico, by rail	147
14.	City of Mexico to Tlalpam, Distrito Federal, and return, by trolley	15
15.	City of Mexico to San Angel and return, by trolley	10
17.	City of Mexico to San Juan del Rio, Querétaro, by rail	119
17.	San Juan del Rio to red hill west of town	4
18.	San Juan del Rio to local stations, both east and west	10

1905.		Miles.
Aug. 19.	San Juan del Rio to Hacienda de Ciervo	24
20.	On hills of Hacienda de Ciervo	10
21.	Hacienda de Ciervo to Cadereyta	9
22.	Cadereyta to Visaron	15
23.	Visaron to Higuerillas	12
24.	Higuerillas to San Pablo	18
25.	San Pablo to Hacienda de Ciervo	30
26.	Hacienda de Ciervo to San Juan del Rio	24
27.	San Juan del Rio to Mexico City, by rail	119
29.	City of Mexico to Tehuacán, Puebla, by rail	208
30.	Tehuacán to El Riego	2
30.	El Riego to limestone hillside	5
31.	El Riego to hill east of Tehuacán	10
Sept. 1.	El Riego to limestone hillside	5
2.	El Riego to limestone hillside	5
3.	El Riego to limestone hillside	10
4.	El Riego to Tomellín, Oaxaca, by rail	83
4–5.	Tomellín to canyon and river flats	7
5.	Tomellín to El Riego, by rail	83
6.	El Riego to red hills east of Tehuacán	10
7.	El Riego to San Sebastián and return, by rail	48
8.	El Riego to mountains west	3
9.	Tehuacán to Puebla, by rail	79
10.	Puebla to City of Mexico, by rail	129
12–13.	City of Mexico to Cuernavaca, Morelos, and return, by rail	148

The herbarium material collected consists of more than 2,000 numbers (8222–10251), a full set of which has been mounted for the National Herbarium. A part of this is reported upon in this paper. Besides the herbarium material some 365 numbers of bulbs, roots, and succulents, the latter consisting chiefly of cacti, were sent to Washington. Many of these are new in cultivation and not a few are undescribed. Not many of the cacti have yet flowered and hence a full list of these introductions can not be given. Most of the plants listed below were collected by me either on my last or on my previous trips to Mexico.

Mexican plants recently introduced by J. N. Rose.—No. 4.

Name.	Catalogue number.	Remarks.
CACTACEAE.		
Cereus hollianus Weber	05. 1305	
Echinocactus horizonthalonius Scheidw	05. 1289	
Echinocactus ornatus DC	05. 1244	
Echinocactus robustus Link & Otto	05. 1283	
Echinocereus tuberosus Rumph	05. 1001	Flowered in 1906.
Mamillaria carnea Zucc	05. 1139	
Mamillaria elegans DC	05. 1280	
Mamillaria elongata DC	05. 1137	
Mamillaria erecta Lem	05. 1140	

Mexican plants recently introduced by J. N. Rose—No. 4—Continued.

Name.	Catalogue number.	Remarks.
CACTACEAE—continued.		
Mamillaria longimamma DC	05. 1144	
Mamillaria mutabilis Scheidw	05. 1278	
Mamillaria uncinata Zucc	05. 1221	
Opuntia brandegei Schum	06. 47	Collected by Mr. E. A. Goldman in Lower California.
Opuntia pilifera Weber	05. 1284	
CRASSULACEAE.		
Cremnophylla nutans Rose	838	Flowered in April, 1906.
Echeveria byrnesi Rose	918	
Echeveria campanulata Rose		January, 1905.
Echeveria goldmani Rose	11005	
Echeveria pinetorum Rose	11013	
Echeveria rubromarginata Rose	930	Sent by Doctor Purpus and Mr Meyers.
Echeveria scopulorum Rose	652	January, 1906.
Echeveria sessiliflora Rose	11012	
Echeveria simulans Rose	767	Sent by Doctor Pringle.
Echeveria tolucensis Rose	957	
Echeveria turgida Rose	962	March, 1906.
Echeveria sp. nov	05. 242	Sent by Mr. Maxon from Guatemala.
Echeveria sp. nov	05. 319	Sent by Mr. Maxon from Guatemala.
Echeveria sp. nov	05. 1164	
New genus near Echeveria	05. 1237	
Sedum sp. nov	752	In March, 1906.
MISCELLANEOUS.		
Beaucarnea sp. nov	05. 1269	
Calibanus gen. nov	05. 894	
Oxalis sp	752	
Dasylirion sp	04. 1288	
Dasylirion sp	05. 1159	
Dasylirion sp	05. 1035	
Dasylirion sp	05. 1159	

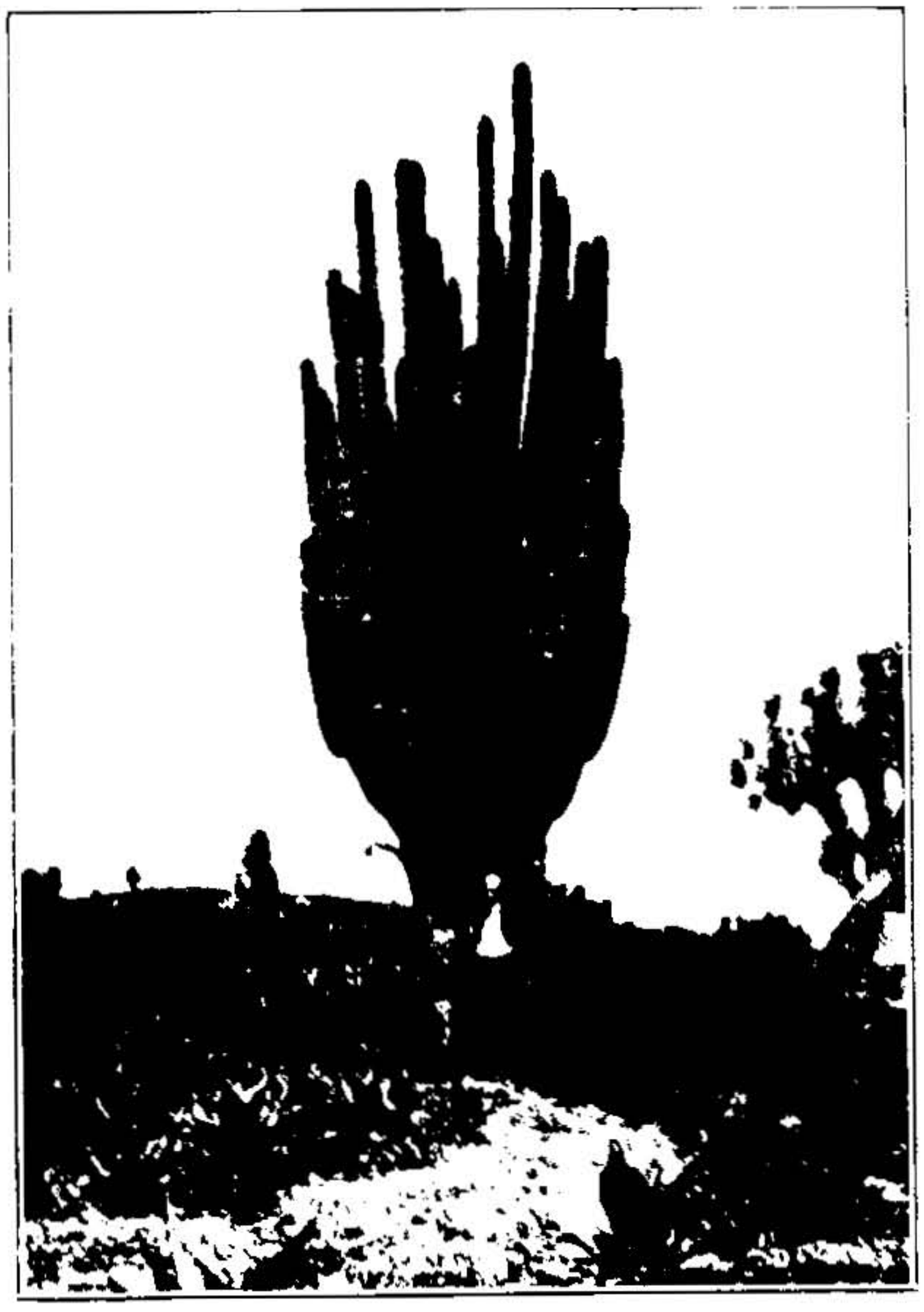
My chief interest being at present in the Cactaceae, these were made the first object of our quest, as a result of which about 150 specimens have been added to the herbarium, while perhaps 200 living specimens were sent to Washington. The most interesting cactus region visited was Ixmiquilpan, where, with the veteran botanical collector, Dr. C. A.

A.—Echinocactus robustus Link & Otto.

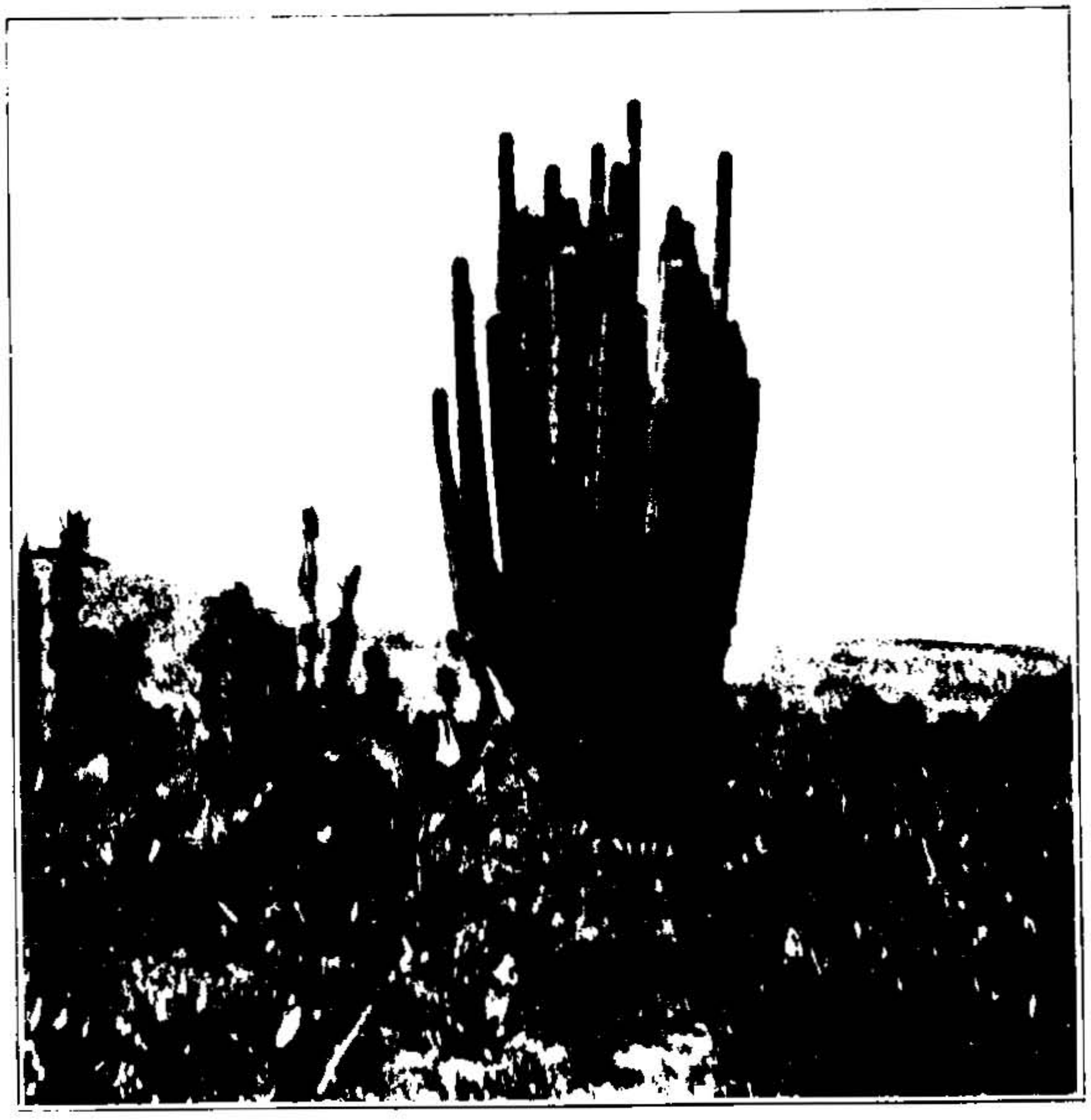
B.—Mamillaria angularis Link & Otto.

A. -Opuntia tunicata Link & Otto.

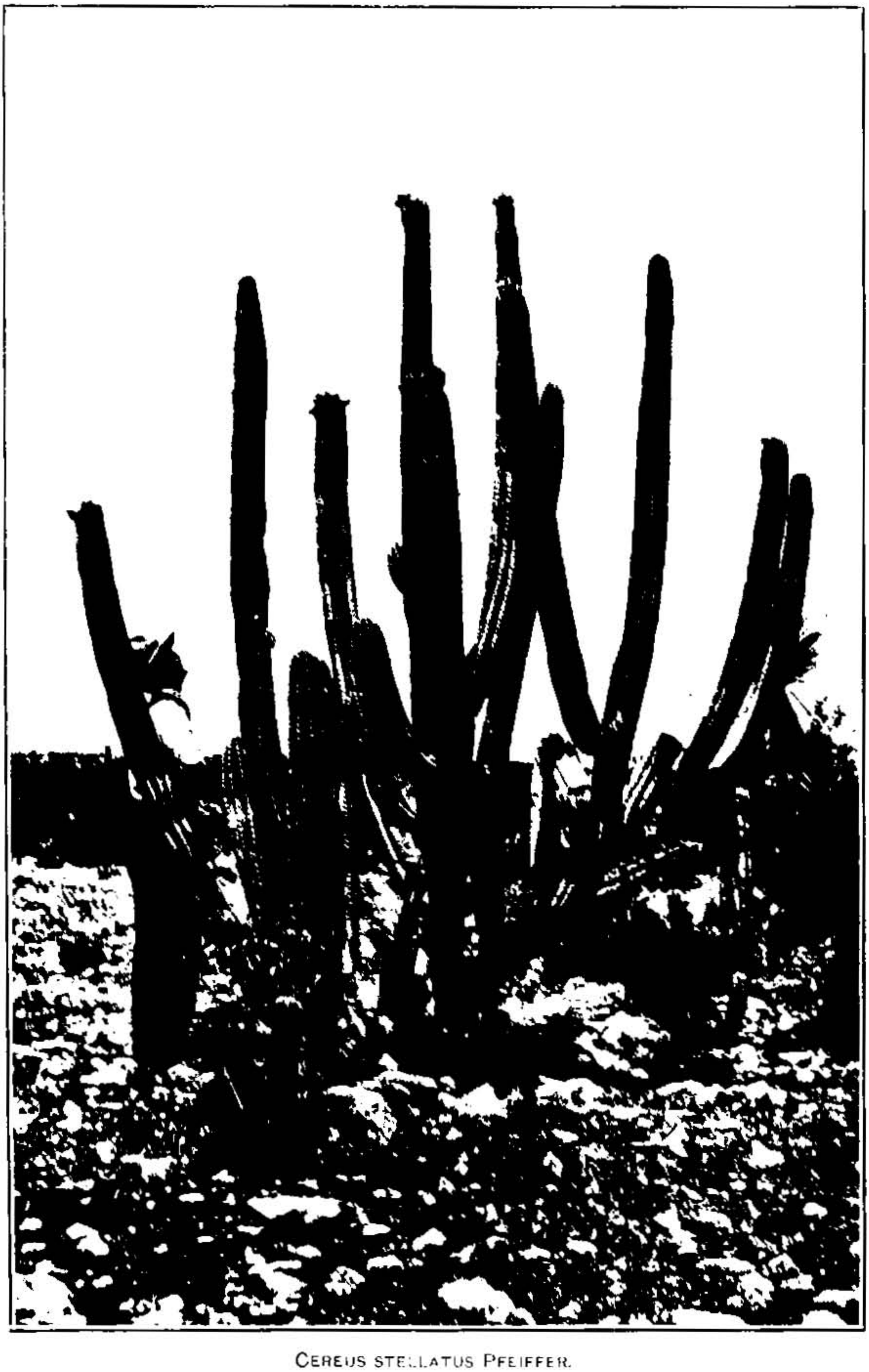
B. Echinocactus ingens Zucc.



PILOCEREUS FULVICEPS WEBER.



PILOCEREUS FULVICEPS WEBER.



CEREUS STELLATUS PFEIFFER.

Purpus, as a guide, about twenty species were studied. Here on the dry white chalky plain are found many striking forms. One of the most interesting of these is *Mamillaria angularis* Link & Otto, forming great clumps consisting of many individuals (Pl. XVI). Here is also found a giant Echinocactus (*E. ingens?*), the flesh of which is much employed in making a highly prized confection. The plant grows to be sometimes as much as 2.4 meters tall with a diameter of 90 to 120 cm. The body is cut into sections resembling American cheeses about 60 cm. in diameter and 15 to 20 cm. thick, and these are sent to the candy factory where they are boiled with sugar and made into a candy or "dulce" somewhat resembling preserved citron (Pl. XVII). In the same region *Opuntia imbricata*, *O. tunicata* (Pl. XVII), *O. kleinae*, and other Opuntias were abundant, and here we found a natural hybrid between *Opuntia microdasys* and another Opuntia which has not been specifically identified. Both species were growing near the hybrid. While *O. microdasys* is a low, pubescent, spineless species, the other parent is tall, glabrous, and spiny, and the hybrid is somewhat intermediate in size and without pubescence or spines. So far as my observation goes natural hybrids are not common among the Cactaceae.

Another very interesting cactus desert which we visited is situated around Tehuacán. It is remarkable especially for the great display of tree species belonging to Cereus, Pilocereus, Cephalocereus, and Opuntia. The cactus species of all genera seen here numbered 22.

Two species of Echinocactus (*E. flavescens*, *E. robustus* (Pl. XVI)) form great clumps, very much larger than any I had ever seen before. In the case of *E. robustus* it was not uncommon to see masses 1 to 1.3 meters high and 3 meters in diameter, and in one example nearly 5 meters in diameter. These masses must have contained hundreds, if not thousands, of individuals. A photograph of *E. robustus* is here reproduced.

On the hills east of the town are great forests of the huge *Cephalocereus macrocephalus* (Pl. XLIII, facing p. 126), which in many respects resembles the much better known *Cephalocereus senilis*. Unlike the latter, however, it develops a very woody trunk. Another striking species is *Pilocereus fulviceps* (Pl. XVIII), which has a short, stout, woody trunk and hundreds of nearly erect branches reaching a height of 12 to 15 meters. These branches set very close together and form a cylindrical mass, not infrequently 5 meters in diameter.

Pilocereus chrysomallus, which grows to the height of 2 to 3 meters, is a common plant, while *Cereus hollianus* (Pl. XIX) is so common as to be used as a hedge plant. Its fruit is as large as a goose egg. Another Cereus near *C. stellatus* (Pl. XX) is very common and furnishes fruit for the market. *Escontria chiotilla* (Pl. XLIII, facing p. 126)[a] is still

[a] See p. 126.

another of the tree cacti here found. This species produces small yellow flowers and a fruit clothed with thin papery scales. The fruit is a common article in the markets, sold under the names of chiotilla, "geotilla," tuna, etc. Here, and farther south, near Tomellín Cañon, is perhaps the real giant of the cactus family. A single tree often produces hundreds of nearly erect branches, and the quantity of material wrapped up must amount to many tons. Unfortunately I failed to find it either in flower or in fruit, but its habit, spines, etc., would indicate that it is a near relative of *Cereus pecten-aboriginum* (Pl. XXI), which I have found as far inland as Cuernavaca. This plant, doubtless, like many other cacti, has two or more names already.[a] Hardly less interesting was the little *Pelecyphora pusilla*, which had recently been discovered also by Doctor Purpus near Tehuacán. For nearly a week we explored hill after hill and not until we were completely discouraged did we find this little plant on the top of a hill almost hidden in the gray pebbles and sand.

A third cactus region explored was in the desert of Querétaro. Fitting out at San Juan del Rio we traveled northeast to Cadereyta and then east toward Zimapan as far as Higuerillas, thence north nearly to Tolomán, returning by the way of Cadereyta to San Juan del Rio. On this trip 36 species were examined, of which 9 were Opuntias and 15 were Mamillarias. The so-called *Mamillaria dura* was especially abundant, often forming clumps of 50 or more plants each 2 feet high. Each plant would have 10 to 12 large yellow flowers open at one time, the whole clump thus making a most gorgeous display. Many fine specimens of *Echinocactus ornatus* were seen, but unfortunately only a single living specimen reached Washington. In the same desert were found *Echinocactus grusonii*, *E. turbiniformis*, and *E. ingens*.

Perhaps the most interesting rediscovery made was that of the *Fouquieria spinosa* of Humboldt, Bonpland, and Kunth, or, as it is now called, *F. fasciculata*. Nearly ten years ago, while making some preliminary studies on the genus Fouquieria, I looked up Humboldt's original station and found it to be in the State of Hidalgo. Since then every proposed itinerary of mine in Mexico has included a trip to this type locality, but as the station is far from railroad connections the trip has repeatedly been given up. I had looked in vain for the plant in the dry parts of Hidalgo. Inquiry was made of botanical collectors in Mexico, but without success. The species has therefore remained a prominent desideratum.

It will be recalled that as long ago as 1844 Mr. Bentham referred a plant from southern Lower California to *F. spinosa* and various specimens since collected in Lower California and western Mexico have accordingly thus been labeled. To those at all familiar with the floral

[a] Later determined as *C. weberi*.

PLATE XXI.

CEREUS WEBERI COULTER.

CEREUS WEBERI COULTER.

PLATE XXII.

FOUQUIERIA SPINOSA H. B. K.

regions of Mexico such a distribution of the species seems most unnatural. This western material has been segregated by Mr. Nash under the name of *F. peninsularis* and *F. macdougalii*. While planning for the trip to Ixmiquilpan I learned from Dr. C. A. Purpus that there was a Fouquieria along the stage road from Tetepango to Ixmiquilpan. As this road runs near Actopan I felt convinced that this was the plant for which I had so long been looking. During the stage ride of 40 miles only a single specimen was observed, but this fortunately was a very fine one. A photograph of it is here shown (Pl. XXII). Some days afterwards while making an excursion some 20 miles east of Ixmiquilpan we found this species in great abundance growing on the hills with the oldman cactus, *Pilocereus senilis*, and with *Dasylirion quadrangulatum*. And again while making our trip through the desert of Querétaro we found the plant growing profusely on the dry hills and on the walls of the canyons. Among the poor natives it is known as *chiquiña*. They use the stems for the sides of their rude huts and to form first a fence and then a hedge about their yards. The stems are placed close together forming a compact paling, well defended by the sharp recurved spines which are revealed after the leaves fall off. The stems easily root and then form a permanent hedge. It is not uncommon to see the naked stems giving off bright red clusters of flowers from their upper axils. The photograph gives a good idea of the habit of the plant. The material collected, of which there is an abundance, shows that the species instead of being the most remote is perhaps the nearest relative of *Fouquieria formosa*. The material, although not yet critically studied, also indicates that it is very close to *Fouquieria campanulata*.

At Ixmiquilpan we collected material of the so-called *Dasylirion hookeri*, which has led to the ascertainment of the real identity of this very curious plant. It was long ago (1859) figured in the Botanical Magazine and wrongly referred to *Dasylirion hartwegi*. Then it seems to have been lost sight of until 1904, when a specimen was sent to Washington by Mr. C. R. Orcutt from San Luis Potosí. This specimen being without flowers, fruit, or foliage, its relationship could only be guessed at. In habit it resembled a great puffball with a thick corky bark like that of an oak and of a loose cellular structure within. Later in the year the Department of Agriculture commissioned Dr. E. Palmer to collect the plant near San Luis Potosí. Some 10 or 12 fine specimens were received from him, but these have remained perfectly dormant up to the present. Having learned from Doctor Purpus that he had seen a similar plant near Ixmiquilpan, when I visited that place, a day was spent with him in hunting for it in its habitat on the tops of mountains. Specimens are not at all common and so much do they resemble moss-covered bowlders or old stumps that one may easily

overlook them. Flowers were collected, and later Doctor Purpus sent me fruit. These show clearly that this plant is distinct from both Dasylirion and Nolina, though much nearer the latter.

About Tehuacán two remarkable species of Beaucarnea were discovered, both of which seem to be undescribed. One of them has a most singular trunk, at first nearly globular but afterwards sending up a slender stem which becomes more or less branched. The swollen base takes on a multitude of shapes, but is always very large as compared with the rest of the plant. One such measured at 0.6 meters above the base, 6.3 meters in circumference, and at 1.8 meters above the base contracted abruptly into the slender stem proper. The basal expansion is made up of very loose cellular tissue which when dead and dry is almost as light as cork. This club-footed base suggests the specific name used elsewhere in this paper for this species. The aspect of the plant is shown in Pl. XXIII, facing page 88.

Dasylirion quadrangulatum S. Wats., while perhaps not uncommon in cultivation, is not often met with even in our larger herbaria. This species was found to be very common in eastern Hidalgo and the drier parts of Querétaro. It forms a very distinct trunk 120 to 150 cm. long below the crown of leaves and sends up a flowering stem 3.6 to 4.5 meters long. The leaves are very unlike those of all the other species, being very thick and narrow and not prominently saw-toothed. They are often 3 meters long. In some parts of Querétaro the natives use them as a thatch for their houses. They call the plant junquillo.

Material of the small parasite Pilostyles (or Apodanthes) of the Rafflesiaceae was collected at five localities, two near Ixmiquilpan, one in the desert of Querétaro, and two near Tehuacán. Whether more than one species was obtained I have not yet determined, but there were two or three hosts, each being some species of Parosela.

According to Doctor Robinson Pilostyles has been reported only three times from North America, once by Geo. Thurber and twice by Dr. C. G. Pringle. Material was collected, however, by Mr. Frederick V. Coville in Texas in 1904 and by Dr. E. Palmer in San Luis Potosí in 1905. This genus, in North America at least, is always parasitic on some genus of Viciaceae, generally on Parosela. The plants are minute, reduced simply to flower parts, which may account for the fact that the species have been so very rarely collected. Unless one has seen specimens or is looking particularly for them he will readily pass them by as secretions or insect work.

All new species here described are based upon specimens in the United States National Herbarium and when two or more collectors are cited the type specimen is definitely stated.

The line drawings are the work of Miss Juliet C. Patten, except that plate 25 was made by the late Frederick A. Walpole and plate 40 by Homer D. House.

LILIACEAE.

DASYLIRION AND ITS ALLIES.

After passing in review the specimens and descriptions of Dasylirion and Nolina I have become convinced that certain species should be excluded from both and brought together into a third genus. Some of these species have long been known as Beaucarnea and are an attractive sight in every large conservatory.

The discovery of female flowers and mature fruits of the so-called *Dasylirion hookeri* furnishes data which justify its segregation also.

The following key will point out the essential differences in these genera:

Ovary 1-celled; fruit strongly 3-winged.
  Stems strongly bulbose at base; leaves never saw-toothed; inflorescence a broad open panicle ..... BEAUCARNEA.
  Stems never bulbose at base; leaves saw-toothed (except in one species); inflorescence an elongated spike-like panicle..... DASYLIRION.
Ovary 3-celled; fruit not at all winged.
  Fruit not 3-lobed, its walls very thick and woody, not dropping away; trunk a swollen globular body..... CALIBANUS.
  Fruit strongly 3-lobed, its wall very thin, soon dropping away; trunk if present never swollen ..... NOLINA.

BEAUCARNEA.[a]

The genus Beaucarnea was described by Lemaire in 1861 with *B. recurvata* as the type. Two other species (*B. striata* and *B. gracilis*) were also described by him. In 1872 and also in 1881 J. G. Baker monographed the genus, combining with it the much older genus Nolina. He describes twelve species and several varieties. In 1875 S. Watson monographed the United States species of Nolina, stating that the Mexican species of Beaucarnea described by Mr. Baker should doubtless be referred to Nolina. Three years after Mr. Baker's last paper Mr. Hemsley again takes up the name Nolina, and so the two names have been alternating, first one and then the other receiving the sanction of botanists. In America the name Nolina, being much the older, has generally been accepted by botanists, while gardeners throughout the world have, as a rule, clung to Beaucarnea.

After a careful study of the species along with those of Dasylirion it seems clear that both genera should be retained. For at least two accepted species of Dasylirion with several referred to Beaucarnea and Nolina form a very natural genus abundantly distinct from both Nolina and Dasylirion. The genus Beaucarnea has the inflorescence and foliage similar to those of Nolina while the fruit is much like that of Dasylirion; hence heretofore those species of Beaucarnea

[a] BEAUCARNEA Lemaire, Illust. Hortic. 8: Misc. 57. *pl. 303.* 1861. Type species *B recurvata.*

known only from foliage or flowering specimens have been referred to Nolina while those collected in fruit have been described as Dasylirion. Beaucarnea rarely flowers in cultivation and, being dioecious or nearly so, its fruit has rarely if ever been obtained.

Monographers therefore have associated Beaucarnea and Nolina together because of the similarity of their leaves.

Beaucarnea guatemalensis Rose, sp. nov. FIGURE 1.

Tree, 6 to 12 meters high with a thickened bulbous base abruptly contracted into a slender stem 5 to 8 cm. in diameter; swollen base covered with a thick corky bark 6 cm. thick; upper part of stem smooth and with very thin bark; leaves numerous, clustered at the top as in the common cultivated Beaucarneas, erect (?), broad at base (4 to 5 cm. broad), 10 to 15 mm. broad immediately above the base, 25 mm. broad 20 cm. from base, gradually tapering upward into a long filiform tip 60 to 80 cm. long, the margin entire; male inflorescence an open panicle, 75 to 110 cm. long; female inflorescence not seen; fruit 15 mm. long, strongly 3-winged; wings thin, 4 to 5 mm. broad.

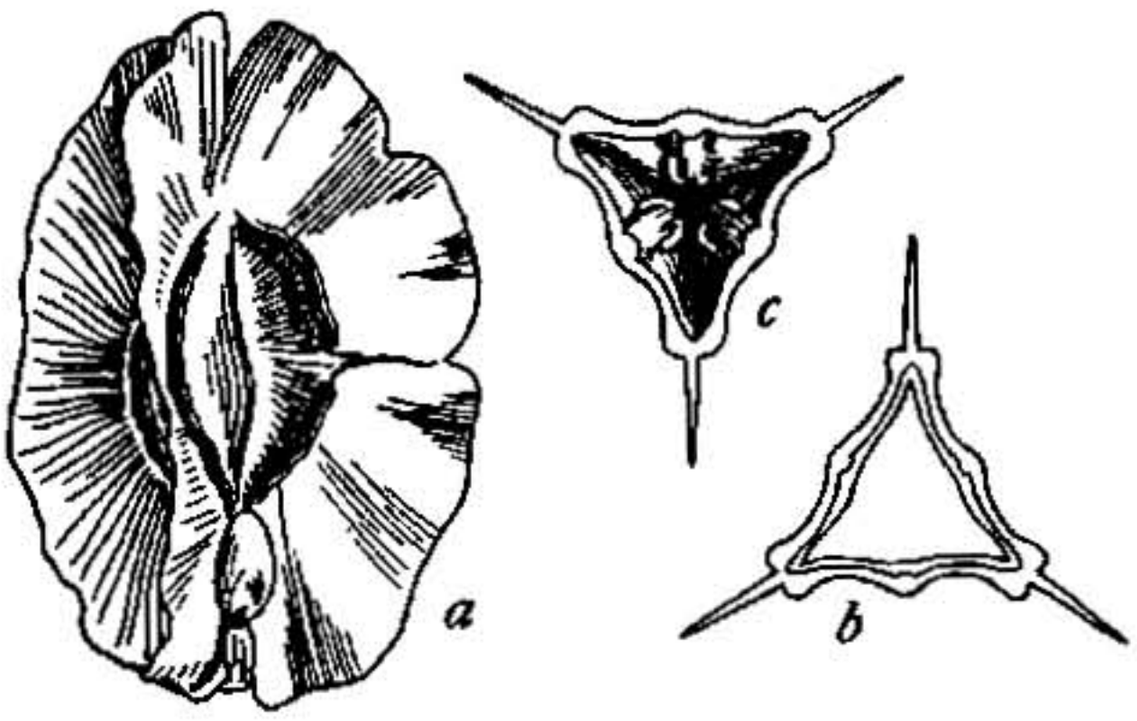


FIG. 1.—Fruit of *Beaucarnea guatemalensis*. *a*, Side view; *b*, cross section showing seed; *c*, cross section showing undeveloped ovules at base. All scale 2.

Type specimen U. S. National Herbarium no. 474781, collected by W. A. Kellerman in a rocky ravine on the south side of the Sierra de las Minas, opposite El Rancho, Guatemala, altitude about 600 meters, on March 10, 1905 (no. 4320).

This species belongs with *B. inermis* and *B. pliabilis*, but the fruit is broader-winged than in the former and the leaves are broader than in the latter.

Beaucarnea inermis (S. Wats.) Rose. FIGURE 2.

Dasylirion inermis S. Wats. Proc. Am. Acad. **26**: 157. 1891.

This remarkable tree, although common in its native haunts, has until very recently only been known from the specimens obtained by Dr. C. G. Pringle near Las Palmas in the low lands of San Luis Potosí. Dr. E. Palmer collected it in 1905 in this same general region. The writer observed it in 1899, but obtained no specimens.

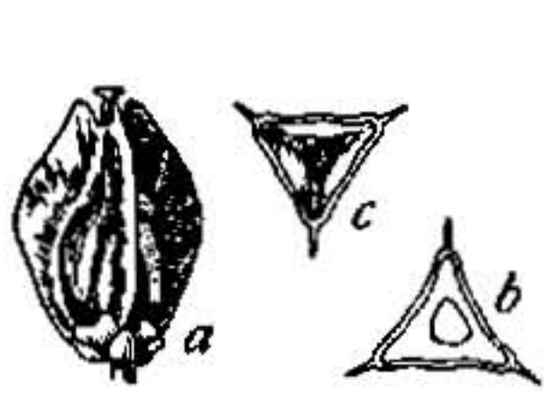


FIG. 2.—Fruit of *Beaucarnea inermis*. *a*, Side view; *b*, cross section showing seed; *c*, cross section showing undeveloped ovules at base. All scale 2.

Beaucarnea oedipus Rose, sp. nov. PLATE XXIII.

Trees 6 to 12 meters or more high; the base variously and enormously enlarged, at first a globular body crowned by a clump of leaves but in very old plants more or less dome-shaped and 1 to 2 meters high by 2 to 7 meters in circumference; the trunk above the base comparatively slender, often much branched, each branch crowned by a cluster of slender leaves; leaves erect, linear, 25 to 40 cm. long, 4 to 6 mm. broad above the base; inflorescence paniculate; fruit 3-winged.

Type U. S. National Herbarium no. 453660, collected by J. N. Rose and Jos. H. Painter on hills near Tehuacán, Puebla, August and September, 1905 (no. 10157). Also collected from the same station by Dr. Wm. Trelease, August, 1903, and by Dr. C. R. Purpus, 1905.

BEAUCARNEA OEDIPUS ROSE.

BEAUCARNEA OEDIPUS ROSE.

Beaucarnea pliabilis (Baker) Rose.

Dasylirion pliabile Baker, Journ. Linn. Soc. **18:** 240. 1881.

B. pliabilis has heretofore only been known from Schott's specimen collected many years ago at Sisal, Yucatan. In 1902 Mr. E. A. Goldman collected leaves and took photographs of this species at Progreso not far from Sisal. These indicate a species closely related to *B. guatemalensis*, but the leaves are shorter and perfectly smooth and evidently belong to a quite distinct plant.

Collected by E. A. Goldman at Progreso, Yucatan, February 24 to March 5, 1901 (no. 607, photograph no. 2211).

Beaucarnea purpusi Rose, sp. nov.

Tree 6 to 8 meters high, somewhat swollen at base, a little branched, the trunk almost completely clothed by the reflexed and closely appressed old leaves; leaves at first erect, then spreading, and at last reflexed, long-persisting, very pale, 50 to 60 cm. long, 10 to 12 mm. broad, the margin pale and entire.

Type specimen U. S. National Herbarium no. 453659, collected by J. N. Rose and Jos. H. Painter near Tehuacán, Puebla, in 1905 (no. 10156).

Beaucarnea recurvata Lemaire, Illust. Hortic. **8:** Misc. 59. 1861.

Beaucarnea recurvata was introduced into cultivation from Mexico about 1845, but the station from which it was obtained is not known. The specimen cited under this name in the Biologia Centrali-Americana belongs to a true Nolina, *N. altamiranoana*.

Beaucarnea stricta Lemaire, Illust. Hortic. **8:** Misc. 61. 1861.

Beaucarnea stricta is a glaucous-leaved species, only known from garden specimens. It is often confused with *Nolina hartwegiana* and *B. recurvata*. *Beaucarnea glauca*, another garden plant, may or may not belong here.

DASYLIRION.[a]

After excluding the species belonging to Nolina and Beaucarnea eleven species still remain belonging to Dasylirion. Some of these are not very well known. Below is given a list of them with the description of one that is new.

Dasylirion acrotrichum Zucc. Abh. Akad. Muench. **3:** 228. 1843.

Dasylirion berlandieri S. Wats. Proc. Am. Acad. **14:** 249. 1879.

Dasylirion flexile C. Koch, Ind. Sem. Hort. Berol. **1867:** app. 1. 5. 1867.

Dasylirion glaucophyllum Hook. Bot. Mag. **84:** *pl. 5041.* 1858.

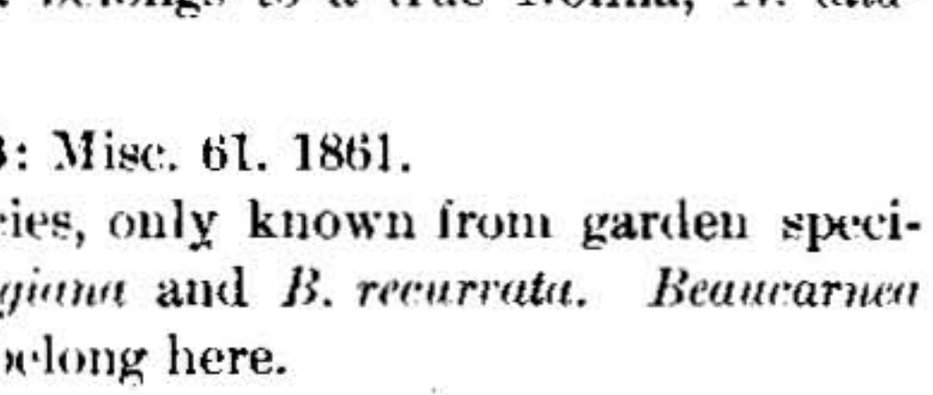


FIG. 3.—Fruit of *Dasylirion quadrangulatum*. *a*, Side view; *b*, cross section showing seed; *c*, cross section showing undeveloped ovules at base. All scale 2.

Dasylirion graminifolium Zucc. Abh. Akad. Muench. **3:** 225. 1843.

Dasylirion longissimum Lem. Illustr. Hortic. **3:** Misc. 91. 1856.

Dasylirion quadrangulatum S. Wats. Proc. Am. Acad. **14:** 250. 1879. FIGURE 3.

Dasylirion serratifolium Zucc. Abh. Akad. Muench. **3:** 225. 1843.

Dasylirion texanum Scheele, Linnaea **23:** 140. 1850.

Dasylirion wheeleri S. Wats. Proc. Am. Acad. **14:** 249. 1879.

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[a] DASYLIRION Zucc. Otto & Dietr. Allg. Gartenz. **6:** 258. 1838.

Dasylirion lucidum Rose, sp. nov.

Stems one to two meters high, crowned by a cluster of leaves; leaves 40 to 60 cm. long, 12 to 13 mm. broad above the enlarged base, greenish-yellow, smooth and shining on both surfaces, the marginal teeth reddish brown, the edge serrulate between the teeth, the apex resolving into a long tuft of fibers; inflorescence paniculate, 2 to 3 meters high including the peduncle; male racemes rather slender, 5 to 6 cm. long; fruiting panicle narrow and dense, the racemes appressed to the main axis; pedicels short, articulated near the apex; perianth lobes 2 mm. long, obtuse; fruit 7 mm. long, 5 mm. broad, rounded at base, retuse at apex, 3-winged, the wings rounded at apex and distinct from the short but evident style; ovules 6; seeds one, somewhat 3-angled in section.

Type U. S. National Herbarium no. 453508, collected by Rose and Painter on the limestone hills west of Tehuacán, Puebla, September 1, 1905 (no. 10009), and in flower earlier the same year (June) by Dr. C. A. Purpus (no. 1253a).

This species is perhaps nearest *D. serratifolium* but is certainly distinct, that species having broader scabrous, yellow-spined, and dull-colored leaves. J. G. Baker states that the wings are adnate to the style, but an examination of the figure cited by him does not clearly bear this out. I find no record of fruit having been collected by anyone except Karwinsky.

CALIBANUS.

Calibanus Rose, gen. nov.

Plants dioecious; flowers, both male and female, arranged in short and broad panicles; perianth segments 6, orbicular, obtuse; stamens 6, only slightly exserted; ovary 3-celled, 6-ovuled; fruit globular, 1-seeded, thick-walled, not bursting when ripe; seed globose or somewhat 3-angled; trunk a large globular body covered with thick bark; leaves appearing in fascicles over the surface, linear, entire or serrulate to the touch; panicles arising with the leaf clusters, leafless.

This genus is nearest Nolina, but differs greatly in its habit and in its globular, thick-walled, 1-seeded fruit. It is very different both in habit, inflorescence, and fruit from Dasylirion, to which it has long been referred. Its globular trunk suggests Beaucarnea, in which it was once placed by J. G. Baker, but its fruit excludes it from that genus.

The genus is named for Shakespeare's Caliban.

Calibanus caespitosus (Scheidw.) Rose. PLATES XXIV, XXV. FIGURE 4.

Dasylirion caespitosum Scheidw. Wochenschrift Verein Gartenb. **4**: 286. 1861.

Dasylirion hookeri Lemaire, Hort. Belg. **15**: 324. 1865.

Beaucarnea hookeri Baker, Journ. Bot. **1872**: 327. 1872.

FIG. 4.—Fruit of *Calibanus caespitosus*. *a*, Side view; *b*, cross section showing seed; *c*, cross section showing undeveloped ovules at base. All scale 2.

Plant body proper 30 to 100 cm. in diameter covered with a thick corky bark like that of an oak, within of loose cellular structure, resting upon the ground like a puffball and attached to the earth only by small fibrous roots; leaves 30 to 90 cm. long, linear, 2 to 2.5 mm. broad, pale green, slightly serrulate, striate; panicle 10 to 20 cm. long, about 10 cm. broad, the horizontal branches quite rigid; segments of the flower orbicular, scarious-margined, purplish; fruit 5 to 7 mm. in diameter.

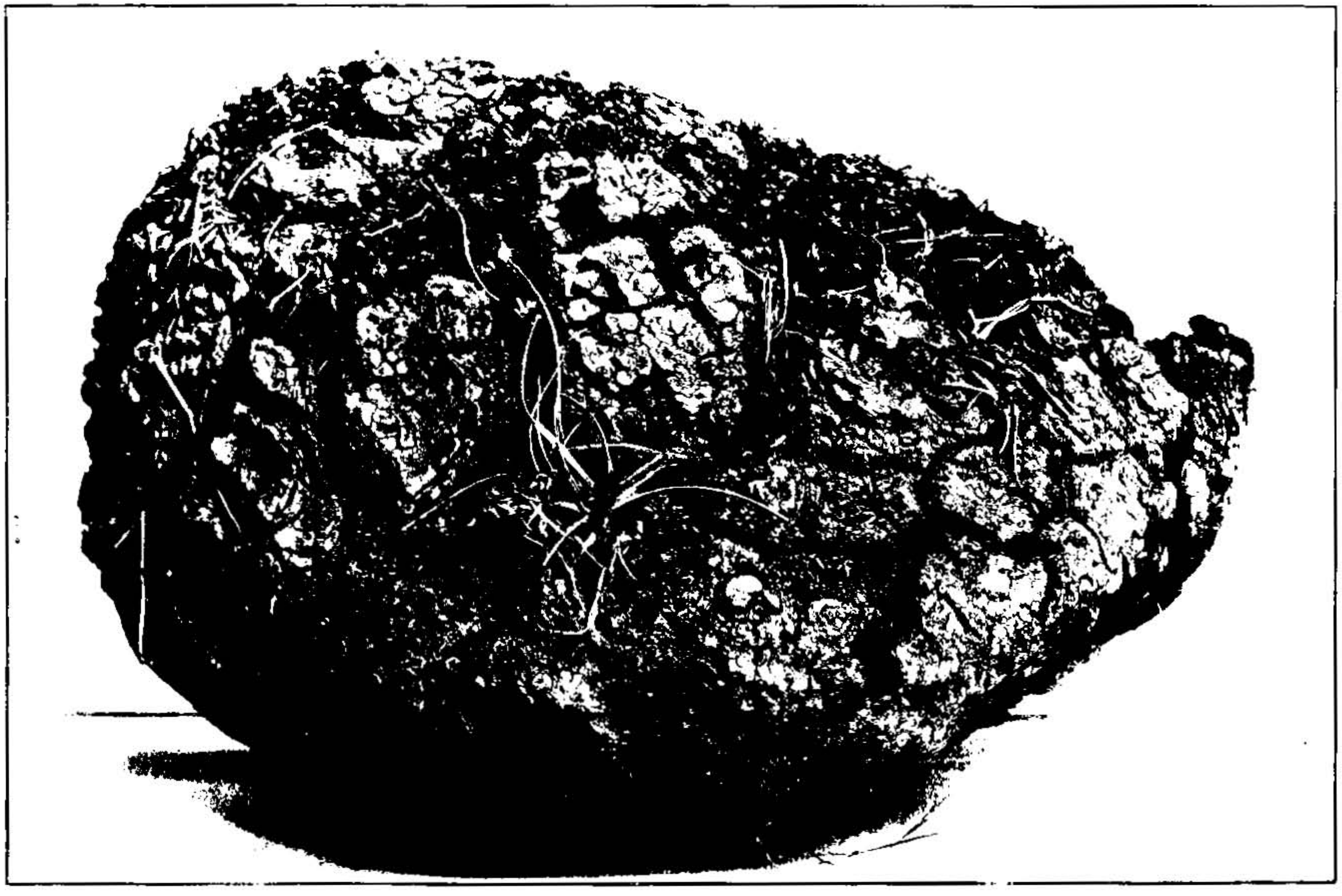
Specimens examined:

San Luis Potosí: Near City of San Luis Potosí, C. R. Orcutt, 1903 (trunk only); Dr. E. Palmer, 1905 (numerous plants but no flowers).

Hidalgo: Near Ixmiquilpan, Rose & Painter, 1905 (no. 8954) with male and female flowers and immature fruit; Dr. C. A. Purpus, same date and place; also later, in fruit.

This plant was illustrated in the Botanical Magazine for 1859 (*pl. 5099*) under the name of *Dasylirion hartwegianum*, the plate being accompanied by the following note:

PLATE XXIV.



CALIBANUS CAESPITOSUS · SCHEIDW. ROSE.

CALIBANUS CAESPITOSUS (SCHEIDW.) ROSE.

About the year 1846, we received from Mr. Repper, of the Real del Monte Company's establishment, Mexico, some remarkable plants in the form of tubers, a foot and half long, and nearly as high aboveground, the surface of which is formed by a number of wrinkled tubercles, slightly elevated, and somewhat circinately wrinkled; from a few of which appeared tufts of rigid, subulate leaves, 1 to 2 feet long, in form and texture resembling those of some Dasylirium. The general aspect of the tubers remind one of the well-known "Elephant's-foot" of South Africa, or of some remarkable Dioscoreae which we cultivate from Mexico. These remained dormant for some years, but one of them has lately produced more copious tufts of foliage and panicles of flowers; and precisely accord (the female flowers are, however, wanting to our plants) with the *Dasylirium Hartwegianum* of Zuccarini, which Hartweg sent from Zacatecas, in Mexico; and a Dasylirium of Mr. Charles Wright ("Coll. N. Mex. 1851–2"), n. 1918, also seems to be identical; but neither of these collectors has made a note on the nature of the plant, so that whether we are to consider this tuber as the normal condition of the stem or caudex of this species, or whether we are to look upon it as an accidental collection or congeries of united stems (a kind of monstrosity), still remains a doubt in our minds. All the Dasyliria yet known to us have separate, unbranched, and distinct stems, more or less elongated, as in the caulescent species of Agave, and as may be seen in our figures of two of the species of this remarkable genus, at our Tab. 5030 and Tab. 5041. The flowers of the panicles develop themselves very slowly, and the withered stalks and branches remain a long time attached to the trunk. Mr. Bentham compares this plant with the *Cordyline longifolia* of H. B. K.; but the very large, almost sheathing bracteas, rather than leaves (which latter do not appear in the figure given by Humboldt), and the widely different ramification of the panicle, and the acuminated sepals, indicate something very different.

NOLINA.[a]

The genus Nolina as first described contained but one species, viz, *N. georgiana*, which therefore is the type of the genus. After excluding from Nolina those species which belong to Beaucarnea we have left twenty species, as follows:

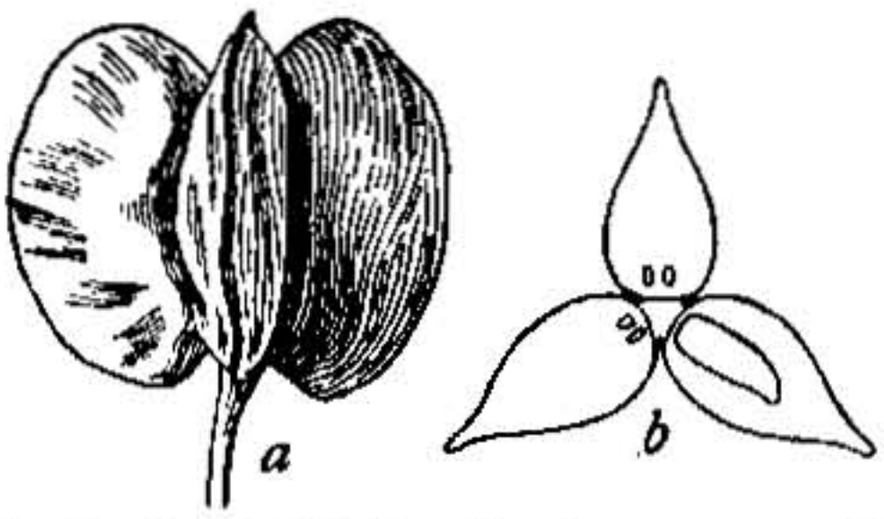


FIG. 5.—Fruit of *Nolina altamiranoana*. *a*, Side view; *b*, cross section showing seed in one cell and undeveloped ovules in two. Both scale 2.

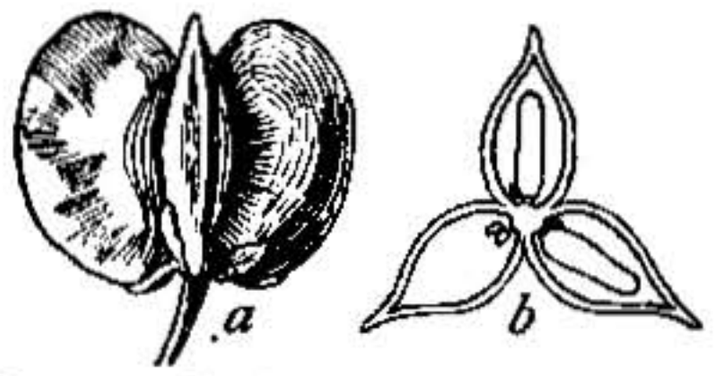


FIG. 6.—Fruit of *Nolina elegans*. *a*, Side view; *b*, cross section showing seeds in two cells and undeveloped ovules in all. Both scale 2.

Nolina altamiranoana Rose, Proc. Nat. Mus. **29**: 438. 1905. FIGURE 5.

Nolina beldingi Brandegee, Zoe **1**: 305. 1890.

Nolina bigelovii (Torr.) S. Wats. Proc. Am. Acad. **14**: 247. 1879.

Nolina brittoniana Nash, Bull. Torr. Club **22**: 158. 1895.

Nolina elegans Rose, sp. nov. FIGURE 6.

Probably acaulescent; leaves 50 to 60 cm. long, 9 to 12 mm. broad, stiff, yellowish, both surfaces smooth, the margins serrulate; inflorescence a narrow panicle, 1 to 3 meters long; flowering branches ascending; bractlets scarious, their margins lacerate; pedicels 8 to 9 mm. long, jointed a little above their base; sepals obtuse, scarious-margined; fruit strongly 3-lobed, 7 to 10 mm. broad, broader than high, the walls thin but not bursting before the ripening of the seeds.

This species is probably common in the mountains of Chihuahua, Durango, and Zacatecas.

[a] NOLINA Michx. Fl. 1: 207. 1803.

Type specimen U. S. National Herbarium no. 301306 (J. N. Rose, no. 2396).

Specimens examined:

Zacatecas: In the mountains, J. N. Rose, August 18, 1897 (no. 2396).

Durango: Dr. E. Palmer, 1896 (no. 249); E. W. Nelson between El Oro and Guanacevi, August, 1898 (no. 4745).

Chihuahua: Townsend & Baker, near Colonia Garcia, June, 1899 (no. 76).

Nolina elegans has been confused in collections with both *N. microcarpa* and *N. recurvata*. From the former it differs in its broader, stiffer leaves, larger fruit, etc. From the latter it is generically distinct, and it is needless to point out the differences here.

Nolina erumpans (Torr.) S. Wats. Proc. Am. Acad. **14:** 248. 1878.

Nolina georgiana Michx. Fl. **1:** 208. 1803.

Nolina greenei S. Wats. Bot. Gaz. **5:** 56. 1880.

Nolina hartwegiana (Zucc.) Hemsley, Biol. Centr. Am. **3:** 371. 1884.

Nolina humilis S. Wats. Proc. Am. Acad. **14:** 248. 1879.

Nolina lindheimeriana (Scheele) S. Wats. Proc. Am. Acad. **14:** 247. 1879.

Nolina longifolia (Karw.) Hemsley, Biol. Centr. Am. **3:** 372. 1884.

Nolina microcarpa S. Wats. Proc. Am. Acad. **14:** 247. 1879.

Nolina nelsoni Rose, sp. nov.

Trunk 1 to 3 meters high; leaves 50 to 70 cm. long, 3 to 4 cm. broad above the base, gradually tapering to a point, both surfaces smooth, the margins serrulate; inflorescence, including the peduncle, 2 to 3.5 meters long; bracts scarious, lacerate; pedicels 5 to 6 mm. long, jointed near the middle; sepals ovate, obtuse, scarious-margined; mature fruit not seen.

Type specimen U. S. National Herbarium no. 332674, collected by E. W. Nelson near Miquihuana, Tamaulipas, June 10, 1898 (no. 4489).

In its leaves this species resembles *N. parryi* and *N. bigelovii* of the Far West, but it is certainly quite distinct.

Nolina palmeri S. Wats. Proc. Am. Acad. **14:** 248. 1879.

Nolina parryi S. Wats. Proc. Am. Acad. **14:** 247. 1879.

Nolina parviflora (H. B. K.) Hemsley, Biol. Centr. Am. **3:** 372. 1884.

Nolina pumila Rose, sp. nov.

Acaulescent; leaves numerous, in some specimens erect, in others recurved, 20 to 30 cm. long, linear, many-nerved (sometimes 15 to 20-nerved), the apex entire but in most cases broken off, the margin serrulate; inflorescence a narrow panicle, 20 to 30 cm. long, the peduncle and lower branches leafy-bracted; male flowers not seen; peduncles slender, 6 to 7 mm. long, jointed just above the base, somewhat enlarged upward; sepals papery, oblong, obtuse, 3 mm. long; fruit dry, strongly 3-lobed, indehiscent but the walls early falling away, leaving the naked seed; style short but distinct; cells 3; ovules 6; mature seeds 3, one in each cell, globular.

Type specimen U. S. National Herbarium no. 301074.

Collected by J. N. Rose near Santa Teresa, Tepec, August 10, 1897 (no. 2165); and also in southern Durango, August 16, 1897 (no. 2340).

Nolina texana S. Wats. Proc. Am. Acad. **14:** 248. 1879.

Nolina watsoni (Baker) Hemsley, Biol. Centr. Am. **3:** 372. 1884.

A NEW ECHEANDIA.

Echeandia paniculata Rose, sp. nov.

Caulescent, about 70 cm. long, leafy below, glabrous, glaucous, the basal leaves several; lower stem leaves weak, 40 to 60 cm. long, 3 to 4 cm. broad, thin, a little glaucous, with a very narrow scarious margin only slightly serrulate; inflorescence 6-branched, the branches 20 to 30 cm. long, the bracts scarious, each subtending 3 (rarely 2) flowers; perianth 6-parted, yellow, the three outer lobes linear-oblong, the others oblong, 14 mm. long, 6 to 7 mm. broad, all reflexed in full flower but erect and twisted in age; filament free, with thin scales; anthers united.

Collected by J. N. Rose and Jos. H. Painter on bluff at Tepoxtlan, Morelos, September 2, 1903 (no. 844), and flowered in Washington, November, 1904.

This species is nearest *E. reflexa*, but is more leafy and has a more branched inflorescence.

The following species also belongs to Echeandia but has never been placed in that genus:

Echeandia reflexa (Cav.) Rose.

Anthericum reflexum Cav. Ic. Pl. **3**: 21. *pl. 241.* 1794.

NYMPHAEACEAE.

THE MEXICAN WATERLILIES.

For several years past I have been greatly interested in the Mexican Castalias, having myself collected four of the seven species, one of which has long borne an unpublished name. When I learned some years ago that Dr. Henry Conard was preparing a monograph of the genus Nymphaea I withheld my notes from publication and turned over the specimens to Doctor Conard for his inspection. His monograph, an exhaustive treatise and beautifully illustrated, has recently appeared.

I have attempted here only to present a very brief synopsis of our Mexican species, referring the reader to Doctor Conard's work for a full treatment of them.

KEY TO THE MEXICAN SPECIES OF CASTALIA.

Flowers yellow.
- Flowers 6 to 9 cm. wide; inner petals rounded at tip ..... 1. *C. flava.*
- Flowers 11 to 15 cm. wide; inner petals pointed ..... 2. *C. mexicana.*

Flowers not yellow.
- Flowers blue ..... 3. *C. elegans.*

Flowers white.
- Stamens with slender terminal appendages ..... 4. *C. gracilis.*
- Stamens with short or no terminal appendages.
  - Leaves strongly nerved beneath; margin toothed ..... 5. *C. ampla.*
  - Leaves not strongly nerved below; margin entire or nearly so.
    - Sinus closed; leaves retuse at apex ..... 6. *C. pringlei.*
    - Sinus open; leaves rounded at apex ..... 7. *C. odorata.*

Castalia flava (Leitner) Greene, Bull. Torr. Club **15**: 85. 1888.

Nymphaea flava Leitner in Audubon, Birds Am. **4**: 411. 1838.

This species, I believe, has not been reported from Mexico, but its occurrence at Brownsville, Texas, would indicate that it might be expected on the Mexican side of the lower Rio Grande.

Castalia mexicana (Zucc.) Coulter, Contr. Nat. Herb. **2**: 12. 1891, as to synonym, not as to specimens.

Nymphaea mexicana Zucc. Abh. Akad. Muench. **1**: 265. 1832.

This species is very common in the lakes and along the canals in the Valley of Mexico. It has also been reported from Patzcuaro and Jalisco, but I have seen no specimens from these two localities. This Mexican species has often been confused with the *C. flava* of Florida, but it grows at much higher altitudes, has much larger flowers and very different petals, and the leaves are perhaps thicker.

Castalia mexicana has been collected only a few times and I believe has never been in cultivation.

Specimens examined:

Valley of Mexico: Bourgeau, 1865–66 (no. 4); Rose and Hough, May 26, 1899 (no. 4327).

Type locality: In lacu prope urbem Mexico.

Zuccarini described the flowers as white and this has raised the question as to the identity of our yellow-flowered Mexican species. Doctor Conard has examined the leaves of three types at Munich and pronounces them identical with the above. Either the flowers had faded out or else two species were confused in the original description. A white-flowered species grows in the Valley of Mexico along with this yellow-flowered one.

Castalia elegans (Hook.) Greene, Bull. Torr. Club **15**: 85. 1888.

Nymphaea elegans Hook. Bot. Mag. **77**: *pl. 4604*. 1851.

This species seems to be confined to the lowlands of Mexico. On the west coast of Mexico it has been collected at Topolobampo (Palmer); Mazatlan (Brandegee); and near Rosario (Rose), the latter being the southernmost station for the species. It has also been reported along the Rio Grande basin from El Paso to Brownsville. The reference of this species to Guatemala by Conard must be a mistake. According to Dr. E. Palmer the small black tubers are used by the Mexicans on the west coast as a substitute for potatoes.

Castalia gracilis (Zucc.) Rose.

Nymphaea gracilis Zucc. Abh. Akad. Muench. **1**: 362. 1832.

Mr. Conard's reference of *N. gracilis* to *N. ampla* does not seem borne out by a careful study of the original description of *N. gracilis* or by an examination of material which seems to belong to that species.

This species is common in the Valley of Mexico and throughout the Valley of Lema.

Castalia ampla Salisb. Parad. **1**: under *pl. 14*. 1805.

Castalia pringlei Rose, sp. nov.

Rhizomes apparently horizontal, large, 30 to 60 cm. long; leaves orbicular, 25 to 30 cm. in diameter, entire, retuse at apex, not at all peltate, the sinus generally closed or the lobes overlapping except the short acute tips, glabrous throughout, somewhat purplish beneath, the veins not prominent; flowers very large, 12 to 15 cm. in diameter, white; sepals 5, thin, oblong, obtuse, green except the more or less whitish margins; petals pure white, oblong, obtuse; stamens yellow, the outer ones with broad petaloid filaments, the inner with shorter and narrower filaments; connective scarcely longer than the anther.

This species is perhaps near *C. odorata*, but differs in having the flowers and leaves larger, the under surface of the leaves only slightly purplish, the sepals thinner, etc.

POTENTILLA LOZANI ROSE.

Type U. S. National Herbarium no. 461981, collected by Dr. C. G. Pringle in Lake Xochimilco, Valley of Mexico, 1896 (no. 6464); also in the same lake by J. N. Rose and Walter Hough, May 26, 1899 (no. 4330).

Doctor Conard refers this species to *Nymphaea odorata gigantea*, the "types" of which, he states, came from Saint Georges, Delaware. Even if Doctor Conard's reference were correct the name would be untenable, as there is already a *Nymphaea gigantea*.

Castalia odorata (Ait.) Woodville & Wood, Rees' Cyclopedia **6:** no. 1. 1806.

Nymphaea odorata Ait. Hort. Kew. **2:** 227. 1789.

To *C. odorata* I have referred with some doubt material collected by Dr. E. Palmer near Durango in 1896 (no. 244). This station, however, is so far away from the known range of *C. odorata*, that species having not heretofore been reported from anywhere in Mexico, that its inclusion in the Mexican flora can at present be only tentative. The possibility of the species having been introduced into ponds has been suggested, but Dr. Palmer assures me that the plant shows every indication of being a native.

RANUNCULACEAE.

TWO NEW SPECIES OF CLEMATIS.

Clematis rhodocarpa Rose, sp. nov.

Apparently high-climbing vines, somewhat pubescent; upper leaves ternate; leaflets ovate to broadly ovate, 5 to 8 cm. long, 3 to 6 cm. broad, more or less deeply cordate, coarsely toothed, acuminate, slightly pubescent on both surfaces; inflorescence usually much shorter than the leaves; sepals oblong, obtuse; fruit rose-red, only slightly hairy, when mature terminated by long curved hairy tails.

Type U. S. National Herbarium no. 253028 (Pringle's no. 4770).

Apparently common about Oaxaca, where it has been been collected by Pringle, Nelson, and Charles L. Smith.

Clematis rufa Rose, sp. nov.

A vine 3 to 9 meters long, the stem as well as the leaves densely covered with a reddish yellow pubescence; only the upper leaves seen, these ternate; leaflets lanceolate to ovate, 4 to 7 cm. long, acute to shortly acuminate, 3 to 5-nerved, entire; inflorescence compact about the length of the subtending leaf; flowers numerous; pedicels 10 to 15 mm. long; sepals oblong, obtuse; fruit not seen.

Type U. S. National Herbarium no. 234391, collected by E. W. Nelson along road between Tenejapa and Yatalon, Chiapas, altitude 400 to 1,500 meters, October 13, 1895 (no. 3243).

ROSACEAE.

A NEW POTENTILLA.

Potentilla lozani Rose & Painter. PLATE XXVI.

Perennial from a stout rootstock; stems several, erect or ascending, up to 40 cm. long, pubescent with soft scattered hairs throughout, most plentifully so at base; leaves 5-foliolate, strictly palmate, on long silky-pubescent petioles; leaflets of basal leaves with scattered short hairs above and more copious hairs beneath, rounded at apex, crenately toothed, 20 to 40 cm. long, obovate to oblong, cuneate; stipules ovate, entire; flowering stems bearing few small leaves; calyx lobes ovate, acute, hairy; petals dark purple, emarginate, almost rhombic in outline, slightly exceeding the sepals.

Type U. S. National Herbarium no. 461978, collected by C. G. Pringle and F. Lozano in meadows at Cuyamoloya, Hidalgo, August 2, 1904 (no. 1345), and by Rose and Painter between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9234).

EXPLANATION OF PLATE XXVI.—Plant, natural size.

TWO NEW SPECIES OF ALCHEMILLA.

In preparing a synopsis of the Mexican species of Alchemilla I find the two following species undescribed. The genus Alchemilla is a very difficult one, owing to the fact that the flowers are all extremely small and not easy to make out clearly with an ordinary hand lens, whence collectors and botanists have not looked into the floral characters carefully. As a result several Mexican species are passing under the same name.

Alchemilla procumbens Rose, sp. nov. PLATE XXVII.

Perennial with numerous creeping stems, these clothed with appressed pubescence; leaves 3-parted, appearing 5-parted from the lateral lobes being deeply cleft, dark green and glabrous above, paler and appressed-pubescent beneath, the lobes spatulate, rounded at apex, serrate-toothed; stipules united at base, toothed; inflorescence rather open, few-flowered; pedicels slender, 4 to 8 mm. long, silky-pubescent; calyx pubescent, 8-parted, the 4 outer lobes much broader and longer than the others, pubescent within; stamens 2; styles sometimes as many as 8.

Type U. S. National Herbarium no. 452685, collected by J. N. Rose and Jos. H. Painter between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9202).

Apparently common in the high mountains of Mexico from Zacatecas to Oaxaca.

EXPLANATION OF PLATE XXVII.—Fig. *a*, plant; *b*, calyx; *c*, section of calyx showing stamens and styles. Fig. *a*, natural size; figs. *b* and *c*, enlarged.

Alchemilla subalpestris Rose, sp. nov.

Perennial but with herbaceous stems, either single and erect or much branched at base and ascending; stems 10 to 30 cm. long, often glabrous throughout or with scattered hairs on the stem, leaves, and bracts and very rarely on the calyx; basal and lower stem leaves on petioles sometimes 6 to 9 cm. long, somewhat orbicular in outline, more or less lobed and cleft; upper stem leaves perfoliate, the lobes 3 or 4-cleft into linear obtuse teeth, the margins revolute; flowers subsessile; calyx usually glabrous, 8-lobed, the lobes nearly equal; stamens 2; styles 2; fruiting calyx 1 mm. long; seeds ovoid in outline, pointed.

Type U. S. National Herbarium no. 451546 (Rose no. 7928 from Nevada de Toluca).

Apparently common in the high mountains throughout Mexico. I have frequently collected it, first in the Sierra Madre of Tepic, afterwards on Mount Orizaba and Mount Toluca, and several times on the high mountains surrounding the valley of Mexico.

This species is probably *A. hirsuta alpestris* Schlecht. & Cham.; at least it is the plant so understood by Dr. S. Watson and Mr. Hemsley. But I have not seen the type and with only the short original diagnosis I can not be sure of this, while in any case the name *alpestris* is a homonym and must be rejected.

MIMOSACEAE.

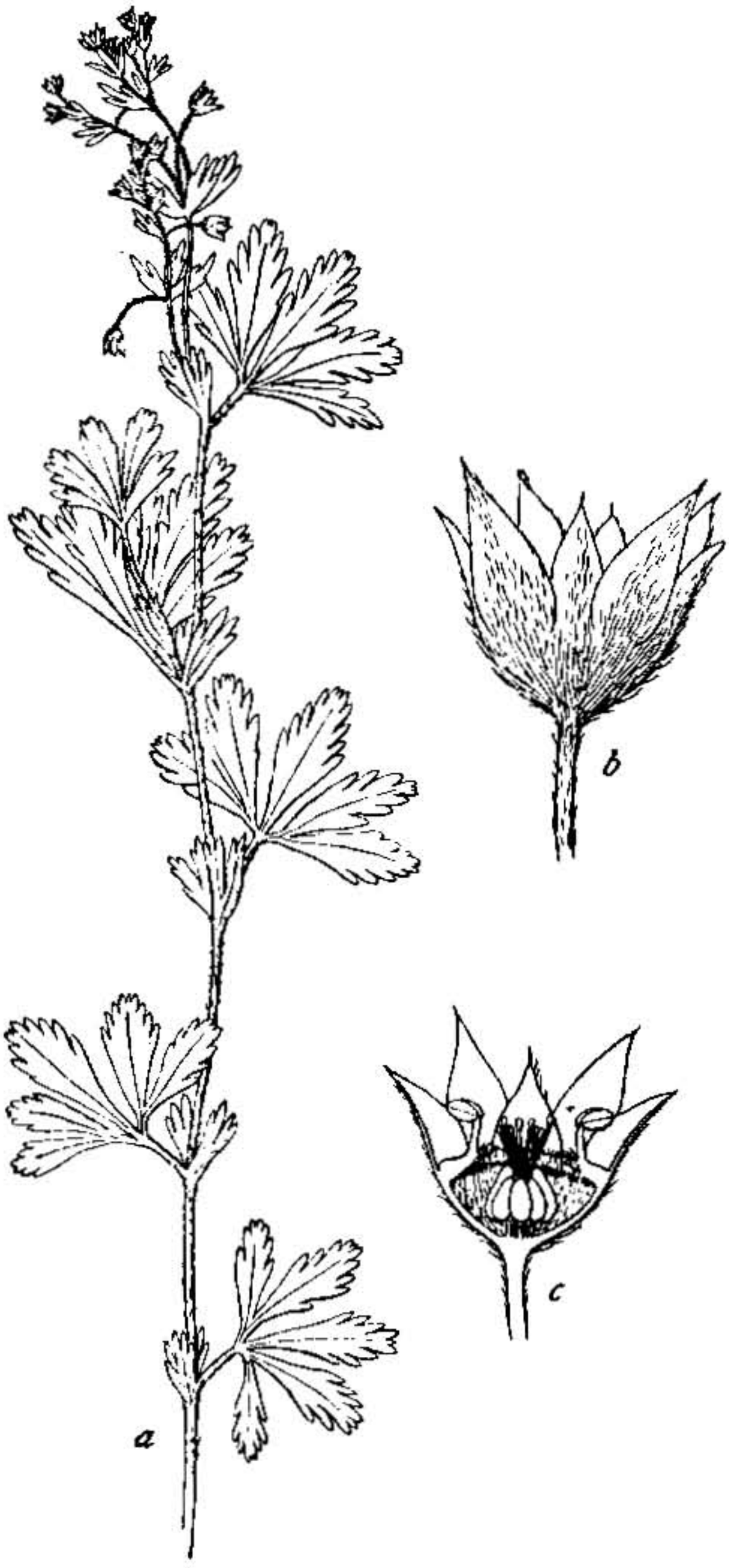
A NEW PITHECOLOBIUM.

Pithecolobium revolutum Rose, sp. nov. PLATE XXVIII.

A low depressed compact bush; first year branches very pubescent, older branches gray and glabrous; stipular spines short, stout, straight or becoming recurved; pinnae one pair; common petiole short, bearing a gland at the top; leaflets 3 to 5 pairs, closely set, linear, obtuse, the margins strongly involute, covered with short stiff hairs as are also the rachis and petioles; flowers not seen; pods curved, flattened, 5 to 7 cm. long, 10 to 12 mm. broad, pubescent; seeds black.

Type U. S. National Herbarium no. 453274, collected by Rose and Painter south of Higuerillas, Querétaro, August 23, 1905 (no. 9784). Here a common desert shrub.

EXPLANATION OF PLATE XXVIII.—Fig. *a*, branch; *b*, leaf; *c*, cross section of leaflet; *d*, fruit. Figs. *a* and *d*, natural size; *b* and *c*, scale 6.



ALCHEMILLA PROCUMBENS ROSE.

PITHECOLOBIUM REVOLUTUM ROSE.

CAESALPINIACEAE.

THREE NEW BAUHINIAS.

Bauhinia confusa Rose, sp. nov.

Shrub about 2 meters high; pubescence on young branches short and dense; leaves 5 to 6 cm. long, either rounded at base or with a broad sinus, the terminal lobes about one-third the length of the blade, slightly spreading, acute, slightly hairy above, pubescent on the veins beneath; petiole shorter than the blade, pubescent; inflorescence a dense raceme becoming 4 to 5 cm. long; bracts long-acuminate; buds elongated, with long free tips; calyx spathaceous; corolla white, 15 mm. long, tapering at base into a slender claw, long-acuminate; perfect stamens one, glabrous; ovary on a long slender stipe, pubescent; pods 10 to 12 cm. long, 10 to 12 mm. broad, flat, glabrate.

Type U. S. National Herbarium no. 461982 (Pringle's no. 3104).

Specimens examined:

San Luis Potosi: Tamasopa Cañon, C. G. Pringle, June 25, 1890 (no. 3104); San Dieguito, Dr. E. Palmer, June, 1904 (no. 126); near Tancanhuitz, E. W. Nelson, May, 1898 (no. 4363).

Dr. Pringle's specimens were distributed as *B. divaricata* L., a species with very different leaves.

The above description of the pods is drawn from Mr. Nelson's specimen.

Bauhinia goldmani Rose, sp. nov.

A small tree 6 to 8 meters high; young branches pubescent; petioles 6 to 10 mm. long; leaves slightly cordate at base, 5 to 7 cm. long, the lobes one-third the length of the blade, ovate, ascending and obtuse, glabrate above, softly pubescent beneath, reticulate; racemes short and compact; peduncles 15 to 18 mm. long; calyx tips free, filiform; petals narrow, glabrous, about 25 mm. long, purple; perfect stamen 1; ovary long-stipitate, pubescent; pods 10 to 12 cm. long, 12 mm. broad, long-apiculate, on a stipe 10 to 18 mm. long.

Type U. S. National Herbarium no. 470546, collected by E. A. Goldman at Tuxtla Gutierrez, Chiapas, March 8, 1904 (no. 742).

Bauhinia (Pauletia) **longiflora** Rose, sp. nov.

A bush 3 meters high, with pubescent branches; leaves orbicular, 25 to 50 mm. long, broadly cordate at base, lobed at apex, glabrous above, pale and pubescent beneath, 7 to 9-nerved; lobes rounded; petioles shorter than the leaves; stipules spinescent, unequal; flowers axillary in twos, or in terminal racemes, slender, 7.5 to 10 cm. long, greenish-yellow; calyx spathaceous; petals 5, filiform; stamens 10, 5 anther-bearing; ovaries villous; pods 15 to 20 cm. long, 12 mm. broad.

Type U. S. National Herbarium no. 305328, collected by Dr. E. Palmer, ravines and mountain sides, Ymala, Sinaloa, August 16 to 25, 1891 (no. 1426); in fruit, October 17 (letter *D*).

FOUR NEW CASSIAS.

Cassia arida Rose, sp. nov.

Perennial, much branched at base, erect, 15 cm. high, pubescent; stipules linear, pubescent, often glandular; petioles slender, 3 to 4 cm. long, bearing a slender gland between the leaflets of the lowest pair; leaflets 3 pairs, oblong, 15 to 22 mm. long, tipped by a brown perhaps deciduous mucro; peduncles 6 to 9 cm. long; pods 3 to 4 cm. long, somewhat incurved, acuminate, hairy.

Type U. S. National Herbarium no. 453267, collected by J. N. Rose and Jos. H. Painter, near Higuerillas, Querétaro, August 23, 1905 (no. 9778). A common plant of the deserts in that locality.

Cassia demissa Rose, sp. nov.

Stems low, often trailing, much branched, pubescent; petioles slender, 15 to 30 mm. long; leaflets generally two pairs, rarely three pairs, oblong, 10 to 15 mm. long,

mucronate, slightly pubescent above, appressed-pubescent beneath; peduncles about as long as the leaves, 2 or 3-flowered; pods very short, 10 to 12 mm. long, mucronate.

Type U. S. National Herbarium no. 280167, collected by C. G. Pringle near Carneros Pass, Coahuila, 1889 (no. 2783); also by Dr. E. Palmer in the Sierra Madre south of Saltillo, 1880 (no. 281).

This species has been confused with *C. vogeliana*, but it has the pods much shorter, the leaflets fewer, etc.

Cassia durangensis Rose, sp. nov.

Stems apparently single and erect, 20 to 40 cm. high, velvety pubescent; leaflets 1 pair, broadly oblong to nearly orbicular, 3 to 5 cm. long, with dense soft pubescence on both sides of a decidedly yellowish cast, especially when young; peduncles longer than the leaves, usually 3 to 5-flowered; pods strict, 3 to 3.5 cm. long; seeds glossy.

Type U. S. National Herbarium no. 304717, collected by Dr. E. Palmer near Durango in 1896 (no. 271); also near the same place by E. W. Nelson in 1898 (no. 4595).

Perhaps nearest *C. bauhinioides* Gray, but of simple and more erect habit with larger and much broader leaflets, more upright pods, etc.

Cassia goldmani Rose, sp. nov.

Shrub or tree 4 to 6 meters high; leaves clustered near the ends of stunted branches or scattered along the vigorous branches; rachis slightly pubescent; leaflets 5 to 12 pairs, rather thick, the venation somewhat indistinct, glabrous or nearly so, the margins never ciliate, pale on both sides, perhaps glaucous, 12 to 16 mm. long, broadest near the tip, oblique at base, rounded at apex, usually with a short mucro; pods 8 to 10 cm. long, somewhat glaucous, 2 cm. or more broad, the margins winged.

Type U. S. National Herbarium no. 565323, collected by Nelson and Goldman about 5 miles southwest of El Potrero, Lower California, October 31, 1905 (no. 7238).

Resembling *C. polyantha* of Central Mexico, but having somewhat different leaflets, less pubescence on branches and leaflets, etc.

HOFFMANSEGGIA: A NEW SPECIES AND A NEW NAME.

Hoffmanseggia arida Rose, sp. nov. PLATE XXIX.

Stems low, diffuse, usually herbaceous but sometimes woody at base, glabrous except some stipitate glands; stipules ovate, acute; petioles slender, bearing a few stipitate glands; pinnae 3 to 6 pairs; leaflets 4 to 8 pairs, oblong, 3 to 4 mm. long, glabrous except a gland in the retuse apex; inflorescence an erect or ascending raceme, 10 to 20 cm. long including the peduncle, at first very dense, bearing many stipitate glands; bracts subtending the flowers ovate, acuminate, ciliate; calyx deeply 5-parted, the lobes somewhat unequal, ciliate; flowers yellow tinged with red; pods narrowly oblong, 3 to 4 cm. long, acute, glabrous except for the numerous stipitate glands.

Common on the deserts of Querétaro.

Type U. S. National Herbarium no. 453109, collected by J. N. Rose and Jos. H. Painter between San Juan del Rio and Cadereyta, August 19, 1905 (no. 9619); also near Higuerillas, August 23, 1903 (no. 9770).

This species is near *H. stricta* Benth., but the inflorescence and pods lack the soft pubescence on the racemes and pods.

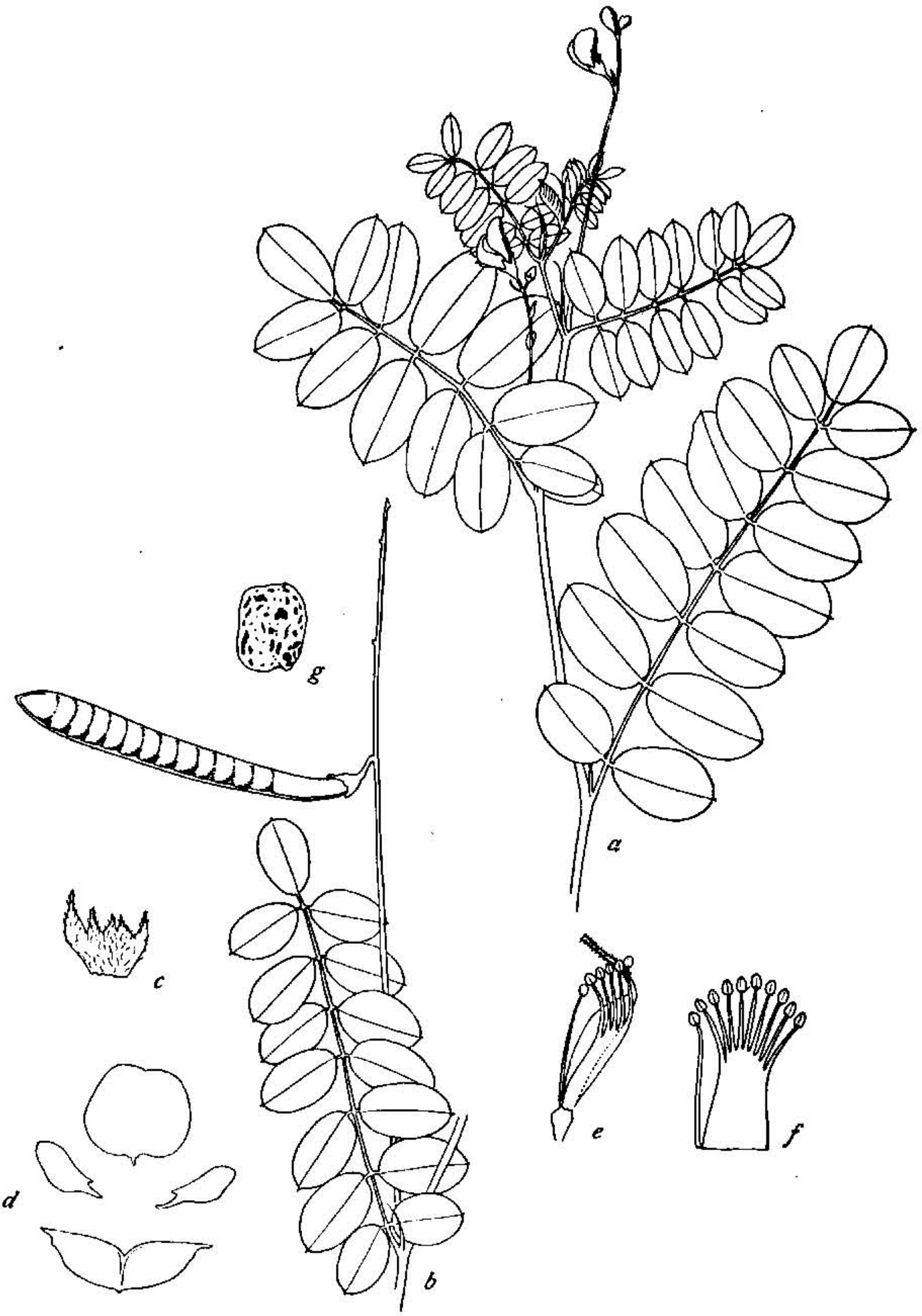
EXPLANATION OF PLATE XXIX.—Fig. *a*, flower; *b*, inflorescence; *c*, flower; *d*, corolla laid open; *e*, calyx laid open; *f*, petal; *g*, stamen; *h*, fruit; *i*, seed. Figs. *a*, *b*, and *h*, natural size; *c*, *d*, *e*, *f*, *g*, and *i*, scale 2.

Hoffmanseggia watsoni (Fisher) Rose.

H. gracilis S. Wats. Proc. Am. Acad. **17**: 347. 1882, not Hook. & Arn. 1833.

Caesalpinia watsoni Fisher, Bot. Gaz. **18**: 122. 1893.

HOFFMANSEGGIA ARIDA ROSE.



BENTHAMANTHA PUMILA ROSE.

VICIACEAE.

THE MEXICAN AND CENTRAL AMERICAN SPECIES OF BENTHAMANTHA.

The name Cracca of Bentham being a homonym, the genus was renamed Brittonamra by Otto Kuntze, but he afterwards took up the older name Benthamantha published by Alefeld in 1862. This latter course has been followed by Britten and Baker who published in the Journal of Botany for January, 1900, a list of all the known species. I wish to make a few slight changes in this list, adding also two new species.

Benthamantha edwardsii (A. Gray) Rose.

Benthamantha grayi Alefeld, Bonplandia **10**: 264. 1862.

Cracca edwardsii A. Gray, Pl. Wright. **2**: 35. 1853.

Gray's variety *glabella* is certainly not a form of *B. edwardsii*, but is much closer to *B. sericea*.

Benthamantha greenmanii (Millspaugh) Rose.

Cracca greenmanii Millsp. Field Columb. Mus. Bot. **1**: 299. *pl. 13*. 1896.

Benthamantha bicolor (Micheli) Rose.

Cracca bicolor Micheli, Bull. Herb. Boiss. **2**: 444. *pl. 11*. 1894.

Native of Guatemala.

Benthamantha micrantha (Micheli) Rose.

Cracca micrantha Micheli, Prim. Fl. Costaric. **1**: 189. 1891.

Native of Guatemala.

Benthamantha fruticosa Rose, sp. nov.

Stem perhaps nearly a meter high, shrubby, the bark of the branches silky-pubescent the first year, white the second year; leaves pinnate; leaflets 3 to 5 pairs, silky-pubescent, oblong, 8 to 12 mm. long, rounded at apex, mucronate; racemes few-flowered, either shorter or longer than the leaves; bracts subtending the flowers filiform, longer than the pedicels; calyx lobes linear, silky-pubescent; petals greenish yellow or the banner more or less purplish; pods linear, pubescent, 4 to 6 mm. long, many-seeded.

Type U. S. National Herbarium no. 453587, collected by Rose and Painter in Tomellín Cañon, Oaxaca, September, 1905 (no. 10087); also at the same locality by Rose and Hough, June 23, 1899 (no. 4665).

Benthamantha glandulosa Rose, sp. nov.

Branches herbaceous, spreading, pubescent; leaflets 5 to 7, oblong to obovate, pubescent on both surfaces, paler beneath, rounded at apex, mucronate; stipules linear; racemes much longer than the leaves, the rachis as well as the calyx bearing silky and glandular hairs; ovary not at all pilose; style hairy.

Type U. S. National Herbarium no. 258413 (Smith's no. 3301).

Collected by Heyde and Lux in Guatemala, Department of Santa Rosa, at Chiapas, September, 1892, and Casillas, May, 1892. Both specimens were named *Cracca mollis* by Micheli and distributed by Capt. John Donnell Smith under the numbers 3745 and 3301 respectively. The species is very different from the South American species, *B. mollis*.

Benthamantha pumila Rose, sp. nov. PLATE XXX.

Low, more or less spreading, herbaceous, purplish, pubescent; leaflets 11 to 15, oblong, glabrous above even from the first, more or less appressed-pubescent beneath; common petiole short; stipules linear, elongated; fruiting raceme nearly twice as

long as the leaves; pods glaucous, 4 to 5 cm. long, 4 to 5 mm. broad; seeds yellow mottled with brown.

Type U. S. National Herbarium no. 453173, collected by Rose and Painter on the road between San Juan del Rio and Cadereyta, Querétaro, August, 1905 (no. 9683).

EXPLANATION OF PLATE XXX.—Fig. *a*, flowering branch; *b*, fruiting branch; *c*, calyx; *d*, petals; *e* and *f*, stamens; *g*, seed. Figs. *a* and *b*, natural size; *c* and *d*, scale 2; *e*, *f*, and *g*, scale 4.

TWO ADDITIONAL SPECIES OF COLOGANIA.

In 1904 I published a synopsis of the species of Cologania and the next year the description of *C. congesta*. In 1903 and 1905 I collected many additional specimens (47 sheets) in Mexico, which have greatly enriched our herbaria and added much to our knowledge of the genus.

Cologania lozani Rose, sp. nov.

Stems twining with spreading or somewhat reflexed reddish hairs; leaflets 3, lanceolate or somewhat rhombic, 4 to 7 cm. long, 1.5 to 2.5 cm. broad, acute, roughish-pubescent on both sides, dark green above, flowers (so far as known) in umbels of four; peduncle 2 to 4 mm. long; pedicels about 10 mm. long, hairy; bractlets at base of calyx 2, filiform; calyx 8 mm. long, somewhat purplish, glabrous except for a few spreading hairs; lower calyx lobe linear, longer than the others; corolla purplish, 25 mm. long; fruit not seen.

Type U. S. National Herbarium no. 461966, collected by C. G. Pringle and his most valuable assistant, Filemón Lozano, in the Sierra Madre near Monterey, Nuevo Leon, September 7, 1904 (no. 13425).

This species is near *C. deamii*, but has very differently shaped leaflets, etc.

Cologania tenuis Rose, sp. nov. PLATE XXXI.

A delicate twining vine with appressed pubescence; leaflets 3, very thin, ovate-oblong, 3.5 to 6 cm. broad, rounded at base, acute, with scanty appressed pubescence on both sides, pale beneath; flowers 4 or 5 in a subsessile umbel or short raceme; pedunceles 5 to 10 mm. long; calyx tube 8 mm. long, purple, densely pilose; upper calyx lobe entire, acute; the lower one linear, much longer than the others; corolla purple, 2.5 cm. long; pods narrow, 4 cm. or more long, appressed-pubescent.

Type U. S. National Herbarium no. 450806 (Rose no. 7223). Collected by Dr. C. G. Pringle in a mountain canyon above Cuernavaca, Morelos, July 21, 1904 (no. 13414), in the same general region (El Parque) by Rose and Painter, September 21, 1903 (no. 7223), and by Dr. C. A. Purpus at Salto de Agua, October, 1905 (no. 1750).

This species should probably be placed near *C. grandiflora*, but it has different foliage, smaller flowers, and different pubescence on the calyx.

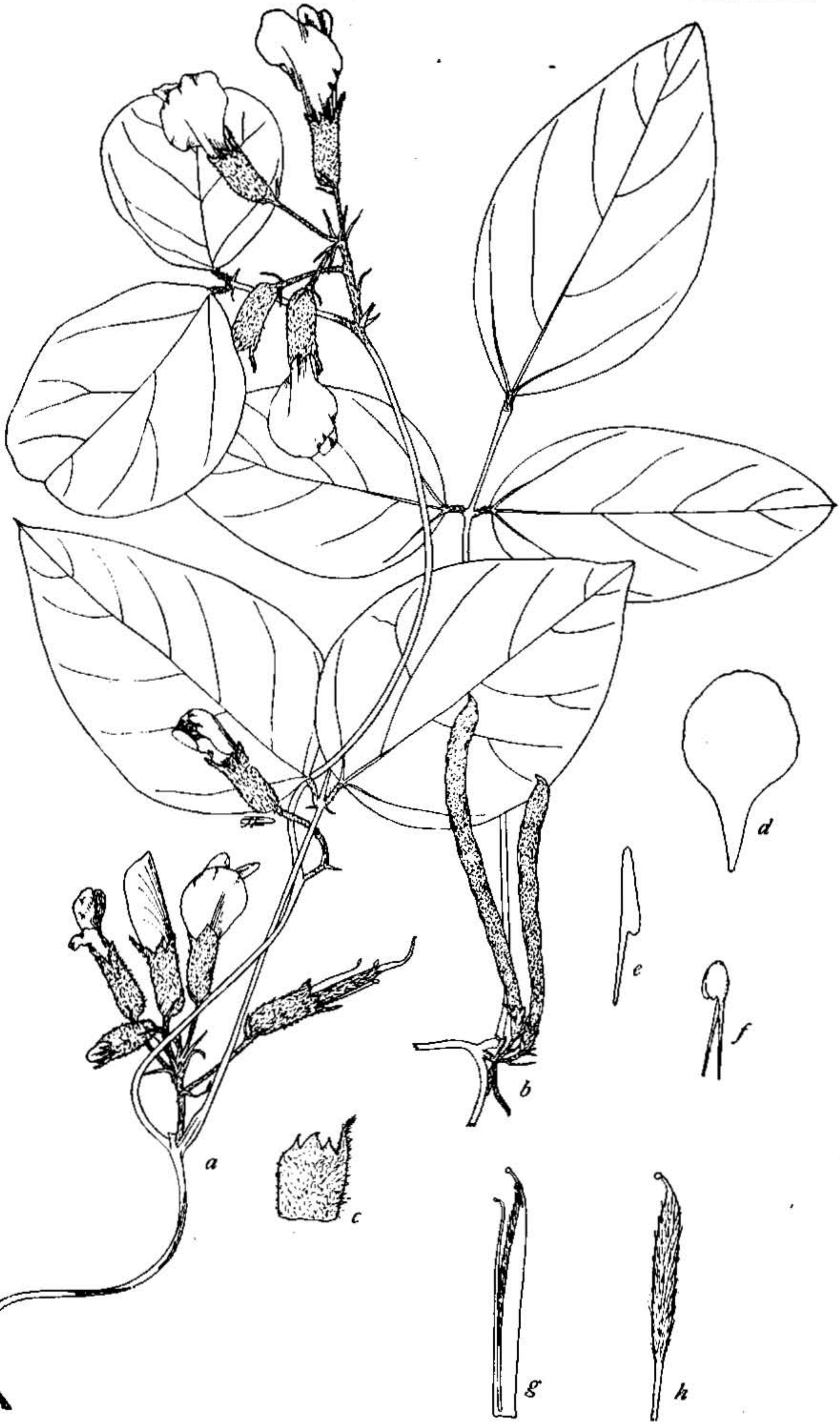
EXPLANATION OF PLATE XXXI.—Fig. *a*, plant. *b*, fruit; *c*, calyx; *d*, banner; *e*, wing; *f*, keel; *g*, stamens; *h*, ovary. Figs. *a* to *f*, natural size; *g* and *h*, scale 2.

THE MEXICAN SPECIES OF DOLICHOLUS.[a]

Mr. Hemsley, in the Biologia Centrali-Americana, published in 1880, credits ten species of Rhynchosia to Mexico proper.

Of these, *R. caribaea* has been excluded by S. Watson, and *R. meni-spermoides* has been referred by Miss Vail to *americana*. The Mexican specimens referred to *R. senna* are true *R. texana* Torr. & Gr. Several of the Mexican species have since been described, and four others

[a] DOLICHOLUS Medic. Vorles. Churpf. Phys. Ges. **2**:354. 1787.
Type species *D. minima* (L.) Medic. loc. cit.
Rhynchosia Lour. Fl. Cochinch. **2**:460. 1790.
Type species *R. volubilis* Lour. loc. cit.



COLOGANIA TENUIS ROSE.

are here added. *R. phaseoloides* has been credited to Mexico by several writers, but is probably to be excluded. I have examined all the Mexican species except *R. hirsuta*, *R. erythrinoides*, and *R. bicolor*.

The name Rhynchosia, first published in 1790, must give place to the older name Dolicholus. The Mexican species with which I am familiar are the following:

Dolicholus americanus (Mill.) Vail.

Dolicholus cuernavacanus Rose.

Rhynchosia cuernavacana Rose, Contr. Nat. Herb. **8**: 313. 1905.

Dolicholus discolor (Mart. & Gal.) Rose.

Rhynchosia discolor Mart. & Gal. Bull. Acad. Brux. **10**[2]: 198. 1843.

Dolicholus hondurensis Rose, sp. nov.

Delicate vine, pubescent; leaflets 3, obovate, 2 to 4 cm. long, acute, sometimes shortly acuminate, rounded or broadly wedge-shaped at the base, with appressed pubescence on both surfaces, strongly nerved beneath; racemes 8 to 12 cm. long, densely flowered; pedicels short (1 mm. long); pods small, 8 to 10 mm. long, apiculate.

Type U. S. National Herbarium no. 246585, collected by C. Thierne near San Pedro Sula, Department of Santa Barbara, Honduras, May, 1888, and distributed by John Donnell Smith (no. 5200).

This species was distributed as *Rhynchosia precatoria* DC., but it is much nearer *R. calycosa* Hemsley, though still quite distinct from that species.

Dolicholus longeracemosus (Mart. & Gal.) Rose.

Rhynchosia longeracemosa Mart. & Gal. Bull. Acad. Brux. **10**[2]: 198. 1843.

Dolicholus macrocarpus (Benth.) Rose.

Rhynchosia macrocarpa Benth. Pl. Hartw. 11. 1839.

Dolicholus minimus (L.) Medic.

Dolicholus nelsoni Rose, sp. nov.

Doubtless a high-climbing vine; leaflets 3, softly pubescent on both surfaces, broadly ovate, 4 to 6 cm. long, in cultivated specimens 10 cm. long, shortly acuminate; raceme 10 to 15 cm. long; pedicels slender, 3 to 4 mm. long, covered with soft white pubescence interspersed with long yellow stiff hairs as are also the calyx and peduncle; calyx teeth 5, all narrow, the two upper united below, the lowermost one much longer than the others.

Type U. S. National Herbarium no. 273452, collected by E. W. Nelson on road between Tlaliscatillo, Guerrero, and Tlapacingo, Oaxaca, altitude 1,260 to 1,560 meters, December 6, 1894 (no. 2052).

Dolicholus nigropunctatus (S. Wats.) Rose.

Rhynchosia nigropunctata S. Wats. Proc. Am. Acad. **22**: 408. 1887.

Dolicholus precatorius (Humb. & Bonp.) Rose.

Rhynchosia precatoria DC. Prod. **2**: 385. 1825.

Glycine precatoria Humb. & Bonp. Willd. Enum. Hort. Berol. 755. 1809.

Dolicholus pringlei Rose.

Rhynchosia pringlei Rose, Contr. Nat. Herb. **3**: 316. 1895.

Dolicholus texanus (Torr. & Gr.) Vail.

Dolicholus vailiae Rose, sp. nov.

Vine climbing to the height of 2 to 3 meters; leaflets 3, softly pubescent on both surfaces, ovate, 3 to 7 cm. long, acuminate; racemes elongated, 20 to 25 cm. long,

much longer than the leaves; pedicels 1 to 1.5 mm. long; calyx bearing yellow stiff hairs; sepals linear, the lower much longer; banner brown, orbicular, pubescent without; pods pubescent, 2 cm. long; mature seeds not seen.

Type U. S. National Herbarium no. 40237, collected by Dr. E. Palmer near Tequila, Jalisco, 1886 (no. 269). Also collected near the same station by C. G. Pringle, September 25, 1893 (no. 4597).

This species was distributed as *Rhynchosia phaseoloides* DC., from which it is very distinct in foliage, pods, distribution, etc. This species is named for Miss Anna Murray Vail, who [a] first called attention to the fact that Doctor Palmer's plant had been wrongly distributed.

RESTORATION OF ODONIA, WITH ITS MEXICAN SPECIES.

The genus Odonia was first described by Bertoloni in 1822 and afterwards taken up by DeCandolle in 1825 and Sprengel in 1827. Bentham and Hooker, however, combined it with Galactia, where it has since remained. It is true that many supposed species of Galactia are congeneric with Odonia and this is probably the one reason why the two genera have been combined. The true type of Galactia is the large scarlet-flowered species from Jamaica long known as *Galactia pendula* but now as *Galactia galactia*. It is very different from all our United States and Mexican species in its corolla. The Mexican species of Odonia will be as follows:

Odonia acapulcensis Rose.

Galactia acapulcensis Rose, Contr. Nat. Herb. **5**: 137. 1897.

Odonia brachystachys (Benth.) Rose.

Galactia brachystachys Benth. Ann. Wien. Mus. **2**: 127. 1837–40.

Odonia multiflora (Robinson) Rose.

Galactia multiflora Robinson, Proc. Am. Acad. **29**: 315. 1894.

Odonia wrightii (A. Gray) Rose.

Galactia wrightii A. Gray, Pl. Wright. **1**: 44. 1852.

Odonia incana Rose, sp. nov. PLATE XXXII.

A bushy plant, the branches apparently never twining, softly pubescent; leaflets 3, lanceolate, 3 to 7 cm. long, acute and bearing a long mucro, dark green and slightly pubescent above, very pale and more pubescent beneath; racemes elongated, much longer than the leaves, sometimes 20 cm. long, many-flowered; flower buds covered with a dense silvery pubescence; petals purplish, the banner nearly orbicular; ovary pubescent, many-ovuled; pods not seen.

Type U. S. National Herbarium no. 302336, collected by J. N. Rose in Tepic between Aguacata and Dolores, August 6, 1897 (no. 3360).

EXPLANATION OF PLATE XXXII.—Fig. *a*, plant; *b*, flower; *c*, calyx; *d*, banner; *e*, wing; *f*, keel; *g*, stamens; *h*, pistil; *i*, ovary. Fig. *a*, natural size; figs. *b* to *h*, scale 2; *i*, scale 4.

Odonia retusa Rose, sp. nov.

A vine, 2 to 4 meters long, hirsute; leaflets 3, oblong, 3 to 6 cm. long, retuse, somewhat pubescent above, softly and densely pubescent beneath; racemes slender, 10 to 20 cm. long, much longer than the leaves; loosely-flowered; pedicels short; calyx tube proper about 2 mm. long; calyx lobes 4, narrow, 4 cm. long; corolla pale blue, about 8 mm. long; banner orbicular, retuse; fruit 6 to 8 cm. long, 5 mm. broad, pubescent, flattened.

[a] See Bull. Torr. Club **26**: 111. 1899.

PLATE XXXIII.

ODONIA VIRIDIFLORA ROSE.

Type U. S. National Herbarium no. 450676, collected by Rose and Painter near Cuernavaca, Morelos, September 1903 (no. 6910); also by C. G. Pringle on lava beds near the same locality, September 14, 1896 (no. 6497); and by E. W. D. Holway near Cuautla, October, 1903 (no. 14).

Dr. Pringle's specimen was distributed as *Galactia tenuiflora*, from which, however, it is quite different.

Odonia viridiflora Rose, sp. nov. PLATE XXXIII.

A stout vine trailing or half-climbing over low bushes; stems covered with soft white pubescence; leaves 12 to 20 cm. long, 3-foliolate; leaflets nearly orbicular, the terminal one generally the largest, 6 to 10 cm. in diameter, rounded or slightly cordate at base, rounded at apex or with a short acumination, pubescent on both surfaces, paler and reticulated beneath; inflorescence much longer than the leaves, 20 to 30 cm. long including the peduncle; flowers 4 or 5 in a cluster; calyx 4-parted, the upper lobe broader, all acute; banner orbicular, the upper part of margin ciliate, green; wings narrow, purplish, spurred; ovary pubescent, many-ovuled; fruit 8 to 9 cm. long.

Type U. S. National Herbarium no. 381798, collected by C. G. Pringle near Iguala, Guerrero, October 24, 1900 (no. 9229, type); also in 1906 (no. 10324); near the same locality by Rose & Painter, August 11, 1905 (no. 9371); and by Dr. Pringle near Jojutla, Morelos, August 30, 1902 (no. 11366).

EXPLANATION OF PLATE XXXIII.—Fig. *a*, plant: *b*, calyx; *c*, banner; *d*, wing; *e*, keel; *f*, stamens *g*, style; *h*, ovary. Fig. *a*, natural size; figs. *b* to *g*, scale 2; *i*, scale 4.

THE SESSILE-FLOWERED SPECIES OF PAROSELA IN MEXICO.

In a former paper in this series[a] the reasons are given for taking up the name Parosela instead of Dalea, and a nearly completed list is supplied of the Mexican species with pedicelled flowers. Below will be found the remaining species, so far as studied, arranged in the order in which I have classified them in my preliminary treatment. Further work in this genus may change this arrangement somewhat. There are perhaps still two dozen or even more species in Dalea not included in these lists, but since these are species not yet studied or whose exact status is not known it seems best not to consider them now. These will be reported upon in another paper after more study and further exploration in Mexico. Besides these, a considerable number of new species already indicated, but not yet all described, will be presented at another time. Names which have been previously published under Parosela are given without synonymy.

Parosela insignis (Hemsley) Rose.
Dalea insignis (Hemsley) Diag. Pl. Nov. **1**: 7. 1878.

Parosela uncifera (Schlecht. & Cham.) Rose.

Parosela scoparia (A. Gray) Heller.

Parosela glaberrima (S. Wats.) Rose.
Dalea glaberrima S. Wats. Proc. Am. Acad. **22**: 470. 1887.

Parosela lasianthera (A. Gray) Heller.

[a] Number 4, Contributions, Volume VIII, page 302. 1905.

Parosela polyphylla (Mart. & Gal.) Rose.
Dalea polyphylla Mart. & Gal. Bull. Acad. Brux. **10**[2]: 44. 1843.

Parosela citriodora (Willd.) Rose.
Dalea citriodora Willd. Sp. Pl. **3**: 1339. 1801.

Parosela mucronata (DC.) Rose.
Dalea mucronata DC. Prod. **2**: 246. 1825.

Parosela pectinata (Kunth) Rose.
Dalea pectinata Kunth, Mimos. 169. *pl. 49.* 1819.

Parosela grayi Vail.

Parosela acutifolia (DC.) Rose.

Parosela mutabilis (Cav.) Rose.

Parosela trochilina (Brandegee) Rose.
Dalea trochilina Brandegee, Proc. Cal. Acad. II. **3**: 220. 1892.

Parosela hemsleyana Rose, sp. nov.

A shrub with numerous long slender purplish branches closely set with glandular knobs, glabrous; leaves small; leaflets 9 to 15, 2 to 3 mm. long, obtuse, glabrous on both sides, very glandular-dotted beneath; peduncles slender; inflorescence a compact head; bracts broad; calyx silky, about 4 mm. long, including the lobes; lobes about two-thirds the length of the tube; corolla purplish.

Type U. S. National Herbarium no. 24436, collected by Parry and Palmer near San Luis Potosí, 1878 (no. 154). This is reported in the Biologia Centrali-Americana as *Dalea ramosissima* Benth., from which I think it is abundantly distinct. *D. ramosissima*, a Lower Californian species, has recently been collected by Mr. Brandegee and accords with Bentham's original description and excellent figure. Bentham's name must give way to the older one of Martius and Galeotti.

Parosela leucostachys (A. Gray) Rose.
Dalea leucostachys A. Gray, Pl. Fendl. 32. 1848.

Parosela lumholtzii (Rob. & Fern.) Vail.

Parosela eysenhardtioides (Hemsley) Rose.
Dalea eysenhardtioides Hemsley, Diag. Pl. Nov. **1**: 6. 1878.

Parosela oaxacana Rose, sp. nov.

Shrubs, 90 to 120 cm. high with many short ascending branches clothed with a short soft pubescence, each terminating in a short dense spike of purplish flowers; leaflets 6 to 15 pairs, narrowly oblong, 6 to 9 mm. long, pubescent on both sides when young but early glabrate, especially above, rounded at each end, apiculate, paler beneath, thickly set with small glands; bracts ovate, acuminate; calyx hairy, the tube not at all angled, slightly cleft on the upper side, the teeth much shorter than the tube, darker-colored, ovate, acute, almost spiny-toothed.

Type U. S. National Herbarium no. 40238, collected by Dr. C. G. Pringle on the Sierra de San Felipe, Oaxaca, altitude 2,250 meters, October 10, 1894 (no. 4961).

Parosela naviculifolia (Hemsley) Rose.
Dalea naviculifolia Hemsley, Diag. Pl. Nov. **1**: 7. 1878.

Parosela tuberculata (Lag.) Rose.
Dalea tuberculata Lag. Nov. Gen. & Sp. 23. 1816.

Parosela pulchella (Moric.) Heller.

Parosela psoralioides (Moric.) Rose.
Dalea psoralioides Moric. Mem. Geneve **6**: 533. 1833.

Parosela canescens (Mart. & Gal.) Rose.
Dalea canescens Mart. & Gal. Bull. Acad. Brux. **10**[2]: 43. 1843.

Parosela polygonoides (A. Gray) Heller.

Parosela lachnostachys (A. Gray) Heller.

Parosela mollis (Benth.) Heller.

Parosela rubescens (S. Wats.) Vail.

Parosela inconspicua (Schauer) Rose.
Dalea inconspicua Schauer, Linnaea **20**: 744. 1847.

Parosela nana (Torr.) Heller.

Parosela wrightii (A. Gray) Vail.

Parosela vetula (Brandegee) Rose.
Dalea vetula Brandegee, Proc. Cal. Acad. II. **2**: 146. 1889.

Parosela cliffordiana (Willd.) Rose.
Dalea cliffordiana Willd. Sp. Pl. **3**: 1336. 1801.

Parosela revoluta (S. Wats.) Rose.
Dalea revoluta S. Wats. Proc. Am. Acad. **22**: 404. 1887.

Parosela pringlei (A. Gray) Heller.

Parosela laevigata (G. Don) Rose.
Dalea laevigata G. Don, Hist. Dichl. Pl. **2**: 224. 1832.

Parosela cyanea (Greene) Rose.
Dalea cyanea Greene, Pittonia **1**: 153. 1888.

Parosela brachystachys (A. Gray) Heller.

Parosela filiformis (A. Gray) Heller.

Parosela nigra (Mart. & Gal.) Rose.
Dalea nigra Mart. & Gal. Bull. Acad. Brux. **10**[2]: 43. 1843.

Parosela lemmoni (Parry) Heller.

Parosela erythrorhiza (Greenman) Rose.
Dalea erythrorhiza Greenman, Zoe **5**: 185. 1904.

Parosela luisiana (S. Wats.) Rose.
Dalea luisiana S. Wats. Proc. Am. Acad. **17**: 341. 1882.

Parosela triphylla (Pav.) Rose.

Parosela aurea (Nutt.) Britton.

Parosela pogonanthera (A. Gray) Vail.

Parosela sericea (Lag.) Rose.
Dalea sericea Lag. Nov. Gen. & Sp. **23**: 1816.

Parosela gracilis (Kunth) Rose.
Dalea gracilis Kunth, Mimos. 166. *pl. 48.* 1819.

Parosela painteri Rose, sp. nov.

Stems bushy, forming large clumps 30 to 50 cm. high, woody below; branches clothed with short appressed pubescence, dark-colored, with few or no glands; leaflets 5 to 7 pairs, oblong, 5 mm. long, retuse, glabrous and glandless above, glandular and slightly pubescent beneath; spikes at first globular, becoming in fruit 3 cm. long; bracts ovate, acute, a little hairy, deciduous; calyx tube broad, glabrous and shining without and bearing a row of black glands between the ribs; calyx teeth linear,

somewhat unequal, about the length of the tube; petals yellow or the keel and wings somewhat reddish; fruit pubescent.

Type U. S. National Herbarium no. 453017, collected by J. N. Rose and Jos. H. Painter on a stony hillside near San Juan del Rio, Querétaro, August 18, 1905 (no. 9526). Resembling *P. plumosa*, but leaflets smaller and glabrous above, stems darker-colored, spikes shorter, etc.

Parosela pauciflora Rose, sp. nov.

Woody at base, much branched, about 60 cm. high, the young branches finely pubescent; leaflets 7 to 9 pairs, sometimes reduced to 3 pairs, small, 4 to 7 mm. long, oblong, acute or mucronate, hairy on both sides, glandular beneath; bracts lanceolate, acuminate, rather conspicuous, hairy; calyx tube short, hairy, the teeth ovate at base tapering into long subulate tips longer than the the calyx tube; petals small, white; keel and wings borne on the stamen tube a little below the top; ovary hairy.

Type U. S. National Herbarium no. 316752, collected by C. G. Pringle in shaded places on hills near Guadalajara, Jalisco, December 12, 1888 (no. 1825).

Parosela watsoni Rose, sp. nov.

Perennial, with at least upper branches herbaceous, very villous; leaflets 9 to 11 pairs, hairy on both sides, linear-oblong, obtuse, 3 to 5 mm. long; spikes narrow, very densely flowered; bracts linear to filiform, hairy; calyx hairy, the teeth longer than the tube; petals small, white.

Type U. S. National Herbarium no. 24472, collected by Dr. E. Palmer at Frayles, Chihuahua, 1885 (no. 252), and briefly described but not named by Dr. S. Watson.[a]

Parosela albiflora (A. Gray) Vail.

Parosela eriophylla (S. Wats.) Rose.

Dalea eriophylla S. Wats. Proc. Am. Acad. **17**: 340. 1882.

Parosela seemani (S. Wats.) Rose.

Dalea seemani S. Wats. Proc. Am. Acad. **22**: 470. 1887.

Parosela greggii (A. Gray) Heller.

Parosela wislizeni (A. Gray) Vail.

Parosela argyrostachys (Hook. & Arn.) Rose.

Dalea argyrostachys Hook. & Arn. Bot. Beech. Voy. 285. 1841.

Parosela plumosa (S. Wats.) Rose.

Dalea plumosa S. Wats. Proc. Am. Acad. **21**: 448. 1886.

Parosela leucostoma (Schlecht.) Rose.

Dalea leucostoma Schlecht. Linnaea **12**: 294. 1838.

Parosela domingensis (DC.) Heller.

Parosela formosa (Torr.) Vail.

Parosela purpusi (Brandegee) Rose.

Dalea purpusi Brandegee, Erythea **9**: 2. 1899.

Parosela berlandieri (A. Gray) Rose.

Dalea berlandieri A. Gray, Proc. Am. Acad. **5**: 177. 1861.

Parosela microphylla (H. B. K.) Rose.

Dalea microphylla H. B. K. Nov. Gen. & Sp. **6**: 482. 1823.

Parosela brandegei Rose.

Dalea ramosissima Benth. Pl. Hartw. 1844, not *D. ramosissima* Mart. & Gal. 1843

Named for Mr. Brandegee, who has called attention to the fact that two species

[a] Proc. Am. Acad. **21**: 424. 1886.

SPHINCTOSPERMUM CONSTRICTUM (S. WATS.) ROSE.

are passing under the name of *D. ramosissima* and who has recently re-collected and distributed Bentham's species.

Parosela lasiostachya (Benth.) Rose.

Dalea lasiostachya Benth. Pl. Hartw. 11. 1839.

Parosela emoryi (A. Gray) Heller.

SPHINCTOSPERMUM, A NEW GENUS.

Sphinctospermum Rose, gen. nov.

Calyx teeth 5, acuminate, the 2 upper more united than the others; petals nearly equal in length; banner nearly orbicular; wings oblong; stamens 10, one free to the base, style slender, hairy near the top; ovaries sessile, many-ovuled; pods linear, 2-valved, septate between the seeds, 6 to 10-seeded; seeds shortly oblong, 4-angled, constricted in the middle suggesting miniature vertebrae, dull-colored and minutely roughened.

Annuals with simple linear leaves and single (rarely paired) axillary flowers. In its flowers and pods suggesting some species of Cracca (Tephrosia), such as *C. tenella*. Its annual habit, simple leaves, and axillary flowers, and especially its most remarkable seeds, exclude it positively from Cracca.

Sphinctospermum constrictum (S. Wats.) Rose. PLATE XXXIV.

Tephrosia constricta S. Wats. Proc. Am. Acad. **24**: 46. 1889.

Reported from western Sonora and Lower California.

EXPLANATION OF PLATE XXXIV.—Fig. *a*, plant; *b* and *c*, flowers; *d*, banner; *e*, wing; *f*, keel; *g*, stamens; *h*, seed. Fig. *a*, natural size; *b* to *g*, scale 3; *h*, scale 4.

KRAMERIACEAE.

THE NORTH AMERICAN SPECIES OF KRAMERIA.

Our knowledge of the species of Krameria has been very meagre, especially that of the Mexican ones. Recently collectors in Mexico have not only found new species, but rediscovered some of the very rare ones, such as *K. cuspidata*, *K. revoluta*, and *K. pareifolia*. Of the fifteen species which we now recognize from North America, all except *K. lanceolata* are represented in our Mexican collection. The following are the North American species:

Krameria bicolor S. Wats. Proc. Am. Acad. **21**: 417. 1896.

Krameria cuspidata Presl, Rel. Haenk. **2**: 103. 1835–36.

Krameria cytisoides Cav. Ic. **4**: 61. *pl. 390*. 1797.

Krameria diffusa Rose & Painter, sp. nov.

Perennial with long diffuse herbaceous branches and scant pubescence; leaves linear, 1 to 2 cm. long, acute, becoming glabrate; inflorescence racemose; peduncles 10 to 15 mm. long, bibracteate above the middle; flowers large, purple; fruit small, globular, with a few short stout spines, these either naked or with very short retrorse hairs.

Type U. S. National Herbarium no. 452798 (Rose no. 9311), apparently common on the west coast of Mexico, extending from Sinaloa to Guerrero.

Specimens examined:

Sinaloa: Ymala, Dr. E. Palmer, September 25 to October 8, 1891 (no. 1671).

Morelos: Near Puenta de Ixtla, J. N. Rose and Robert Hay, July 4, 1901 (no. 5326).

Guerrero: Near Iguala, J. N. Rose and Jos. H. Painter, August 10 and 12, 1905 (no. 9311).

Krameria glandulosa Rose & Painter.

Low compact shrubs, the branches often forming long weak spines; the bark on old branches dark or sometimes bleaching out; young branches clothed with long cinereous appressed hairs; leaves linear, with cinereous pubescence, tipped by a long deciduous mucro; peduncles and calyx and often the branches and leaves covered with black glandular hairs; sepals and petals purplish; fruit flattened, ovate in outline, covered with long purple barbed hairs.

Type U. S. National Herbarium no. 346914, collected by J. N. Rose near El Paso, Texas, May 8, 1899 (no. 4904). This species is distributed from western Texas to California, extending north into Utah and south into northern Mexico. It has long been known as *K. parvifolia* Benth., but that species is confined to southern Lower California, has much greener foliage, less mucronate leaves, red branches, reddish yellow flowers, etc.

Krameria grayi Rose & Painter.

Krameria canescens A. Gray, Pl. Wright. **1**: 42. 1852, not Willd., 1825.

Krameria lanceolata Torr. Ann. Lyc. N. Y. **2**: 168. 1828.

Krameria palmeri Rose, Contr. Nat. Herb. **1**: 304. *pl. 27*. 1895.

Krameria parvifolia Bentham, Bot. Voy. Sulph. 6. *pl. 1*. 1844.

Krameria paucifolia Rose.

Krameria canescens paucifolia Rose, Contr. Nat. Herb. **1**: 661. 1890.

Krameria pauciflora DC. Prod. **1**: 341. 1824.

Krameria ramosissima (A. Gray) S. Wats. Proc. Am. Acad. **17**: 326. 1882.

Krameria parvifolia ramosissima A. Gray, Pl. Wright. **1**: 41. 1852.

Krameria revoluta O. Berg, Bot. Zeit. **14**: 751. 1856.

Krameria secundiflora DC. Prod. **1**: 341. 1824.

Krameria interior Rose & Painter, sp. nov.

Shrub, much branched, with black shreddy bark; young branches with cinereous, appressed pubescence; leaves linear, 12 to 20 mm. long, mucronate-tipped; flowers not seen; fruiting peduncles 15 mm. or less long, bibracteate; fruit globular, the body 8 mm. long; spines with retrorse hairs along the upper half.

Type U. S. National Herbarium no. 301352, collected by J. N. Rose near San Juan Capistrano, Zacatecas, August 19, 1897 (no. 2441).

GERANIACEAE.

THREE NEW SPECIES OF GERANIUM.

Geranium bellum Rose, sp. nov.

Resembling *G. schiedeanum*, but the flowers always white, the sepals much broader, the outer ones 4 or 5-nerved, and the leaf segments much more obtuse.

Very common in the high mountains of Central Mexico, frequently collected by the writer and recently by Dr. C. G. Pringle.

Type U. S. National Herbarium no. 395386, collected by J. N. Rose and Robert Hay on Sierra de Pachuca, Hidalgo, July 21 and 22, 1901 (no. 5618).

Geranium lozani Rose, sp. nov.

Perennial; stems several, arising from the base or near it, 20 to 30 cm. high, either nearly glabrous or with a rather scanty pubescence consisting of rather short reflexed hairs; basal leaves long-petioled; blades orbicular in outline, 3 to 5-lobed, the lobes usually 3-cleft and strongly toothed, coriaceous in texture, scarcely if at all paler beneath, a little pubescent on both surfaces; peduncle extending beyond the leaves, 2-flowered; pedicels elongated, 5 to 7 cm. long; sepals broadly lanceolate, 3-nerved,

inner ones ciliate; petals white, veined with red, 14 mm. long; fruit narrow, 3 cm. long, pubescent.

U. S. National Herbarium no. 461465, collected by C. G. Pringle and F. Lozano near Buena Vista Station, Hidalgo, altitude 2,550 meters, 1904 (no. 8994).

Geranium pringlei Rose, sp. nov.

Perennial; stems erect, about 30 cm. high, very pilose, especially at base, the upper part of the stem and inflorescence with numerous purple stipitate glands; basal leaves long-petioled, white-pilose, especially below the blade, deeply lobed, each lobe cleft and sharply toothed; stem leaves somewhat similar but shorter-petioled; peduncles usually 2-flowered; pedicels short, 1 to 2 cm. long, densely glandular-pubescent; sepals lanceolate, faintly 3-nerved, the inner ones ciliate; petals blue, large; fruit linear, pubescent, with stipitate glands.

Type U. S. National Herbarium no. 461451, collected by C. G. Pringle in meadows, Cuyamaloya Station, in eastern Hidalgo, altitude 2,490 meters, August 2, 1904 (no. 8978).

OXALIDACEAE.

INTRODUCTORY NOTE.

The breaking up of Oxalis by Dr. J. K. Small[a] into several genera has been variously received by botanists. My own view of the subject is that his ground has been well taken and his treatment is followed in this paper. Oxalis proper is not found in Mexico, but all the segregates made by Doctor Small are represented, and in addition to these Biophytum and Pseudoxalis, the latter here described for the first time.

For more than ten years I have been studying the Mexican material of this family, in which I have found many new species, some of them here first described.

SOME MEXICAN SPECIES OF IONOXALIS.

In Mexico Ionoxalis might well be called the harbinger of spring, for it is one of the first plants to respond to the rains which break up the long dry season and is the very first to give color to the landscape. One may travel for many miles north of the City of Mexico and see the high valleys and plains blue, pink, or white with Ionoxalis while most other vegetation has hardly started. Of the 35 named species of Oxalis credited to Mexico and Central America by Hemsley 15 belong to this genus, but the actual number is greatly in excess of this figure.

The genus has a wide range both horizontal and altitudinal. It is scattered over the entire length and breadth of the country, reaching from near the sea level to the tops of many of the high mountains; it grows on the open plain, in woods, in cultivated fields as a weed, on nearly barren rocks, on dry exposed hillsides, and in sandy nooks under the influence of the spray of a waterfall. Some species grow on nearly perpendicular cliffs, others on the level so thickly set together as to form a sod, while others are scattered or solitary.

The following comprise most of the Mexican species.

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[a] Flora of the Southeastern United States, p. 664. 1903.

Ionoxalis alpina Rose, sp. nov.

Bulbs solitary; leaves radical, several; petioles slender, glabrous; leaflets 3, broadly cuneate, strongly notched, glabrous, pale beneath; peduncle long, longer than the leaves, glabrous, 2 or 3-flowered; involucral bracts small, slightly pubescent; pedicels long (2.5 to 5 cm.) and slender, somewhat unequal; sepals lanceolate, 4 mm. long, obtuse or acutish, glabrous with scarious margins; petals white, large, 20 mm. long; 5 of the stamens a little longer than the others; filaments glabrous below, slightly hairy at the top.

Type U. S. National Herbarium no. 304004, collected by Dr. C. G. Pringle on Sierra de las Crucis, Mexico, altitude 3,000 meters, August 13, 1896 (no. 6439).

Ionoxalis amplifolia (Trelease) Rose.

Oxalis divergens amplifolia Trelease in A. Gray, Syn. Fl. **1**[1]: 368. 1897.

This form seems to deserve specific rank. It is characterized by broad obcordate leaflets, the lobes short and rounded. Doctor Trelease determined it as a form of *O. divergens*, a species of South Mexico having white flowers.

I have referred here tentatively a specimen collected by Palmer near Durango, 1896 (no. 297).

Ionoxalis bipartita Rose, sp. nov.

Bulbs globose, small, the scales many-nerved, ciliate; buds and young parts hairy; leaflets 3, a little hairy, deeply 2-lobed; lobes widely spreading, linear and elongated, obtuse; sepals 3 mm. long, obtuse, 2-glandular at tip; petals pale blue (?), small, 6 mm. long; stamens 10, united below, of two lengths, the longer ones hairy; ovary sessile or nearly so; styles long and short in different flowers; fruit oblong-linear, 5 mm. long.

Type U. S. National Herbarium no. 461290, collected by C. G. Pringle near Cuernavaca, Morelos, July, 1898 (no. 6896); also collected in the same locality by J. N. Rose, May, 1899 (no. 4365).

This species resembles *I. stipitata* of the Valley of Mexico, but has different leaflets, flowers, etc.

Ionoxalis compacta Rose, sp. nov.

Plants glabrous, growing in clusters on rocks in dark canyons; bulbs small, the coats 1-nerved, small; leaflets 3, small, wedge-shaped, retuse at apex; peduncles longer than the leaves, 2 to 4-flowered; pedicels slender, about 2 cm. long; sepals lanceolate, obtuse, 2.5 mm. long; petals pale lilac, 10 mm. long; 5 longer stamens slightly hairy.

Type U. S. National Herbarium no. 302425, collected by J. N. Rose in a canyon near top of the Sierra Madre just below the little village of Santa Teresa, Tepic, altitude about 2,400 meters, August 12, 1897 (no. 3448).

Perhaps nearest *I. gregaria*, but with different leaflets, fewer and larger flowers, etc.

Ionoxalis confusa Rose, sp. nov. PLATE XXXV, FIGURE 1.

Resembling *I. furcata;* leaflets glaucous and much deeper-cleft (usually to below the middle); sepals glabrous; flowers more numerous and smaller; capsule linear-oblong, 7 mm. long; stamens of two lengths, the short ones glabrous, the long hairy.

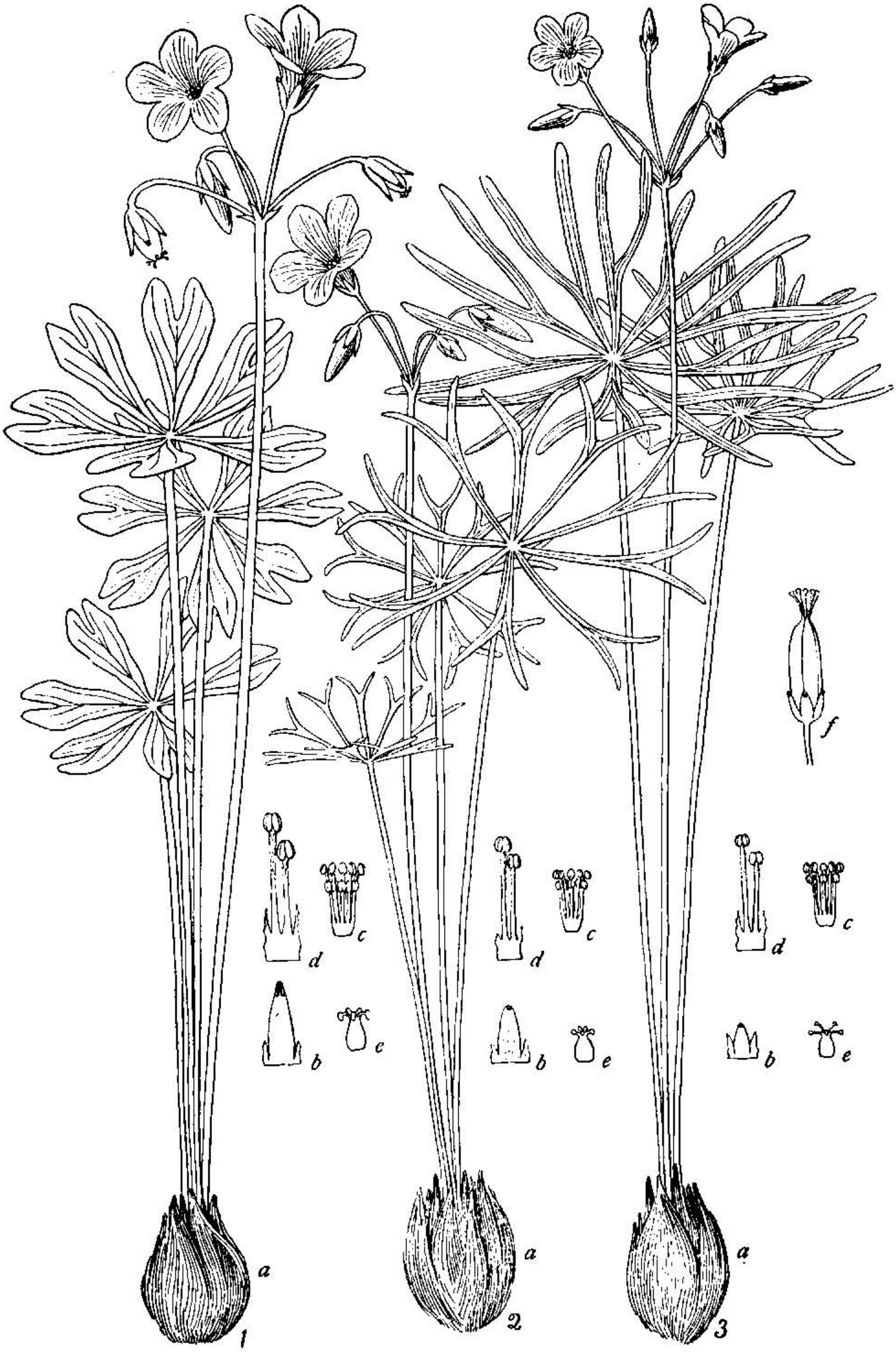
Type U. S. National Herbarium no. 305682, collected by Dr. C. G. Pringle on wet banks near Guadalajara, Jalisco, June, 1889 (no. 2789).

This species was distributed as *O. decaphylla* H. B. K., from which it proves to be very distinct.

EXPLANATION OF PLATE XXXV, FIG. 1.—Fig. *a*, plant; *b*, sepal; *c*, *d*, stamens; *e*, ovary. Fig. *a*, natural size; *b* to *e*, scale 2.

Ionoxalis conzattiana Rose, sp. nov.

Bulbs solitary, rather large, surrounded by a bundle of fibers; bulb-scales orbicular, with many nerves (15 or more); leaflets 4 to 6, orbicular to shortly oblong, rounded



IONOXALIS CONFUSA ROSE, I. FURCATA ROSE, AND I. JALISCANA ROSE.

at apex, 2 to 3 cm. long, somewhat hairy even in age, glaucous beneath, the margin and tip with scattered brown glands; peduncles often much longer than the leaves and appearing with them, 20 to 30 cm. long; flowers numerous, on slender pedicels; sepals lanceolate, 5 to 8 mm. long, obtusish, thin, purplish-margined, bearing a brown gland at tip; flowers deep purple; petals 12 to 20 mm. long; filaments a little pubescent; styles hairy.

Type U. S. National Herbarium no. 346561, collected by J. N. Rose and Walter Hough on Mount Alban near city of Oaxaca, June 16 to 21, 1899 (no. 4586).

I also refer here, although it has much larger flowers, a specimen collected by E. W. Nelson on the west slope of Mount Zempoaltepec, Oaxaca, July, 1894 (no. 550).

This is one of the largest-flowered species of the genus which I have seen in Mexico and would doubtless be worthy of introduction into cultivation. I have named it for my friend Professor Conzatti, of Oaxaca, who conducted me to the region in which the plant was found and to whom I am under many obligations for courtesies shown me while in his city.

Ionoxalis cuernavacana Rose, sp. nov.

Bulbs large, deep-seated, clothed without with stout fibers; bulb scales acute, broad, with numerous strong nerves; leaflets 4, broadly cuneate, rounded or broadly notched at apex, in age glabrate, pale beneath, 3 to 6 cm. long, 2 to 4 cm. broad; peduncles stout, appearing before the leaves; flowers mostly 6 to 12, sometimes reduced to one; sepals oblong, obtuse, gland-tipped; flowers reddish or purplish; petals 12 to 15 mm. long; stamens of two lengths, the longer toothed on one side, glandular-pubescent, the others hairy.

Type U. S. National Herbarium no. 346366, collected by J. N. Rose in deep woods in the canyon above Cuernavaca, Morelos, May, 1899 (no. 4401); also near the same locality by C. G. Pringle, June, 1896 (no. 6344). Bulbs were sent home by the writer which flowered in the Botanical Garden in September, 1899.

Ionoxalis decaphylla (H. B. K.) Rose.

Oxalis decaphylla H. B. K. Nov. Gen. & Sp. **5**: 538. *pl. 468.* 1821.

Humboldt's illustration of this species shows a plant with 10 leaflets somewhat cuneate at base and strongly notched at apex. The material which has been referred to this species comes from widely separated stations and shows a considerable variation in the size and shape of the leaflets. A good part of it seems to belong elsewhere. Material which I collected in the Valley of Mexico is very nearly typical, and, if really so, it will exclude all the northern material.

Ionoxalis drummondii (A. Gray) Rose.

Oxalis drummondii A. Gray, Pl. Wright. **2**: 251. 1853.

I. drummondii has been reported in Sonora by Torrey, but no specimens are cited by Doctor Trelease. I have seen only the Mexican Survey specimens cited by Torrey.

The species is characterized by the broadly spreading lobes of the leaflets and by the blue flowers. The scales of the bulbs are thin and 3-nerved, the stamens glabrous.

Ionoxalis furcata Rose, sp. nov. PLATE XXXV, FIGURE 2.

Bulbs solitary, small, globular, covered with the fibers of the old scales; scales ovate, acute, many (more than 10)- nerved; petioles shorter than the peduncles, glabrous; leaflets 7 to 9, linear in outline, glabrous, each two-cleft; lobes about one-fourth the length of the leaflets, diverging, linear, obtuse; peduncles 3 to 7-flowered; involucral bract small, ovate, acute; pedicels slender, 10 to 12 mm. long; sepals shortly oblong, 3 mm. long, obtuse or rounded at apex, 3-nerved, pubescent; corolla purplish, 10 to 12 mm. long; stamens all hairy; styles (in specimens seen) of one length and very short; capsule not seen.

Type U. S. National Herbarium no. 396715, collected by C. G. Pringle on wet ledges near Guadalajara July 10, 1902 (no. 8659). Here perhaps belongs J. N. Rose's no. 6402 collected in 1901 near the same locality.

EXPLANATION OF PLATE XXXV, FIG. 2.—Fig. *a*, plant; *b*, sepals; *c* and *d*, stamens; *e*, ovary. Fig. *a*, natural size; *b* to *e*, scale 2.

Ionoxalis galeottii (Turcz.) Rose.

Oxalis galeottii Turcz. Bull. Soc. Nat. Mosc. **31**[1]: 433. 1858.

Type locality; "Oaxaca, altitude 7,000 ped.;" type collected by Galeotti (no. 3995).

Specimens examined:

Oaxaca: Sierra de San Felipe, altitude 2,700 and 3,000 meters, C. G. Pringle, May, 1894 (no. 4660).

I have seen no authentic specimens of this species, but Doctor Pringle's plant comes from the same general locality and answers the description fairly well.

Ionoxalis gonzalesii Rose, sp. nov.

Bulbs solitary, globular, covered with many fine fibers; scales with numerous nerves; leaflets about 9, broadly linear, 6 to 7 cm. long, acute, glabrate in age; peduncles 20 to 30 cm. long; umbels many-flowered; pedicels slender, 1 to 2 cm. long; sepals ovate, obtuse, glabrous; petals 1 cm. long, deep purple; styles long, hairy.

Type U. S. National Herbarium no. 371938, collected by C. Conzatti and V. Gonzales on San Felipe, Oaxaca, June 10, 1897 (no. 333).

This species is perhaps nearest *O. lasiandra*, but it has differently shaped leaflets, glabrous sepals, etc.

Ionoxalis grayi Rose, sp. nov.

Bulbs surrounded by a thick coat of old fibers; scales thickish, many-nerved; leaflets 5 to 8, simply notched, or deeply parted; peduncles longer than the leaves; flowers purplish; filaments hairy.

This is the *Oxalis decaphylla* of Gray and of all American writers. It differs greatly from the material from the Valley of Mexico in the texture of the bulb scales and in having numerous veins instead of three. I have referred tentatively to this species all the material heretofore passing under *O. decaphylla* except that from the Valley of Mexico, although there may be other forms which should be taken out. I have taken for the type U. S. National Herbarium no. 14731, the first specimen (Wright's no. 909) wrongly referred to *O. decaphylla*.

Ionoxalis gregaria Rose, sp. nov.

Plants growing in thin sheets on the sides and in crevices of dark overhanging cliffs; bulbs numerous, small, in flowering specimens almost entirely absorbed, apparently arising from slender rhizomes; leaflets 3, sharply cuneate at base, broad above, retuse, the lobes rounded, 6 to 30 mm. long, pale or sometimes violet-colored, glabrous or nearly so; peduncles much longer than the leaves, many-flowered; pedicels very slender, elongated, sometimes 25 mm. long; flowers small; calyx lobes shortly oblong, obtuse, 1 to 2 mm. long, glandular at tip; petals pale lilac, 6 to 8 mm. long; stamens hairy.

Type U. S. National Herbarium no. 40240, collected by C. G. Pringle in the barranca below Cuernavaca, Morelos, 1896 (no. 6343); also collected at the same locality by J. N. Rose, May, 1899 (no. 4437).

It differs from most of the other described species in its clustered bulbs. Apparently of the type of *O. martiana*, but certainly different.

Ionoxalis hernandesii (DC.) Rose.

Oxalis hernandesii DC. Prod. **1**: 695. 1824.

This species has a wide distribution and shows considerable variation in the size and shape of the leaflets. The leaflets, however, are never retuse.

In the U. S. National Herbarium we have some 16 sheets of this species.

Ionoxalis jacquiniana (H. B. K.) Rose.

Oxalis jacquiniana H. B. K. Nov. Gen. & Sp. **5**: 235. 1821.

Type locality: "Prope Real del Monte."

Ionoxalis jaliscana Rose, sp. nov. PLATE XXXV, FIGURE 3.

Bulbs solitary, globular; scales closely many-nerved; petioles scarcely half as long as the peduncles, glabrous; leaflets 5 to 8, broadly cuneate, 6 to 12 mm. broad above, deeply 2-notched or slightly lobed, the lobes broad and obtuse; flowers 5 to 8; pedicels slender, 10 to 12 mm. long; sepals 5 mm. long, oblong, acute, glabrous; corolla purplish, 15 mm. long; styles (in specimens seen) all very short and glabrous; capsule oblong, about twice as long as the sepals, glabrous.

Type U. S. National Herbarium no. 396712, collected by C. G. Pringle near Guadalajara, Jalisco, July 12, 1902 (no. 8646), also collected near the same locality by Dr. E. Palmer in 1896 (no. 68). The latter plant was referred by Dr. S. Watson to *Oxalis decaphylla*, from which it is readily distinguished by its bulb scales, leaflets, etc.

EXPLANATION OF PLATE XXXV, FIG. 3.—Fig. *a*, plant; *b*, sepal; *c* and *d*, stamens; *e*, ovary; *f* fruit. Fig. *a*, natural size; *b* to *f*, scale 2.

Ionoxalis latifolia (H. B. K.) Rose.

Oxalis latifolia H. B. K. Nov. Gen. & Sp. **5**: 237. *pl. 467*. 1823.

This species as heretofore understood has had a wide range extending, according to some authorities, from the southern United States through Mexico and Central America to South America, and from Campeche on the coast to high upon Mount Orizaba.

The only specimens I have seen which at all seem to answer Humboldt's illustration are those collected by Doctor Gaumer (no. 585) and by Doctor Schott (nos. 490 and 918), in both cases in Yucatan, therefore from near the type locality.

As I understand this species it is characterized by broadly cuneate leaflets which are rather strongly nerved, small flowers, small, broad, obtuse sepals, hairy stamens, and a stipitate ovary.

Ionoxalis lasiandra (Zucc.) Rose.

Oxalis lasiandra Zucc. Abh. Akad. Muench. **2**: 353. 1834.

A condensed description is as follows: Leaflets 7 to 9, 7.5 cm. long, 2.5 cm. broad, rounded at apex; sepals with glandular hairs outside; petals large, crimson; filaments glandular-pubescent. This species is now grown in the open grounds of the Washington Botanical Garden, having come from Edinburgh, the original source of the Graham material. Mr. George Oliver tells me that it is very common in the grounds of the Botanical Garden of Edinburgh, sometimes becoming a weed.

Oxalis lasiandra Zucc. and *O. lasiandra* Graham have been heretofore considered distinct species, Graham's name being the one in general use. After a careful comparison of the original descriptions I am led to believe that the name as used by both authorities refers to the same species. Zuccarini described his plant about 1834 (?), having grown it from bulbs sent by Karwinski from Mexico to the botanical garden at Munich. The species being such an attractive one would naturally be distributed. In 1840 Graham received specimens from Berlin under the manuscript name of *O. lasiandra*, which name he used in 1842 when he figured and described it in the Botanical Magazine. Zuccarini should therefore be cited as the authority for this name.

The Kew Index reference of Graham's plant to *O. floribunda* Lehm., a Brazilian species, must be incorrect.

Ionoxalis lunulata (Zucc.) Rose.

Oxalis lunulata Zucc. Abh. Math. Phys. Classe **1**: 200. 1830.

In the Bernhardi Herbarium, now in the Missouri Botanical Garden, is what appears to be a part of the type of *O. lunulata*. It seems to answer that species in every particular, character of bulb scales, size, number, and shape of leaflets, number and color of flowers, etc. The label gives the locality "Mexico."

Ionoxalis occidentalis Rose, sp. nov.

Bulbs solitary, deep-seated; bulb scales acuminate, strongly many (about 20) nerved, some of the nerves anastomosing; leaflets 4 to 6, rather thick, strongly notched at apex, cuneate at base, glabrous; peduncles elongated, much longer than the leaves and appearing with them; flowers 4 to 7, on slender pedicels 2 to 3 cm. long; sepals broadly oblong, 6 to 7 mm. long, rounded or even truncate at the apex, thin with broad purple margins, glabrous, with 3 or 4 glands near tip; petals deep purple above, pale below, 2 cm. long; filaments somewhat hairy; styles pubescent.

Type U. S. National Herbarium no. 301992, collected by J. N. Rose on the road between Bolaños and Guadalajara, but in the State of Zacatecas, September 20, 1897 (no. 3035).

This is a very beautiful species, worthy of cultivation.

Ionoxalis primavera Rose, sp. nov.

Bulbs of medium size; scales oblong, very fibrous, the nerves 12 or more; leaflets 3, triangular in outline more or less strongly lobed at apex, the lobes generally broad and rounded at apex; peduncles 20 to 30 cm. long, nearly twice as long as the leaves; pedicels and calyx glandular-pubescent even in age; flowers numerous, purplish; sepals lanceolate, obtusish, glandular at tip, 5 to 6 mm. long; petals 12 to 16 mm. long; pubescent within; filaments only slightly pubescent.

Very common in the lowlands of Tepic and Sinaloa, where it was collected by J. N. Rose, July 2, 1897 (no. 1508). This specimen, the type, from Acaponeta, Tepec, is no. 300348 of the U. S. National Herbarium.

This plant begins to flower a few days after the first rains and is one of the very earliest of the herbaceous plants to appear on the dry plains of western Mexico. Later in the season it is so abundant that it becomes a troublesome weed in cornfields.

This species has been in cultivation since 1897 in the Washington Botanical Garden, where it has flowered several times.

Ionoxalis pringlei Rose, sp. nov.

Bulbs solitary; leaves radial, several; petioles slender, glabrous; leaflets broadly cuneate, obcordate, glabrous, 10 to 20 mm. broad; peduncle 15 to 25 cm. long, much longer than the leaves, glabrous, 2 to 8-flowered; involucral bracts small, slightly pubescent, acute, gland-tipped; peduncles 12 to 35 mm. long, slender; sepals ovate, acute, 4 mm. long, glabrous, with scarious margins and gland-tipped; petals blue, yellowish below, 10 mm. long; 5 filaments longer than the others; capsule linear, elongated, 15 mm. long.

Type U. S. National Herbarium no. 304003, collected by Dr. C. G. Pringle on lava beds on the side of Sierra de Ajusco, Distrito Federal, altitude 2,550 meters, September 8, 1896 (no. 6483).

Ionoxalis schiedeana (Zucc.) Rose.

Oxalis schiedeana Zucc. Abh. Math. Phys. Classe **2**:352. 1834.

Ionoxalis stipitata Rose, sp. nov.

Bulbs globular, small, covered with thin coats, these with about 8 to 10 delicate nerves, ciliate; young buds hairy; leaflets 3, becoming glabrate, 2-lobed; lobes widely spreading, linear-oblong, obtuse; sepals oblong, 4 mm. long, obtuse, purplish at tip, 2-glandular; petals pale blue, 11 mm. long; stamens 10, united below, of two lengths; free part of filaments broad below, the 5 longer filaments hairy, the 5 shorter glabrous; ovary stipitate; styles (in specimens seen) long, hairy; fruit rather broad, one and one-half times longer than the sepals.

Type U. S. National Herbarium no. 40241, collected by C. G. Pringle, near Tlalnepantla, Valley of Mexico, July 5, 1898 (no. 6894).

Ionoxalis stolonifera Rose, sp. nov. For description see p. 131.

Ionoxalis tenuiloba Rose, sp. nov.

Bulbs solitary; petioles about the length of the peduncle, glabrous; leaflets 3, cuneate at base, deeply 2-lobed; lobes strongly divergent, linear, 2.5 to 5 cm. long, acute; peduncle filiform, 10 to 12 cm. long; umbel about 8-flowered; pedicels filiform, 2.5 mm. long; sepals obtuse, gland-tipped; filaments hairy.

Type U. S. National Herbarium no. 236917, collected by Marcus E. Jones at Colima, State of Colima, July 2, 1892 (no. 118).

This species has very remarkable leaflets.

Ionoxalis tetraphylla (Cav.) Rose.

Oxalis tetraphylla Cav. Ic. **3**: 19. *pl. 237*. 1794.

Oxalis deppei Lodd. Bot. Cab. **15**: *pl. 1500*. 1828.

Type locality: "In Mexico Imperio."

I have referred to this species a plant collected by myself on the pedregal at San Angel near the City of Mexico, which, from its appearance and station, is more likely to belong here than any other which I have seen. Cavanilles's figure shows a plant with 3 or 4 broad, obovate leaflets and with elongated peduncles and slender pedicels, all of which are possessed by my specimen.

Ionoxalis vespertilionis (Zucc.) Rose.

Oxalis vespertilionis Zucc. Abh. Math. Phys. Classe **2**: 350. 1834.

MEXICAN AND CENTRAL AMERICAN SPECIES OF LOTOXALIS.

The following Mexican species of Lotoxalis are either new or have been passing as species of Oxalis.

Lotoxalis angustifolia (H. B. K.) Rose.

Oxalis angustifolia H. B. K. Nov. Gen. & Sp. **5**: 249. 1823.

Lotoxalis dichotoma Rose, sp. nov.

Woody for some distance below, slender, erect, rarely if at all branching, somewhat hairy, 30 to 60 cm. high; petioles slender, 2 to 7 cm. long, somewhat pilose; leaflets orbicular to oblong, 2 to 4 cm. long, rounded at base and apex or sometimes obtuse, thin, more or less hairy on both sides, paler beneath, the terminal leaflet remote; pedicels slender, 2 to 7 cm. long, longer than the subtending petiole, dichotomously branching with a single flower in the fork, several-flowered; sepals 4 mm. long, slightly hairy; petals yellow, twice as long as the sepals; stamens glabrous.

Type U. S. National Herbarium no. 300500, collected by J. N. Rose in the foothills of the Sierra Madre, near Colomas, Sinaloa, July, 1897 (no. 1650).

This species belongs to the group Hedysaroideae, and is closely related to the so-called *Oxalis sepium*.

Lotoxalis fasciculata (Turcz.) Rose.

Oxalis fasciculata Turcz. Bull. Soc. Nat. Mosc. **32**[1]: 272. 1859.

Lotoxalis glabrata (Baker) Rose.

Oxalis neaei glabrata Baker, Ref. Bot. **5**: *pl. 292*. 1871.

Lotoxalis neaei (DC.) Rose.

Oxalis neaei DC. Prod. **1**: 690. 1824.

Lotoxalis occidentalis Rose, sp. nov.

Somewhat woody below, branching at base; branches angled, glabrous; petioles usually hairy; leaflets three, glabrous throughout or slightly ciliate, orbicular to narrowly oblong, obtuse or slightly retuse, the upper leaflet somewhat remote; peduncles 2 to 2.5 cm. long, longer than the petioles; flowers in umbels of 3 or 4; buds ovate, acute; sepals ovate, 5 mm. long, acute, glabrous or nearly so; petals yellow; capsule oblong, 6 to 8 mm. long, smooth; cells 3-seeded.

Type U. S. National Herbarium no. 302240, collected by J. N. Rose on road between Rosario and Concepción, Sinaloa, July 27, 1897 (no. 3265).

Lotoxalis pentantha (Jacq.) Rose.

Oxalis pentantha, Jacq. Oxal. 21. *pl. 1.* 1794.

Lotoxalis psilotricha (Turcz.) Rose.

Oxalis psilotricha Turcz. Bull. Soc. Nat. Mosc. **31**[1]: 428. 1858.

Lotoxalis tephrodes (Turcz.) Rose.

Oxalis tephrodes Turcz. Bull. Soc. Nat. Mosc. **31**: 428. 1858.

Lotoxalis yucatanensis Rose, sp. nov.

Ten to 30 cm. high, erect, woody throughout; young parts with ascending somewhat appressed pubescence; leaflets 3, the terminal remote, oblong to orbicular, thin (in herbarium specimens), mostly rounded at base, usually strongly emarginate, but the tips unequal, nearly glabrous, 5 to 15 mm. long; inflorescence of 5 to 7 flowers, dichotomous with central flower solitary, compact, the pedicels jointed above the base; sepals ovate, obtuse, 3 mm. long, nerved, glabrous or nearly so; corolla yellow; 5 longer filaments hairy; capsule orbicular(?), glabrous on the angles.

Type U. S. National Herbarium no. 268419 (Gaumer no. 715).

Specimens examined:

Yucatan, Schott, 1865 (no. 625); G. F. Gaumer, 1895 (no. 715); C. F. Millspaugh, 1899 (no. 1633).

This species has heretofore passed under the name of *L. berlandieri*, but differs in its more erect shrubby habit and glabrous capsules, in the character of its inflorescence, etc. It is apparently confined to Yucatan.

RESTORATION OF BIOPHYTUM.[a]

This genus was established by DeCandolle in 1824, based upon two species formerly referred to Oxalis. It was shortly afterwards returned to Oxalis where it remained for the next half-century. Gardeners, however, usually kept it out of Oxalis on account of its very peculiar habit. Don and Nickelson both recognize Biophytum. Durand takes it up in 1888 and so does R. Reeche in Engler and Prantl's late work.

Otto Kuntze takes up for this genus the pre-Linnaean name Toddavaddi (1742).

About twenty species have been recognized, but only the following is known to grow in Mexico.

Biophytum dendroides (H. B. K.) DC. Prod. **1**: 690. 1824.

Oxalis dendroides H. B. K. Nov. Gen. & Sp. **5**: 250. 1823.

Toddaraddi dendroides Kuntze, Rev. Gen. Pl. **1**: 96. 1891.

Specimen examined:

Vera Cruz: Barranca of Chavarreillo, C. G. Pringle, 1899 (no. 8165).

PSEUDOXALIS, A NEW GENUS.

Pseudoxalis gen. nov.

Probably perennial, caulescent from slender running rootstocks; leaves alternate; stipules wanting; leaflets 3, palmate, sessile; peduncles 1 or 2-flowered; sepals 5, broad, thin, petaloid, much longer than the petals; petals small, yellow.

Perhaps nearest Xanthoxalis, from which it differs especially in its small corolla and large petaloid sepals. When *Oxalis madrensis* was first described it was compared

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[a] BIOPHYTUM DC. Prod. **1**: 689. 1824.

by Doctor Watson with *O.* (now *Lotoxalis*) *berlandieri*, from which it differs especially in its foliage.

P. madrensis (S. Wats.) Rose.

Oxalis madrensis S. Wats. Proc. Am. Acad. **25**: 144. 1890.

Stems much branched, creeping, pubescent; leaflets obovate, obtuse or retuse, 10 to 12 mm. long; sepals obtuse, 6 to 8 mm. long.

Only known from mountains near Monterey, Nuevo Leon. Collected by C. G. Pringle, July 16, 1889 (no. 2867).

LINACEAE.

TWO NEW SPECIES OF LINUM.

Linum longipes Rose, sp. nov.

Annual, erect, 20 to 30 cm. high, simple below, branching above, slightly hairy; lower leaves in whorls, oblong to obovate, 10 to 15 mm. long, obtuse, shortly but distinctly petioled, very thin; upper leaves attenuate, acute, stipular glands wanting; pedicels slender, 10 to 20 mm. long; sepals 2 to 2.5 mm. long, ovate, acuminate, slightly glandular-ciliate; petals yellow, about twice as long as the sepals; styles slender united, nearly to the top, valves 10; carpels small, without cartilaginous insertions at base.

Type U. S. National Herbarium no. 381811, collected by C. G. Pringle, in mountains near Iguala, Guerrero, October 11, 1900 (no. 9261).

This species resembles somewhat *L. cruciatum*, but has the styles united, the pedicels longer and glabrous, etc.

Linum nelsoni Rose, sp. nov.

Perennial, much branched at base, the branches long, often weak, perhaps sometimes procumbent, when young pilose; lower leaves in whorls, oblong, 10 to 15 mm. long, obtuse, at first pilose, becoming glabrate, the uppermost leaves alternate, acute; inflorescence open; pedicels pilose; sepals ovate, acute; petals yellow, 5 to 6 mm. long; capsule 10-valved.

Type U. S. National Herbarium no. 469215, collected by E. W. Nelson at Boca del Monte, Vera Cruz, March 13, 1894 (no. 210). Also collected by C. A. Purpus, on Ixtaccíhuatl, January, 1903 (no. 67).

BALSAMEACEAE.

RESTORATION OF TEREBINTHUS, WITH ITS SPECIES.

The ancient name Terebinthus was adopted by Tournefort, Ray, and other well-known authors, but was discarded by Linnaeus for Pistacia, a name almost, if not quite, equally ancient. In accordance with the present practice in nomenclature Pistacia must remain the name of the genus to which Linnaeus applied it. Mr. William F. Wight has called my attention to the fact that the name Terebinthus, however, is valid for another genus, that to which it was first applied by a post-Linnaean author. This first use was by Patrick Browne in 1756,[a] who based his genus on a single species, *Pistacia simaruba* L., which will therefore be the type of Terebinthus.[b] Although the Linnaean binomial is not given by Browne, the three following references, "Pistacia foliis pinnatis deciduis, foliolis ovatis. L. Sp. Pl. Terebenthus major Betulae cortice, etc. Slo. Cat. 167 & H. Simaruba. L. M. Med.", unmistak-

[a] Civil and Natural History of Jamaica, p. 345.

[b] For citation and synonymy see *Terebinthus simaruba* in list below.

ably establish the identity of Browne's species with *Pistacia simaruba*, as the same references with no other description or citation, are given by Linnaeus for this species. Four years after the publication of Browne's work, Jacquin, 1760,[a] includes the same species as *Terebinthus brownii*. Linnaeus in 1762,[b] changed the name to *Bursera gummifera*. This name, modified in spelling to *Burseria gummifera*, was adopted by Jacquin 1763.[c] But Bursera or Burseria, is invalid for this genus not only because it is antedated by Terebinthus but because the name was applied earlier[d] to a different genus. Another name which has been used by some authors is Elaphrium, Jacquin 1760.[e] This is four years later than Browne's publication of Terebinthus and even the latter name has place priority in the same work in which Elaphrium appears.

The following are the known Mexican species:

Terebinthus aloexylon (Schiede) W. F. Wight.

Elaphrium aloexylon Schiede, Linnaea **17**: 252. 1843.

Terebinthus aptera (Ramirez) Rose.

Bursera aptera Ramirez, Anal. Inst. Med. Nac. **2**: 16. *pl. 1.* 1896.

Terebinthus arborea Rose, sp. nov.

Tall trees; old trunks red and smooth; young branches pubescent; leaflets 2 to 4 pairs, 4 to 9 cm. long, ovate, rounded or cuneate or rarely cordate at base, more or less abruptly acuminate, the acuminum obtuse, somewhat pubescent on both sides; inflorescence paniculate; fruit glabrous; sepals ovate, acute, ciliate; fruit in very compact clusters.

Type U. S. National Herbarium no. 302233 (Rose 3259e), collected by J. N. Rose between Acaponeta and Concepción, Tepic, July 2 (no. 1505), July 4 (no. 1530); near Rosario, July 22 (no. 1821); between Rosario and Concepción, July 27 (3259a and 3259e) and July 28 (3259b). All collected in 1897.

A very common tree in the low country of Tepic and Sinaloa.

Terebinthus arida Rose, sp. nov. PLATE XXXVI.

A low shrub; branches dark gray, those of the first year densely pubescent, the older ones glabrous; leaves clustered near the ends of short spurs or scattered along the new branches; leaflets mostly 2 to 4 pairs, rarely reduced to 3 or sometimes even to one, oblong to spatulate, 4 to 6 cm. long, obtuse, glabrous on both sides; petiole and the narrowly winged rachis slightly hairy; flowers subsessile; calyx half as long as petals, both hairy; fruit subsessile, glabrous.

Type U. S. National Herbarium no. 453480, collected by J. N. Rose and Jos. H. Painter near Tehuacán, Puebla, 1905 (no. 9985), August 1 and 2, 1901 (no. 5864), and by J. N. Rose, same locality,

This species must be near *B. galeotti*, but it has fewer and differently shaped leaflets, etc.

EXPLANATION OF PLATE XXXVI.—Fig. *a*, plant; *b*, fruit. Fig. *a*, natural size; *b*, enlarged.

Terebinthus bicolor (Schlecht.) Rose.

Elaphrium bicolor Schlecht. Linnaea **17**: 625. 1843.

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[a] Enum. Pl. Carib. 3, 18.

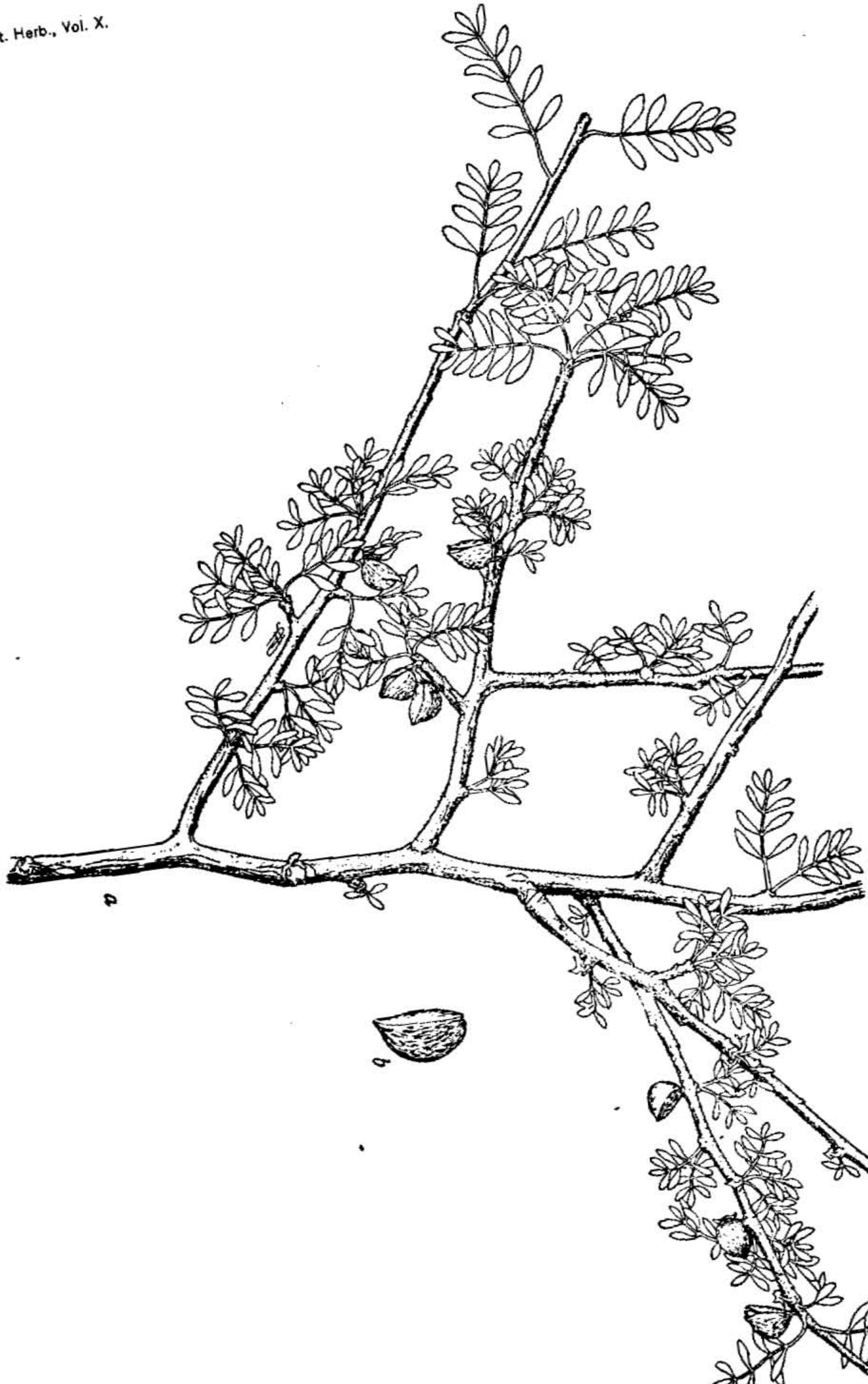
[b] Sp. Pl. ed. 2. **1**: 471.

[c] Stirp. Am. Hist. 94. *pl. 65.*

[d] Loefling, Iter. 194. 1758.

[e] Enum. Pl. Carib. 3, 19.

PLATE XXXVI.



TEREBINTHUS ARIDA ROSE.

Terebinthus biflora Rose, sp. nov.

Two to 5 meters high with many short stunted branches; leaves on very short petioles (8 mm. long); leaflets always 3, small (6 to 20 mm. long), ovate to obovate, acute or obtuse, more or less cuneate at base, crenate, slightly pubescent on both sides; fruiting peduncles slender, 12 to 20 mm. long; pedicels 4 mm. long; fruit usually in pairs, 8 mm. long, glabrous.

Type U. S. National Herbarium no. 316639, collected on limestone ledges near Tehuacán, Puebla, by C. G. Pringle, August 27, 1897 (no. 6686). Also collected at the same locality by J. N. Rose, August 2, 1901 (no. 5903).

Terebinthus bipinnata (DC.) W. F. Wight.

Amyris bipinnata DC. Prod. **2**: 82. 1825.

Terebinthus cerasifolia (Brandegee) Rose.

Bursera cerasifolia Brandegee, Proc. Cal. Acad. II. **3**: 121. 1891.

Terebinthus cinerea (Engler) Rose.

Bursera cinerea Engler, DC. Monog. Phan. **4**: 43. 1883.

Terebinthus cuneata (Schlecht.) Rose.

Elaphrium cuneatum Schlecht. Linnaea **17**: 629. 1843.

Terebinthus delpechiana (Poisson) Rose.

Bursera delpechiana Poisson; Engl. in DC. Monog. Phan. **4**: 53. 1883.

Terebinthus excelsa (H. B. K.) W. F. Wight.

Elaphrium excelsum H. B. K. Nov. Gen. & Sp. **7**: 30. *pl. 611*. 1825.

Terebinthus fagaroides (H. B. K.) W. F. Wight.

Elaphrium fagaroides H. B. K. Nov. Gen. & Sp. **7**: 27. 1825.

Terebinthus fragilis (S. Wats.) Rose.

Bursera fragilis S. Wats. Proc. Am. Acad. **21**: 442. 1886.

Terebinthus galeottiana (Engler) Rose.

Bursera galeottiana Engler in DC. Monog. Phan. **4**: 47. 1883.

Terebinthus glabrescens (S. Wats.) Rose.

Bursera palmeri glabrescens S. Wats. Proc. Am. Acad. **25**: 145. 1890.

Terebinthus gracilis (Engler) Rose.

Bursera gracilis Engler in DC. Monog. Phan. **4**: 50. 1883.

Terebinthus grandifolia (Engler) Rose.

Bursera grandifolia Engler in DC. Monog. Phan. **4**: 50. 1883.

Terebinthus graveolens (H. B. K.) Rose.

Elaphrium graveolens H. B. K. Nov. Gen. Sp. **7**: 31. 1825.

Terebinthus heterophylla (Engler) Rose.

Bursera heterophylla Engler in DC. Monog. Phan. **4**: 46. 1883.

Terebinthus jonesii Rose.

Bursera jonesii Rose, Contr. Nat. Herb. **3**: 314. 1895.

Terebinthus jorullensis (H. B. K.) W. F. Wight.

Elaphrium jorullense H. B. K. Nov. Gen. & Sp. **7**: 28. *pl. 612*. 1825.

Terebinthus karwinskii (Engler) Rose.

Bursera karwinskii Engler in DC. Monog. Phan. **4**: 57. 1883.

Terebinthus kerberi (Engler) Rose.

Bursera kerberi Engler in DC. Monog. Phan. **4**: 41. 1883.

Terebinthus lancifolia (Schlecht.) W. F. Wight.
Elaphrium lancifolium Schlecht. Linnaea **17**: 247. 1843.

Terebinthus lanuginosa (H. B. K.) Rose.
Elaphrium lanuginosum H. B. K. Nov. Gen. & Sp. **7**: 31. 1825.

Terebinthus longipes Rose, sp. nov.

A small tree 3 to 4 meters high, with a smooth trunk and with a broad flat top, glabrous throughout; leaves pinnate, 10 to 25 cm. long; common petiole terete, not at all winged between the leaflets; leaflets 3 to 6 pairs, on slender petiolules (the longer 10 mm. long) long-acuminate, the terminal ones cuneate at base, the others usually rounded, sometimes narrowed, always more or less oblique at base, green above, paler and somewhat reticulated below, quite glabrous on both sides even when quite young; inflorescence paniculate, 10 cm. long; flowering pedicels 4 to 5 mm. long, in fruiting 5 to 8 mm. long; sepals ovate, obtuse; petals white, oblong, 3 mm. long; fruit oblong, 12 mm. long, borne in a dense cluster.

Type U. S. National Herbarium no. 346674, collected by J. N. Rose and Walter Hough on the dry hills above Matamoras, Puebla, June 26, 1899 (no. 4691). Also collected by C. G. Pringle near Jojutla, Morelos, 1901 (no. 8510).

This species was not common about Matamoras, but was found scattered along the brow of dry hills mingled with various species of Acacia, Mimosa, and Opuntia.

The type (Rose's no. 4691) is a fruiting specimen. The flower characters are drawn from Pringle's no. 8510, which apparently belongs here, although the leaves are very immature. This species, while related to *T. simaruba*, is very different in its habit of growth, inflorescence, foliage, etc.

Terebinthus macdougali Rose, Torreya **6**: 170. August, 1906.

A small tree; bark of 1 and 2 year old branches reddish, smooth; leaves clustered at the ends of short spurs, either simple or with 3 to 5 leaflets; rachis of compound leaves winged; petioles short; blade oblong, obtuse, 1 to 1.5 cm. long, crenately toothed, with a very short, dense pubescence on both surfaces; male flowers borne in short racemes or panicles; sepals and petals densely pubescent; female flowers solitary; peduncles very short, 4 mm. long, glabrous.

A species common on the hills near the head of the Gulf of California, first collected by Dr. E. Palmer in 1870 and recently collected near the same region by Dr. D. T. MacDougal, after whom I take great pleasure in naming it.

This has heretofore been confused with *B. hindsiana* of southern Lower California, from which, however, it seems quite distinct. It differs in its more vigorous branches, reddish instead of blackish bark on 1 and 2 year old shoots, somewhat thicker leaves and leaflets, shorter and denser pubescence on leaves, more pubescent petals, etc.

Type U. S. National Herbarium no. 15501, collected by Dr. E. Palmer.

Specimens examined:

Lower California: Exact locality not given but doubtless near the mouth of the Colorado River, Dr. E. Palmer; San Felipe Bay, D. T. MacDougal, February, 1904; Los Angeles Bay, Dr. E. Palmer, 1887 (no. 572).

Sonora: Hills near the Gulf of California, C. G. Pringle, August 20, 1884.

Terebinthus mexicana (Engler) W. F. Wight.
Bursera mexicana Engler, DC. Monog. Phan. **4**: 51. 1883.

Terebinthus microphylla (A. Gray) Rose.
Bursera microphylla A. Gray, Proc. Am. Acad. **5**: 155. 1861.

Terebinthus morelensis (Ramirez) Rose.
Bursera morelensis Ramirez, Anal. Inst. Med. Nat. **2**: 17. 1896.

Terebinthus multifolia Rose, sp. nov.

Small shrub 2.4 meters high; branches dark, sometimes reddish, glabrous; very young branches puberulent; leaves borne in clusters near the ends of short branches,

once pinnate; leaflets 15 to 19, linear-oblong, 10 to 13 mm. long, 2 to 3 mm. broad, glabrous, entire, obtuse; fruit solitary on short reflexed peduncles, orbicular, glabrous, 3 lines long.

Type U. S. National Herbarium no. 301368, collected by J. N. Rose at San Juan Capistrano, Zacatecas, August 21, 1897 (no. 2455).

This species is nearest *T. microphylla* (A. Gray) Rose and *T. morelensis* (Ramirez) Rose, from both of which it differs in its more distinct leaflets, shorter peduncles, etc.

Terebinthus multijuga (Engler) Rose.

Bursera multijuga Engler in DC. Monog. Phan. **4**: 42. 1883.

Terebinthus odorata (Brandegee) Rose.

Bursera odorata Brandegee, Proc. Cal. Acad. II. **2**: 138. 1889.

Mr. Brandegee reduced this species to *B. fagaroides*, but a study of good material recently collected by Nelson and Goldman convinces me that while its relationship is evidently here it is clearly distinct.

Terebinthus ovalifolia (Schlecht.) Rose.

Elaphrium ovalifolium Schlecht. Linnaea **17**: 248. 1843.

Terebinthus palmeri (S. Wats.) Rose.

Bursera palmeri S. Wats. Proc. Am. Acad. **22**: 402. 1886.

Terebinthus pannosa (Engler) Rose.

Bursera pannosa Engler in DC. Monog. Phan. **4**: 54. 1883.

Terebinthus penicillata (DC.) Rose.

Elaphrium penicillatum DC. Prod. **1**: 724. 1824.

Terebinthus pringlei (S. Wats.) Rose.

Bursera pringlei S. Wats. Proc. Am. Acad. **25**: 145. 1890.

Terebinthus rhoifolia (Benth.) Rose.

Elaphrium rhoifolium Benth. Bot. Sulph. 11. *pl. 7*. 1844.

Bursera hindseana rhoifolia Engler in DC. Monog. Phan. **4**: 59. 1883.

Elaphrium hindseanum Benth. op. cit. *pl. 8*.

In 1844 Bentham described from the Bay of Magdalena two species of Bursera under the names *Elaphrium rhoifolium* and *E. hindseanum* differing, as he states, only in the number of leaflets, the former having 3 and the latter only 1. Dr. Engler in his Monograph of the Burseraceae has reduced *rhoifolia* to a variety of *hindseana* although the name *rhoifolia* has precedence by position. There appears to be no ground for maintaining both species and very little to support a subspecies. *Rhoifolia* should therefore be the name of the species and *hindseana* should either be consigned to synonomy or taken up for a subspecies if there proves to be one. Mr. Brandegee, who has visited the type locality, states that the number of leaflets varies from 1 to 9 and he is therefore of the opinion that no variety should be retained, with which opinion I am in accord.

Terebinthus rubra Rose, sp. nov.

Small trees or shrubs with smooth red trunks, the bark peeling off in broad sheets; young branches and leaves glabrous; leaflets 5 to 7 pairs, lanceolate, rounded at base, acuminate, serrate below, entire above, paler beneath, 4 cm. long or less; flowers not seen, but inflorescence apparently open; fruiting peduncle 1 to 2 cm. long, bearing two to four fruits; fruit obovate, somewhat 3-angled.

Only seen in southeastern Sinaloa in the foothills, where it seems to be common growing with *T. tenuifolia*.

Type U. S. National Herbarium 300526, collected by J. N. Rose near Colomas, Sinaloa, July 14, 1897 (no. 1670).

This species seems nearest *T. pringlei* but has shorter petioles and peduncle and much broader leaflets, etc.

Terebinthus schaffneri (S. Wats.) Rose.
Bursera schaffneri S. Wats. Proc. Am. Acad. **22**: 469. 1887.

Terebinthus schiedeana (Engler) Rose.
Bursera schiedeana Engler in DC. Monog. Phan. **4**: 57. 1883.

Terebinthus schlechtendalii (Engler) Rose.
Bursera schlechtendalii Engler in DC. Monog. Phan. **4**: 54. 1883.

Terebinthus sessiliflora (Engler) Rose.
Bursera sessiliflora Engler in DC. Monog. Phan. **4**: 55. 1883.

Terebinthus simaruba (L.) W. F. Wight.
Pistacia simaruba L. Sp. Pl. **2**: 1026. 1753.
Terebinthus brownii Jacq. Enum. Pl. Carib. 18. 1760.
Bursera gummifera L. Sp. Pl. ed. 2. **1**: 471. 1762.

Terebinthus submoniliformis (Engler) Rose.
Bursera submoniliformis Engler in DC. Monog. Phan. **4**: 55. 1883.

Terebinthus subtrifoliata Rose, sp. nov.

Low shrub, glabrous throughout; branches dark; leaves simple or trifoliate, cuneate at base, rounded at apex, crenate, glabrous on both sides, 25 mm. or less long; flowers one to three in the axils of the leaves; pedicels short (2 to 3 mm. long) reflexed in fruit; fruit somewhat 3-angled, glabrous, 3 mm. long.

Type U. S. National Herbarium no. 501971, collected by J. N. Rose west of Bolaños, Jalisco, September 17, 1897 (no. 3014).

Resembling somewhat *T. rhoifolia* in its variable leaflets, but they are not pubescent as in that species.

Terebinthus tenuifolia Rose.
Bursera tenuifolia Rose, Contr. Nat. Herb. **3**: 314. 1895.

TEREBINTHUS TOMENTOSA (Jacq.) W. F. Wight. *Elaphrium tomentosum* Jacq. Enum. Pl. Carib. 19. 1760. This is a South American species which may here be conveniently transferred.

POLYGALACEAE.

THREE NEW SPECIES OF POLYGALA.

Polygala calcicola Rose, sp. nov. PLATE XXXVII.

Perennial, somewhat woody at base, much branched and diffuse, 10 cm. or less high, with appressed cinereous pubescence; leaves all alternate, linear to oblong, 10 to 15 mm. long, acute, with appressed pubescence on both sides; flowers either solitary or 3 to 5 in a short raceme; 3 outer sepals lanceolate, acute, pubescent; wings oblanceolate, 5 mm. long, pubescent, cream-colored; fruit orbicular to shortly oblong, 8 to 8.5 mm. long, glabrous except on the margin.

Type U. S. National Herbarium 316730, collected by C. G. Pringle on limestone hills near Tehuacán, Puebla, August 7, 1897 (no. 7477).

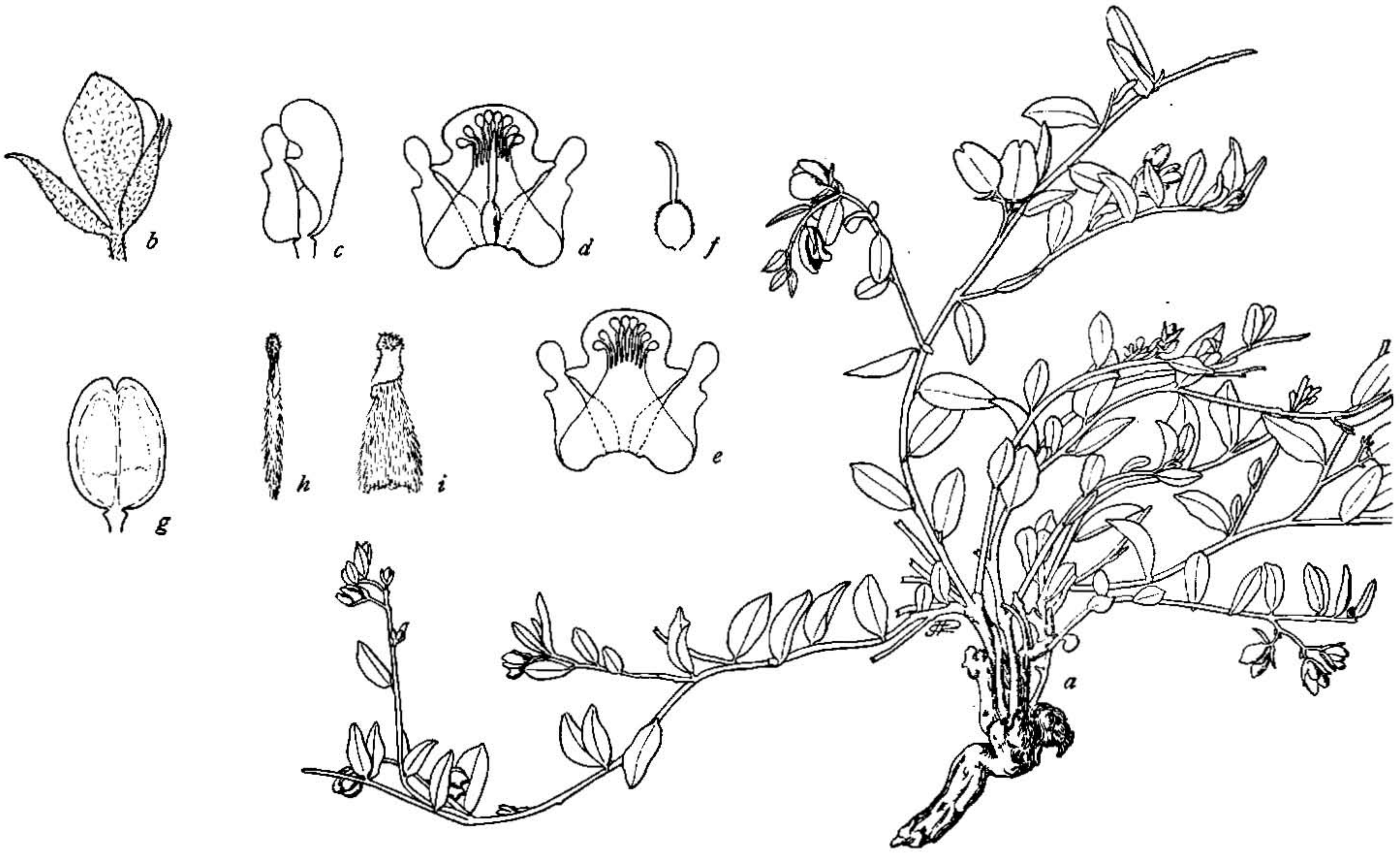
Perhaps nearest *P. ocalifolia*, but with the pubescence appressed and the sepals more persistent, etc.

EXPLANATION OF PLATE XXXVII.—Fig. *a*, plant; *b*, calyx; *c*, petals; *d*, petals, stamens, and pistil; *f*, pistil; *g*, ovary; *h* and *i*, two views of seed. Fig. *a*, natural size; *b* to *i*, scale 4.

Polygala nelsoni Rose, sp. nov. PLATE XXXVIII.

Stems annual, 30 to 40 cm. high, simple below, somewhat branched above, glabrous; upper leaves and probably lower ones all alternate, linear, 8 to 12 mm. long, glabrous and glandular, acute; inflorescence a short spike-like raceme; bracts caducous; 3 outer sepals shortly oblong, obtuse; wings spatulate, reddish; upper petal crested; seeds with appendages at base, very hairy.

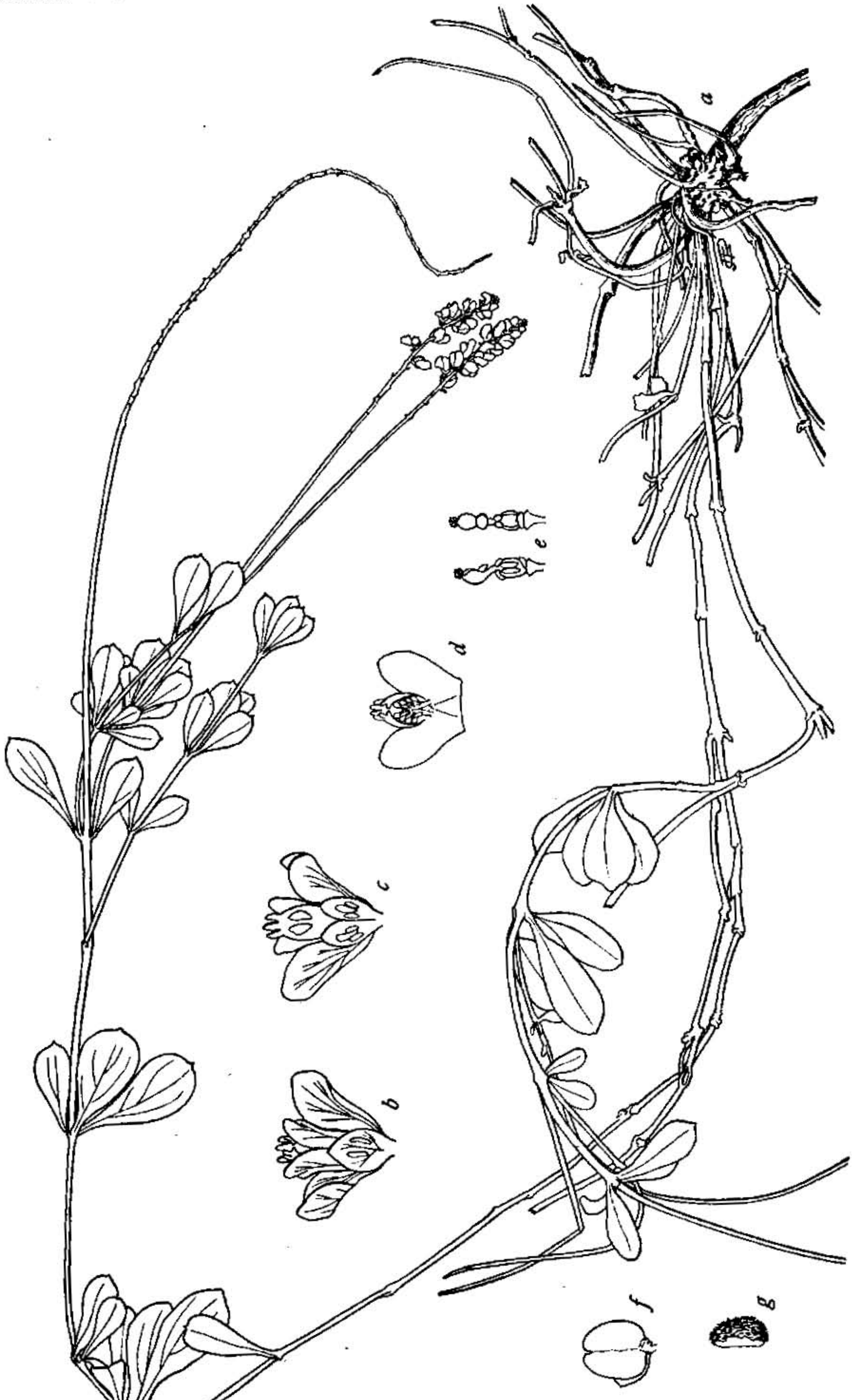
PLATE XXXVII.

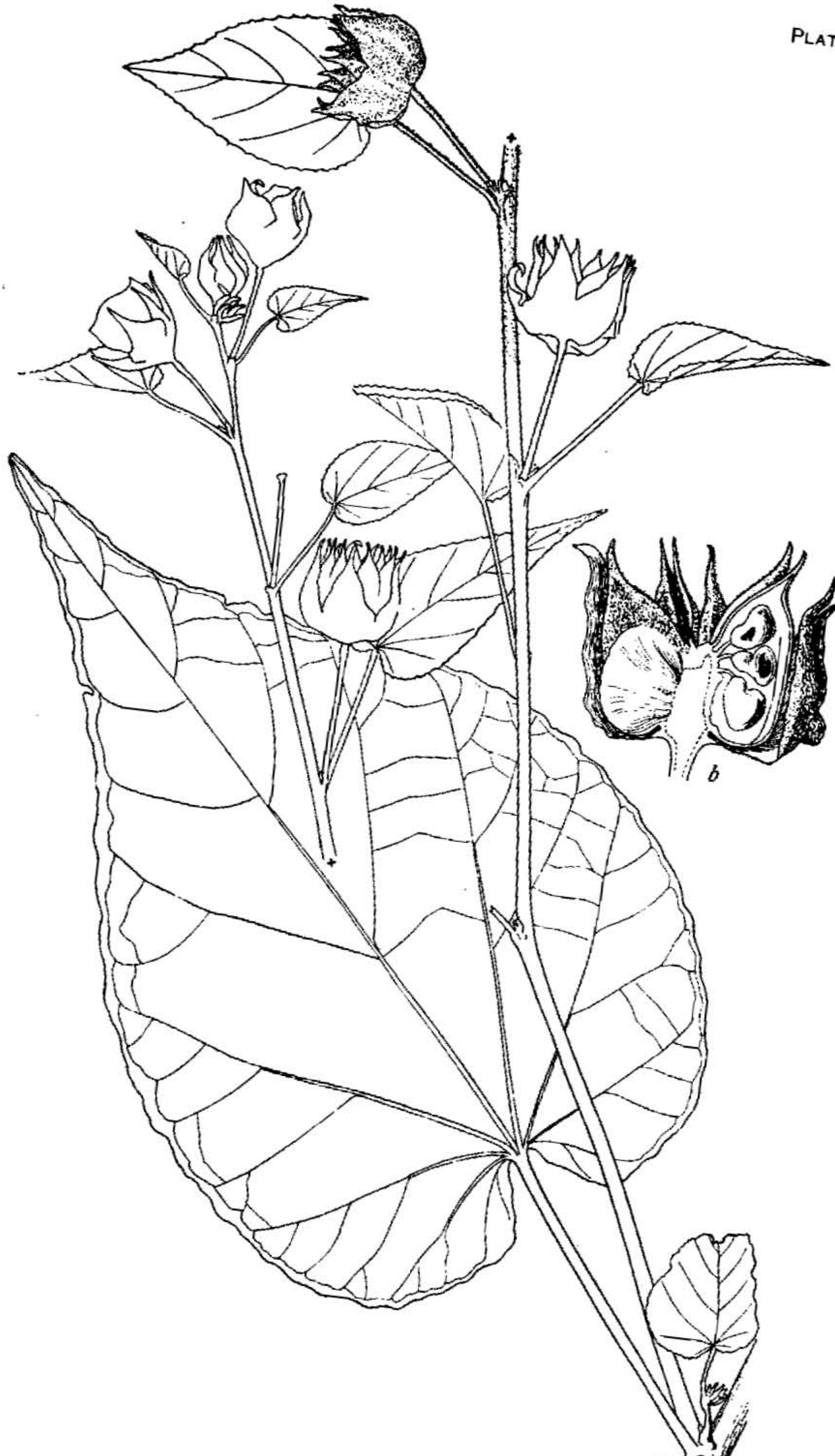


POLYGALA CALCICOLA ROSE.

PLATE XXXVIII.

POLYGALA NELSONI ROSE.


a
e
d
c
b
f
g
POLYGALA TURGIDA ROSE.



ABUTILON DURANGENSE ROSE & YORK.

Type U. S. National Herbarium no. 469216, collected by E. W. Nelson on road between Guichocovi and Lagunas, Oaxaca, June 29, 1895 (no. 2753).

This species is related to *P. paniculata* and *P. longicaulis*.

EXPLANATION OF PLATE XXXVIII.—Fig. *a*, plant; *b*, leaf; *c*, calyx; *d*, sepals; *e*, sepals and petals; *f*, petals; *g*, petals and stamens; *h*, stamens; *i*, two views of pistil; *j*, seed. Fig. *a*, natural size; *b* to *j*, scale 6.

Polygala turgida Rose, sp. nov. PLATE XXXIX.

Perennial, prostrate, much branched, forming dense mats; stems terete, glabrous as are also the leaves and inflorescence; leaves all in whorls, apparently fleshy when alive, obovate, rounded at apex, sometimes mucronate, 15 to 25 mm. long; peduncles slender, weak, 2 to 6 cm. long; inflorescence a spike-like raceme, much elongated in fruit; pedicels short, subtended by small ovate scarious bracts and bearing at their base two small triangular bractlets; 3 outer sepals ovate, scarious-margined; wings much larger than the outer sepals; upper petal crested; capsule glabrous, orbicular, bearing at base a cushion-like disk; seeds hairy, aril scarious, as long as the seed.

Type U. S. National Herbarium no. 8215, collected by C. G. Pringle in alkaline meadows on the Hacienda de Angostura, San Luis Potosí, July 14, 1891 (no. 3792); also collected by Dr. E. Palmer at Media Luna near Rio Verde, San Luis Potosí, June, 1904 (no. 84).

Mr. Pringle's specimen was sent out as a doubtful *P. aparinoides*, but that is a very different species.

EXPLANATION OF PLATE XXXIX.—Fig. *a*, plant; *b* and *c*, flower; *d*, petals and stamens; *e*, two views of pistil; *f*, capsule; *g*, seed. Fig. *a*, natural size; *b* to *g*, scale 6.

MALVACEAE.

ABUTILON, A NEW SPECIES AND A NEW NAME.

Abutilon durangense Rose & York. PLATE XL.

Perennial; stems woody, dark purple, branching, covered with short glandular hairs; leaf blades ovate, 6 to 12 cm. long; 4 to 7 cm. wide, cordate at base (with a wide sinus), long-acuminate, finely dentate or crenate, or almost entire, the under surface pale in color, densely softly stellate-pubescent, the upper surface sparingly stellate with additional simple hairs, the veins purplish; petioles 2.5 to 4.5 cm. long, with glandular pubescence; stipules small, linear, deciduous; inflorescence paniculate, flowers axillary, solitary; peduncles 1.5 to 3 cm. long, jointed near apex; calyx 10 mm. long in fruit, finely and densely stellate, the lobes broadly ovate, long-acuminate, equaling or slightly longer than the mature carpels; petals yellow, obovate, 15 to 18 mm. in length; stamen tube very short; carpels 9, shortly acuminate, about 11 mm. in length, 2 or 3-seeded; seeds puberulent.

Type U. S. National Herbarium no. 304839, collected near Durango City, by Dr. E. Palmer, 1896 (no. 587).

EXPLANATION OF PLATE XL.—Fig. *a*, branch; *b*, carpels. Fig. *a*, natural size; *b*, scale 2.

Abutilon hemsleyana Rose.

Abutilon sidoides Hemsley, Diag. Pl. Nov. 2: 24. 1879, not Dalz. & Gibs. 1861.

TWO NEW SPECIES OF WISSADULA.

Wissadula glandulosa Rose, sp. nov.

Woody at base, the branches spreading or procumbent, very glandular; leaves broadly ovate, acute, cordate at base, stellate-pubescent, crenate, the petiole often longer than the blade; stipules filiform; fruiting calyx 12 to 14 mm. long; sepals broadly ovate, acuminate; petals yellow, 15 to 16 mm. long; carpels 5, strongly mucronate, each 3-seeded.

Type U. S. National Herbarium no. 9809, collected by J. N. Rose and Jos. H. Painter on the road between Higuerillas and San Pablo, Querétaro, August 24, 1905 (no. 9809).

Perhaps nearest *W. pringlei*, but leaves not acuminate, stem less pilose, plant more glandular, etc.

Wissadula lozani Rose, sp. nov. PLATE XLI.

Branches terete, covered with stellate hairs; upper leaves oblong, 5 to 7 cm. long, at most acute, truncate or slightly cordate at base, crenate; inflorescence paniculate; pedicels short (10 mm. or less long), stout; fruiting calyx 10 to 12 mm. long; sepals ovate, acute; petals yellow; carpels 5, each 3-seeded.

Type U. S. National Herbarium no. 461976, collected by C. G. Pringle and F. Lozano at Hacienda El Carrizo near San Juan, Nuevo Leon (no. 13443).

This species belongs to the Abutilastrum section of the genus and is not closely allied to any of the six other described species of this group.

EXPLANATION OF PLATE XLI.—Fig. *a*, plant; *b*, calyx; *c*, corolla; *d*, carpels; *e*, section through carpels. Fig. *a*, natural size; figs. *b*, *c*, *d* and *e*, scale 2.

HYPERICACEAE.

FOUR NEW ST. JOHNSWORTS.

Hypericum confusum Rose, sp. nov.

Perennial, sending up a cluster of 3 to many herbaceous stems, 2.5 to 7.5 cm. high, sometimes 4-angled, glabrous; leaves sessile, oblong, with a short obtuse-tipped apex, either shorter or longer than the internodes, light green above, hardly paler beneath, 4 to 12 mm. long, 2 to 5 mm. wide; sepals somewhat unequal, 4 to 6 mm. long, acute; petals yellow; ovary shorter than the calyx; styles 3, somewhat elongated.

Type U. S. National Herbarium no. 304028, collected by Dr. C. G. Pringle in damp soil, Serrania de Ajusco, Distrito Federal, August 23, 1896 (no. 6440).

This species must be near the South American *H. brevistylum* with which it has been confused, but it has a less spreading habit, larger leaves, calyx, and flowers, longer styles, etc.

Hypericum diffusum Rose, sp. nov.

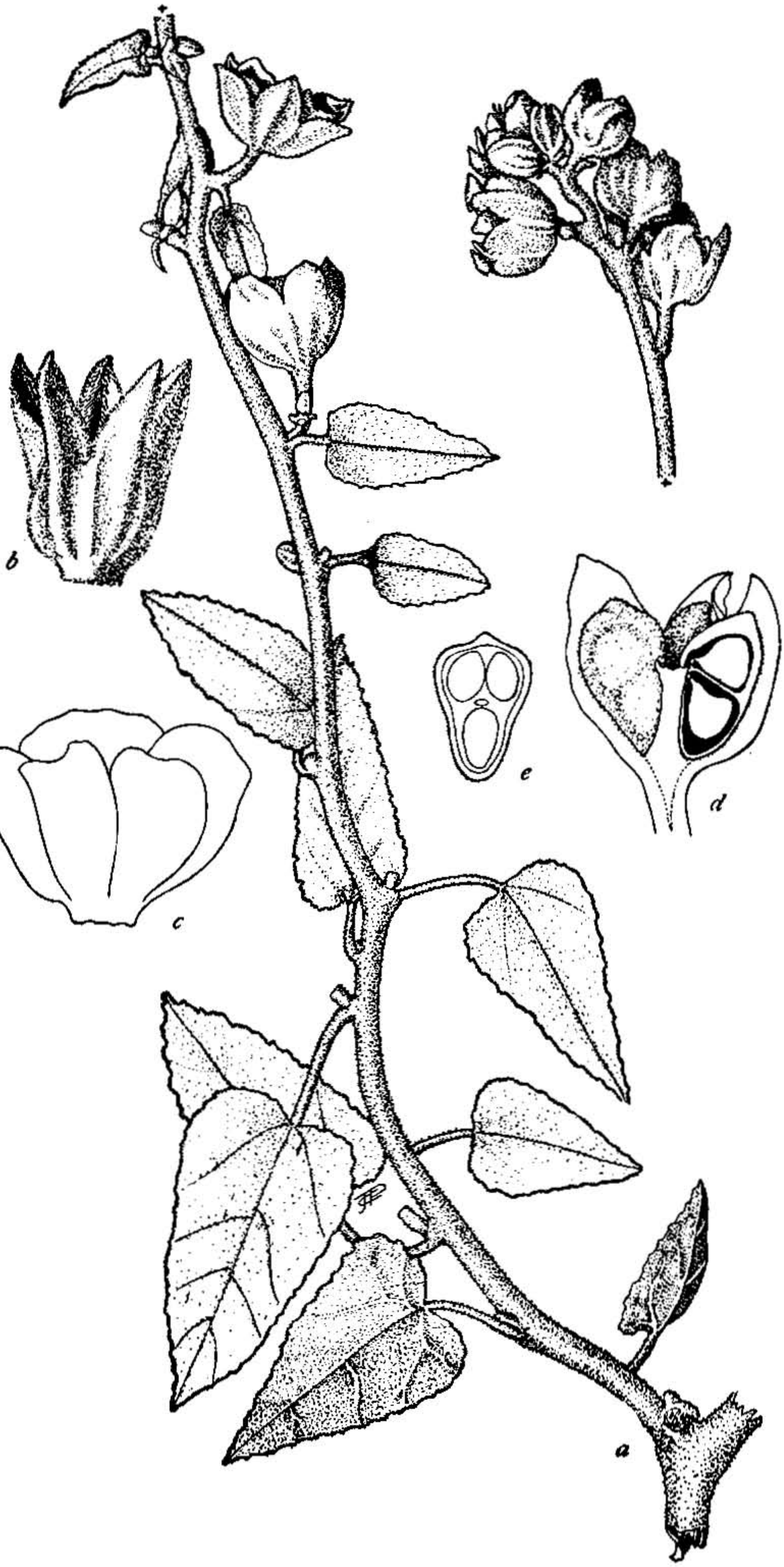
Perennial, usually branching at base; stems ascending, 10 to 12 cm. high, somewhat 4-angled; leaves lanceolate, acute, 10 to 16 mm. long, 4 to 7 mm. broad, 1-nerved, the margin somewhat scarious and slightly denticulate; flowers rather few; sepals lanceolate, 3-nerved, acute, 5 to 6 mm. long; petals yellow, longer than the sepals; stamens 9 to 15; capsule 1-celled, 6 to 7 mm. long; styles 3, distinct, each bearing a broad flat stigma.

Collected by C. G. Pringle in meadows near Buena Vista Station, Hidalgo, 1904 (no. 8802).

Hypericum simulans Rose, sp. nov.

Perennial; stem herbaceous, usually single, erect, 20 to 50 cm. high, glabrous; leaves oblong, 2 to 2.5 cm. long, obtuse, with many black dots on under surface; flowers few; bracts obtuse and leaf-like; sepals broadly ovate, 5 to 7 mm. long, obtuse, black-dotted; petals oblong, 10 to 12 mm. long, yellow or becoming reddish, more or less black-dotted on the margin; styles 3; capsule 3-celled.

Collected by C. G. Pringle, near Canales, Hidalgo, September, 1904 (no. 8993, type) and near Pachuca, Hidalgo, in 1903(?) (no. 6941); also in the latter locality by J. N. Rose, July 21 and 22, 1901 (no. 5572).



WISSADULA LOZANI ROSE.

CALCEOLARIA HUMILIS ROSE & DOWELL.

Hypericum submontanum Rose, sp. nov.

Stem much branched at base and often so above, 10 to 20 cm. high, only slightly angled; leaves decussate, lanceolate, obtuse, 10 to 12 mm. long, rather thin in texture, 1-nerved, with pellucid dots but never black ones; flowers very small; sepals linear, acute, 2 mm. or less long; petals 3 mm. or more long, drying reddish yellow; capsule 4 mm. long, 1-celled; styles 3, distinct, short, each capped by a broad flat stigma.

Type U. S. National Herbarium no. 304022, collected by C. G. Pringle in damp sandy meadows and lava fields on the Sierra de Ajusco, Distrito Federal, altitude 2,400 meters, October 3, 1896 (no. 6527); also collected by Mr. Pringle near the same locality, September 7, 1901 (no. 9357). This species was distributed as *H. philonotis* Schlecht. & Cham., from which, however, it must be very different.

VIOLACEAE.

A NEW CALCEOLARIA.

Calceolaria humilis Rose & Dowell, sp. nov. PLATE XLII.

Perennial, stem herbaceous, branching from the woody base, 10 to 20 cm. high, branches decumbent or ascending, pubescent in two lines; leaves opposite, short-petioled, 1 to 3 cm. long, 1 to 2 cm. wide, orbicular to ovate, acute or obtuse, glabrous, crenate-serrate, the blade decurrent on the ciliate petiole, this about 2 mm. long; stipules subulate to lanceolate and foliaceous, 4 to 8 mm. long, glabrous; flowers violaceous, nodding on slender, one-flowered, solitary, axillary peduncles; peduncles puberulent, 6 to 8 mm. long, the bracts opposite near the articulation; sepals lanceolate, acuminate, 3-nerved, glabrous, 4 mm. long; lip orbicular, slightly longer than its claw, 4 to 5 mm. long, the claw broadly winged, 5-nerved; lower stamens puberulent on the lower part of the connective above the gland-like appendages; capsule ovoid-globose, with a blunt beak, glabrous.

Collected by C. G. Pringle on lava fields near Tizapan, Valley of Mexico, altitude 2,300 meters, July 30, 1901 (no. 9653).

EXPLANATION OF PLATE XLII.—Fig. *a*, plant; *b*, sepals; *c*, petals; *d*, two views of stamens. Fig. *a*, scale ½; *b* and *c* natural size; *d*, scale about 2.

CACTACEAE.

ESCONTRIA, A NEW GENUS.

Escontria Rose, gen. nov.

Flowers small, tubular; ovary globular, covered with imbricating chartaceous, translucent, persistent scales, without spines or hairs; tube of flower narrow, also bearing scales like those of the ovary; petals erect, narrow, yellow; stamens and stipe included; fruit globular, scaly, purple, fleshy, edible; seeds black. Tree, very much branched; ribs of stems few.

This genus is segregated from Cereus on account of its small tubular flowers and scaly fruit. So far as I am aware the species upon which it is founded has no near relatives among the many described species of Cereus. Mr. G. N. Collins has photographed fruit of this or a closely related species at the Isthmus of Tehuantepec.

This genus is named for the late Señor Don Blas Escontría, who was Ministro de Fomento of Mexico at the time of his death, which occurred in January of this year. Señor Escontría was a man of high scientific attainments and took a great interest in all subjects relating to the scientific development of his country.

Escontria chiotilla (Weber) Rose. PLATE XLIII.

Cereus chiotilla Weber; Schumann, Ges. Kakteen 83. 1899.

From 4 to 7 meters high; trunk very short; branches very numerous, forming a very compact head, weak and easily broken, bright green, not at all glaucous; ribs 7 or 8, acute; areoles closely set, often running together, elliptical; radial spines 10 to 15, rather short, often reflexed; centrals several, one much longer, somewhat flattened, sometimes 7 cm. long, all light-colored; flowers borne near the ends of the branches, small, including the ovary about 3 cm. long; petals nearly erect, yellow; ovary and calyx tube covered with overlapping ovate, cartilaginous scales but without wool, spines, or hairs; fruit glabrous, about 5 cm. in diameter, edible, scaly.

The fruit is sold in the market at Tehuacán under the name of "geotilla" or "chiotilla" and as "tuna."

Very common at Tehuacan and Tomellín.

Specimens examined:

Puebla: Near Tehuacán, Rose & Painter, August 31, 1905 (no. 9939);

Oaxaca: Near Tomellín, Rose & Hough, June 23, 1899 (no. 4663); Rose & Painter, September 4, 1905 (no. 10107).

NEW SPECIES OF OPUNTIA AND ECHINOCACTUS.

Opuntia megarrhiza Rose, sp. nov.

Roots long (30 to 60 cm.) and very thick (5 to 6 cm. in diameter); stems low (20 to 30 cm. high), much branched at base; lower joints elongated, 20 to 30 cm. long, thin and pliable; lateral joints appearing along the margins of the older joints and often if not generally in the same plane; sepals small, ovate, reddish or rose-colored, acute and even apiculate; petals about 15, pale lemon or even rose-colored, 2 cm. long, obovate, mucronate-tipped; stamens short, numerous, erect; style longer than the stamens; stigmas about 7, greenish; ovary clavate, 3 cm. long, the areoles numerous, generally spineless but very woolly; umbilicus deep and broad; mature fruit not seen.

Type U. S. National Herbarium no. 570115, collected by Dr. E. Palmer near Alvarez, San Luis Potosí, May, 1905 (no. 607).

Echinocactus grandis Rose, sp. nov.

Cactus body 1 to 2 meters high, 60 to 100 cm. in diameter; ribs numerous (exact number not recorded), rather high, not undulate, bearing many closely set groups of spines; no distinct areole, but a continuous broad groove filled with felt-like hair in which are set the spines; radial spines 5 or 6 (10 specimens examined), about equal, 3 to 4 cm. long, straight and stiff, erect or slightly spreading; one very distinct central spine stouter and longer (4 to 5 cm. long) than the radial ones, distinctly banded as are some of the radial ones; all of the spines at first yellow, but the old ones becoming reddish brown; tops of flowering plants covered with dense white wool; flowers, including ovary, 4 to 5 cm. long, yellow; sepals lanceolate, tipped with a long mucro (almost spinescent), the margin more or less serrulate; petals somewhat similar but broader, obtuse at the apex and with a weaker mucro; fruit 5 to 6 cm. long, densely covered with long downy wool, tipped by the persistent flower, dry, many-seeded, the bracts few and spinescent; seeds blackish, smooth, shining.

Very common on the limestone hills near Tehuacán, Puebla.

Type U. S. National Herbarium no. 461288, collected by C. G. Pringle in 1900 (no. 6696). Also collected by J. N. Rose, August 2, 1903 (no. 5953).

It is remarkable that this species has not heretofore been characterized, for it surely must have been frequently observed by collectors and travelers. It has probably been mistaken for some of the other large species such as *E. ingens*, *E. visnaga*, and *E. grusonii*, which, while they resemble it in a general way, still have very distinct characters.

A.—ESCONTRIA CHIOTILLA WEBER ROSE.

B.—CEPHALOCEREUS MACROCEPHALUS WEBER.

Echinocactus pringlei (Coulter) Rose.

Echinocactus pilosus pringlei Coulter, Contr. Nat. Herb. **3**: 365. 1896.

This species is very distinct from the true *E. pilosus*. Both are under cultivation in Washington.

APIACEAE.

INTRODUCTORY NOTE.

In 1905 was published a supplement[a] to Coulter and Rose's Synopsis of the Mexican and Central American Umbelliferae. During the past year so many new species have been found and so much interesting material has come to hand that it seems best to publish the notes and descriptions.

ARRACACIA, NEW AND OLD SPECIES.

Arracacia aegopodioides Coulter & Rose.

Collected by J. N. Rose and Jos. H. Painter, in oak woods between Pachuca and Real del Monte, Hidalgo, July 19, 1905 (no. 8671); on Sierra de Pachuca, Hidalgo, July 20, 1905 (no. 8853); between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9201).

Arracacia fruticosa Rose, sp. nov.

A meter or more high, the stem woody, at least often so, the herbaceous parts purplish and more or less glaucous, glabrous; basal and lower stem leaves ternately decompound, 30 to 40 cm. long, the ultimate segments small, ovate to lanceolate, sharply toothed or more or less cleft, glabrous; upper stem leaves much reduced; inflorescence much compounded, the rays often forming umbel-like clusters and these sometimes again compounded; rays 15 cm. or less long; involucre bracts and involucel bractlets wanting; but the top and base of the rays granulate; rays numerous, about equal, 3 to 4 cm. long; pedicels 3 mm. long; flowers deep purple; fruit 10 mm. long, smooth; carpels strongly 5-angled; seed deeply concave on the face; middle interval containing a single oil tube, the lateral intervals sometimes with two; carpophores broad and thin; stylopodia small but conical.

Type U. S. National Herbarium no. 453625, collected by J. N. Rose and J. H. Painter near the base of the red hills east of Tehuacán, Puebla, September 6, 1905 (no. 10125). In habit and especially in its frutescent stem this species resembles the genus Coulterophytum, but it has the fruit of a true Arracacia.

Arracacia multifida S. Wats.

Collected by J. N. Rose and Jos. H. Painter, near Tulancingo, Hidalgo, July 22, 1905 (no. 8834); on limestone hillside near Ixmiquilpan, Hidalgo, July 29, 1905 (no. 9048).

Arracacia tenuifolia Rose, sp. nov.

Stems 25 to 35 cm. tall, glabrous throughout, somewhat branched above, naked below; basal leaves large, ternately decompounded into linear, elongated, entire segments; peduncles slender, 8 to 10 cm. long; rays few (3 to 10), stout, 1 to 1.5 cm. long; involucel bractlets several, minute, shorter than the pedicels; pedicels short, 1 to 1.5 mm. long; fruit ovate, 4 mm. long; stylopodia slender-conical.

Type U. S. National Herbarium no. 453208, collected by J. N. Rose and Jos. H. Painter on a ledge of a high cliff near Cadereyta, Querétaro, August, 1905 (no. 9719).

This species is near *A. multifida*, but has smaller and differently shaped fruit, etc.

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[a] Rose, Contr. Nat. Herb. **8**: 331. 1905.

DEANEA, NEW AND OLD SPECIES.

Deanea arguta Rose, sp. nov.

Perennial, 50 to 60 cm. high, glabrous, slightly glaucous; basal leaves 2 or 3 times ternate; petioles slender; leaflets ovate, small, sharply serrate, the terminal ones more elongated, more or less cleft, glabrous except the roughened veins and margin; stem leaves much reduced; peduncle sometimes nearly 20 cm. long, occasionally subsessile, not very stout; rays numerous, about equal, 2 to 4 cm. long; pedicels 2 to 3 mm. long; involucre wanting; involucel bractlets few, linear, a little longer than the pedicels; fruit oblong, 7 mm. long, rounded at each end; wings about half as broad as body; oil tubes in intervals 3 or 4; stylopodium low-conical; seed face deeply concave.

Type U. S. National Herbarium no. 397662, collected by Dr. E. Palmer at Alvarez, San Luis Potosí, September 5 to 10, 1902 (no. 114).

Deanea longipes Rose, sp. nov.

Perennial, 80 to 120 cm. high, simple below, glabrous; basal leaves much dissected, glabrous; ultimate segments lanceolate, acuminate, doubly serrate, or cleft and serrate; stem leaves much smaller, especially the uppermost ones; stipular sheath enlarged; inflorescence somewhat variable, the umbels either sessile or on slender peduncles 15 cm. long; involucral bracts 1 to several, leaflike, more or less toothed or cleft; involucel bractlets linear, entire, much shorter than the pedicels; rays 5 to 6 cm. long; pedicels 9 to 12 mm. long; flowers purplish; fruit glabrous, oblong, 8 mm. long; seeds concave on the face; stylopodia conical.

Collected by C. G. Pringle, at Trinidad, Puebla, August 5, 21, 1905 (no. 13496).

Deanea pringlei Rose, sp. nov.

Rootstock thick and tuberous; stems about one meter high, purplish, glaucous, glabrous or slightly roughened above; basal leaves twice pinnate; leaflets lanceolate, doubly crenate, nearly glabrous above, somewhat scabrous on the margin and veins; peduncles slender; rays few, 3 to 5 cm. long, puberulent; pedicels 2 to 3 mm. long; involucre of a single bract or wanting; involucels small, linear; stylopodia conical; fruit 8 mm. long, oblong, glabrous; oil tubes several in the intervals.

Type U. S. National Herbarium no. 396308, collected by C. G. Pringle on hills near Contadero, Tlaxcala, altitude 2,550 meters, August 27, 1901 (no. 8601).

Resembling *D. arguta*, but with differently shaped leaves, etc.

Deanea purpurea Rose, sp. nov.

Rootstock thick; stems 20 to 30 cm. high, green or if purplish dull, not at all glaucous, with short rough pubescence throughout; basal leaves twice or thrice ternate; peduncle roughish-pubescent; leaflets ovate, simply crenate, roughish-pubescent on both surfaces; peduncles slender; rays 9 or less, 2 to 4 cm. long; pedicels 2 to 3 mm. long; involucre wanting; involucel bractlets several, linear, longer than the pedicels; stylopodia low, conical; fruit 8 mm. long, oblong, glabrous; oil tubes several in the intervals.

Type U. S. National Herbarium no. 453753, collected by J. N. Rose and Jos. H. Painter between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9212); also collected by C. G. Pringle at Hacienda de Cuyamaloya, Hidalgo, August 2, 1904 (no. 449).

This species is nearest *D. pringlei*, from which it differs in its rougher and not at all glaucous flowers, more pubescent leaves, etc.

Deanea (?) tolucensis (H. B. K.) Rose.

Ferula tolucensis H. B. K. Nov. Gen. & Sp. 5: 12. *pl. 418.* 1821.

Peucedanum tolucense Hemsley, Biol. Centr. Am. 1: 570. 1881.

This species, so long a desideratum in all our herbaria, has been frequently collected of late years and from several of the high mountains of central Mexico. An

examination of mature fruit shows clearly that it does not belong to the true Peucedanum of the Old World or to the recently segregated genus Lomatium.

The following specimens are in the National Herbarium:

Jalisco: Volcano de Colima, M. E. Jones, 1893 (no. 235).

Mexico: Nevado de Toluca, C. G. Pringle, 1892 (no. 4233); also Rose & Painter, 1903 (no. 7960); Sierra de las Crucis, C. G. Pringle, 1903 (no. 5953).

Hidalgo: Sierra de Pachuca, C. G. Pringle, 1902 (no. 9816); also Rose & Hay, 1901 (no. 5596).

Puebla: Mount Orizaba, H. E. Seaton, 1891 (no. 118); also Rose & Hay, 1901 (no. 5717).

Deanea tuberosa Coult. & Rose.

Collected by J. N. Rose and Jos. H. Painter, near El Salto, Hidalgo, September 16, 1903 (no. 7064); also in barranca of Rio Aqueducto, near Santa Fé, Valley of Mexico, July 15, 1905 (no. 8618).

ERYNGIUM, NEW AND OLD SPECIES.

Eryngium altamiranoi Hemsley & Rose, sp. nov.

Stems erect, 30 to 50 cm. high, simple below, much-branched above; basal leaves deeply cleft, the edge with a white cartilaginous margin extending beyond the teeth into long white setae; upper stem and floral leaves sessile, deeply parted; heads short-peduncled, rarely 2 cm. long, ovoid, 10 cm. long; bracts few, ovate, pungent, entire or bearing one or even two teeth on each side, the margin white and the inner face cartilaginous and white, usually erect, inclosing the heads; bractlets linear, pungent, somewhat longer than the sepals; sepals ovate, thin, mucronate-tipped; fruit papillose, the papillae usually obtuse.

Type U. S. National Herbarium no. 253003, collected by F. Altamirano, October, 1891 (no. 20).

Common on the plains near Guadalajara.

Specimens examined:

Jalisco: C. G. Pringle, 1902 (no. 9814), and 1903 (no. 11462); Dr. E. Palmer, 1886 (no. 458); Rose & Painter, 1903 (no. 7338); F. Altamirano, 1891 (no. 20).

Eryngium carlinae Delar.

Collected by J. N. Rose and Jos. H. Painter near Tultenango, Mexico, October 13, 1903 (no. 7823); also between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9220).

Eryngium comosum Delar.

Collected by J. N. Rose and Jos. H. Painter near El Salto, Hidalgo, September 16, 1903 (no. 7097); also on rocky banks of streams near San Angel, Valley of Mexico, August 15, 1905 (no. 9492).

Eryngium confusum Hemsley & Rose, sp. nov.

Stems from a slender spindle-shaped root, 20 to 45 cm. high, naked below, with scattered branches above and an umbel of usually 6 branches, glabrous; basal leaves oblanceolate, 5 to 8 cm. long, deeply toothed or cleft, rarely doubly cleft; lower stem leaves somewhat similar; upper stem leaves short, deeply cleft into narrow spinescent entire or toothed lobes; heads short-peduncled (2 to 5 cm. long); involucre bracts narrow, entire or with a tooth on each side, ending in a strong spinescent tip, longer than the heads, ascending; heads ovoid, 10 to 12 mm. long; bractlets small, a little longer than the calyx teeth, except the central ones, these much elongated, resembling the bracts; sepals broadly ovate, keeled on the back, and strongly mucronate at tip, bluish-tinged; fruit covered with white acuminate-pointed scales.

Specimens examined:

Oaxaca: On mountains northeast of Valley of Oaxaca, E. W. Nelson, October 3, 1904 (no. 1565, type); hills at Las Sedas, C. G. Pringle, August 16, 1894; also 1897 (no. 6710).

This species has been confused with *E. comosum*, *E. carlinae*, *E. beecheyanum*, and *E. wrightii*. It has fruit similar to *E. comosum*, but different leaves, heads, and bracts. It differs from the other three species in various ways, but especially in the acuminate fruit scales.

Eryngium leptopodum Hemsley?

Collected by J. N. Rose and Jos. H. Painter, between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9191).

Eryngium monocephalum Cav.

Collected by J. N. Rose and Jos. H. Painter in oak woods between Pachuca and Real del Monte, Hidalgo, July 19, 1905 (no. 8692).

Eryngium serratum Cav.

Collected by J. N. Rose and Jos. H. Painter at Hacienda Ciervo, between San Juan del Rio and Cadereyta, Querétaro, August 20, 1905 (no. 9684); on rocky banks of stream near San Angel, Valley of Mexico, August 15, 1905 (no. 9491); between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9228).

Eryngium sp.

Collected by J. N. Rose and Jos. H. Painter, between Somoriel and Las Lajas, Hidalgo, August 5, 1905 (no. 9190).

PRIONOSCIADIUM, NEW AND OLD SPECIES.

Prionosciadium diversifolium Rose.

Collected by J. N. Rose and Jos. H. Painter, in Cañon de la Mano Negra, near Iguala, Guerrero, August 11, 1905 (no. 9336).

Prionosciadium nelsoni Coult. & Rose.

Collected by J. N. Rose and Jos. H. Painter, in barranca near Cuernavaca, Morelos, September 12 and 13, 1905 (no. 10209).

Prionosciadium palmeri Rose, sp. nov.

Perennials from deep-seated roots; stem stout, about 2 meters high, much branched; basal leaves very large, twice ternate, then pinnately parted or lobed; main rachis and secondary branches not at all winged; leaf segments rather large, more or less confluent, cuneate at base, obtuse, more or less scabrous on the veins, especially below; primary and secondary peduncles umbellate; umbel proper many-rayed; rays stout, about 3 cm. long; pedicels 2 to 3 mm. long, involucre wanting; involucel bractlets minute; fruit oblong, 12 mm. long, glabrous, wings about as broad as body; oil tubes about 3 in the intervals.

Type U. S. National Herbarium no. 397608, collected by Dr. E. Palmer near Alvarez, San Luis Potosí, September 5, 1902 (no. 60).

Perhaps nearest *P. pringlei*, but it is apparently a stouter plant, and has more strongly toothed leaves, glabrous fruit, etc.

Prionosciadium palustre Rose.

Collected by J. N. Rose and Jos. H. Painter, on pedregal near Yautepec, Morelos, July 12 and 13, 1905 (no. 8563.)

Prionosciadium watsoni Coult. & Rose.

Collected by J. N. Rose and Jos. H. Painter, on limestone hillside near Ixmiquilpan, Hidalgo, July 7, 1905 (no. 8964); Hacienda Ciervo, between San Juan del Rio and Cadereyta, Querétaro, August 20, 1905 (no. 9640).

SPECIES OF SEVERAL GENERA.

Apium ammi Urban.

Collected by J. N. Rose and Jos. H. Painter, on mountain side, Hacienda de la Encarnación, Mexico, July 7, 1905 (no. 8467).

Centella asiatica (L.) Urban.

Collected by Dr. E. Palmer, near San Dieguito, San Luis Potosi, June, 1905 (no. 625).

This is the first time the genus has been reported from Mexico, although its occurrence there is not a surprise. It will doubtless be found in many places along the eastern coast.

Coaxana ebracteata Rose.

Oaxacana ebracteata Rose, Contr. Nat. Herb. **8**: 337. 1905, by error.

Stems tall, 60 cm. or more high, erect, glabrous; upper leaves twice ternate; leaflet ovate, acute, more or less cleft and sharply serrate; petioles wanting, the stipular bases of the leaves much enlarged and scarious; peduncles short, 7 to 8 cm. long; rays numerous, spreading, 3 to 4 cm. long; involucre and involucel bractlets wanting; flowers purplish, the sterile ones on slender pedicels, the fruiting ones very short or subsessile.

Collected by C. and E. Seler between Hurtztan and Oxchuc, Chiapas, March 11, 1906 (no. 2148).

Hydrocotyle sp.

Collected by J. N. Rose and Jos. H. Painter, on river bank near Ixmiquilpan, Hidalgo, July 29, 1905 (no. 9082).

Hydrocotyle sp.

Collected by J. N. Rose and Jos. H. Painter, on river bank in alluvial soil near Tomellín, Oaxaca, September 4, 5, 1905 (no. 10053).

Lomatium dasycarpum (Torr. & Gr.) Coult. & Rose.

Collected by E. A. Goldman in the San Pedro Martir Mountains, Lower California, July 15, 1905 (no. 1138).

This is new to the Mexican Flora.

Sphaenosciadium eryngiifolium (Greene) Coult. & Rose.

Collected by E. A. Goldman in the San Pedro Martir Mountains, Lower California, Mexico, 1905 (no. 1230).

This is new to the Mexican Flora.

ADDENDA.

A NEW IONOXALIS.

Ionoxalis stolonifera Rose, sp. nov.[a]

A very delicate plant producing long, slender, branching stolons; bulbs small for the genus (4 to 5 mm. in diameter), growing in damp moss on perpendicular cliffs; bulb scales thin, black, 3-nerved; leaflets 3, 5 to 18 mm. long, wedge-shaped, the apex strongly notched and the lobes usually very unequal; peduncles slender, usually longer than the petioles, solitary or few-flowered; sepals 2 mm. long; petals violet-purplish, 12 mm. long.

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[a] This remarkable species, inserted while the paper is in proof, is the only one herein published based on the collections of 1906.

Type U. S. National Herbarium no. 461983, collected by Dr. C. G. Pringle on Sierra de Tepoxtlan, September 3, 1906 (no. 13768); previously collected by J. N. Rose at same station (August 7, 1906, no. 11127).

This is a very peculiar species, differing from all others which I have ever seen in being stoloniferous. The leaflets are also peculiar in having the apex oblique, one lobe usually being much longer than the other.