

STUDIES IN AMERICAN PHASEOLINEAE

BY C. V. PIPER

INTRODUCTION

The Phaseolineae include those papilionate legumes having the peduncles "knotty," that is, covered with pedicellar glands, and with the style bearded. The principal genus is *Phaseolus*, and the other long-recognized ones are *Physostigma*, *Minkelersia*, *Voandezia*, *Vigna*, *Pachyrhizus*, *Dolichos*, and *Psophocarpus*. In recent times several of the groups long since proposed as genera have been reestablished, such as *Lablab*, *Otoptera*, *Sphenostylis*, and *Chloryllis*. Newly proposed genera include *Dyslobium*, *Ramirezella*, *Oxyrhynchus*, *Monoplegma*, *Kerstingiella*, *Dolichopsis*, *Adenodolichos*, and *Spathionema*. *Strophostyles* Elliott is commonly recognized by American botanists. There is thus exhibited a marked tendency to enlarge the number of genera. In this process *Dolichos* has been divided into four genera, *Vigna* into five, while from *Phaseolus* Prain has wisely separated *Dyslobium* and the American botanists retain *Strophostyles*.

Of the genera listed above, *Minkelersia*, *Pachyrhizus*, *Ramirezella*, *Oxyrhynchus*, *Monoplegma*, *Dolichopsis*, and *Strophostyles* are purely American; *Phaseolus* is predominately a New World genus, while *Vigna* is largely Old World. The other genera are all Old World. *Dipogon* Liebmann from Brazil is obscure but is referred by Harms to *Dolichos*.

Of the 12 American genera, two, *Condyllostylis* and *Alepidocalyx*, are here first proposed. *Plectrotropis* Schum. & Thonn. is considered a valid genus. *Oxyrhynchus* has been discussed at length by Piper.¹ In the present paper *Minkelersia* and *Ramirezella* are fully treated. Notes and in most cases new species are here given in all the other genera except *Pachyrhizus* and *Dolichopsis*.

In the course of this study material has been examined in various herbaria, and if cited is indicated by the following symbols:

N. United States National Herbarium.

G. Gray Herbarium.

Y. New York Botanical Garden.

K. Royal Botanic Gardens, Kew.

¹ Journ. Washington Acad. Sci. 14: 46-49. 1924.

- L. British Museum (Natural History).
 P. Muséum d'Histoire Naturelle, Paris.
 B. Jardin Botanique de l'Etat, Brussels.
 F. Field Museum of National History.
 Mo. Missouri Botanical Garden.
 E. Botanical Garden, Edinburgh.

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KEY TO AMERICAN GENERA OF PHASEOLINEAE

Keel straight, not laterally curved or coiled.

Stigma surrounded by a ring of hairs..... **OXYRHYNCHUS.**

Stigma not surrounded by a ring of hairs.

Style tip explanate, the stigma lateral. Pods septate. **PACHYRHIZUS.**

Style tip not explanate.

Plants shrubby; upper calyx lip longer than the lower; pods woody, not septate..... **MONOPLEGMA.**

Plants herbaceous; upper calyx lip shorter than the lower; pods not woody.

Pods septate..... **DOLICHOPSIS.**

Pods not septate..... **VIGNA.**

Keel laterally curved, curled, or coiled.

Keel merely curved.

Style with a globose enlargement near the middle.... **CONDYLOSTYLIS.**

Style filiform.

Keel with a protuberance on the left side..... **PLECTROTROPIS.**

Keel without lateral protuberance.

Bracts small, few-nerved..... **STROPHOSTYLES.**

Bracts large, many-nerved..... **RAMIREZELLA.**

Keel curled or coiled.

Calyx lobes all longer than the tube..... **MINKELERSIA.**

Calyx lobes not all longer than the tube.

Bracteoles none..... **ALEPIDOCALYX.**

Bracteoles present..... **PHASEOLUS.**

MONOPLEGMA

Monoplegma trinervium (Donn. Smith) Piper.

Dioclea trinervia Donn. Smith, Bot. Gaz. 56:53. 1913.

Monoplegma sphaerospermum Piper, Journ. Washington Acad. Sci. 10:432. 1920.

Dr. J. N. Rose has called my attention to the identity of these two plants, which necessitates a change in name.

VIGNA

Vigna, excluding *Otoptera* and *Sphenostylis*, is represented by far more species in the Old World than in the New. *Ramirezella* and *Dolichopsis* both appear to be valid genera distinct from *Vigna*, but the American species left in *Vigna* are very diverse forms.

***Vigna aristata* Piper, sp. nov.**

Herbaceous; stems terete, very sparsely puberulent; stipules lanceolate, acute, pubescent, 5-nerved, 5 mm. long; petioles shorter than the leaflets; stipels lance-linear, acute, pubescent, 3-nerved, 5 mm. long; leaflets 3, membranous, ovate, acuminate to an acute point tipped with an awn 3 mm. long, broadly cuneate at base, nearly glabrous on both sides but with a few hairs along the veins, not paler beneath, 8 to 10 cm. long; peduncles about as long as the leaves; racemes more or less congested, 5 to 12 flowered; pedicellar glands elongate; bracts oblong-obovate, acuminate, sparsely pubescent, 7-nerved, 7 mm. long, concealing the bud; pedicels glabrous, one-fifth as long as the calyx; bracteoles oblong, acute, pubescent, 7-nerved, as long as the calyx tube; calyx campanulate, 7 to 8 mm. long, pubescent, ciliate, the short upper lip emarginate, the lower lip with 3 subequal triangular acute teeth nearly as long as the tube; corolla purple (?), 2 cm. long; standard orbicular, not emarginate, strongly reflexed at the middle, the basal half compressed to form a deep trough, each edge of this much thickened and projecting to form a ridge basally expanded into a lobe, the stipe short and curved; wings as long as the standard, the blade broadly spatulate, its upper basal angle produced into a rounded lobe, the broad stipe half as long as the blade; keel strongly falcate, not at all twisted, short-beaked at orifice, minutely ciliate toward the tip, the blades angled at base, the stipes short; stamens united for more than half their length, the free one enlarged and curved at base; anthers yellow, oblong, notched at base; ovary linear, puberulent; style much thickened above, and for 4 mm. below the stigma minutely antrorse-puberulent; stigma terminal, produced on the ventral side; very young pod much compressed.

Type in the U. S. National Herbarium, no. 1,191,864, collected at Salento, Caldas, Colombia, July, 1922, "cultivated in a garden," by A. J. Salazar (no. 10).

A noteworthy species which adds to the very diverse forms now referred to the genus *Vigna*.

***Vigna lonchophylla* Piper, sp. nov.**

Herbaceous vine; stems slender, terete, sparsely retrorse-puberulent; stipules triangular, acute, brownish, faintly 3-nerved, 2 to 3 mm. long; petioles slender, shorter than the leaflets, the portion between the lateral and terminal leaflets elongate; stipels lanceolate, acute, 3-nerved, brown, 2 mm. long; petiolules puberulent; leaflets 3, membranous, lanceolate, acute and apiculate, rounded at base, sparsely puberulent on both sides, 12 to 15 mm. long; peduncles much exceeding the leaves; racemes loose, 10 to 15 flowered; pedicellar glands prominent; bracts caducous, not seen; pedicels glabrous, twice as long as the calyx; bracteoles orbicular, strongly 5-nerved, one-fourth as long as the calyx; calyx campanulate, glabrous except the ciliate margin, 7 mm. long, the short upper lip scarcely emarginate, the lateral teeth broadly triangular, acute, the median tooth longer and narrower, as long as the calyx tube; corolla purple (?), 12 mm. long; standard nearly orbicular, emarginate, thickened in the middle below, a deep sinus at base, short-stipitate, a small inflexed auricle at base of blade on each side, 10 to 12 mm. long, nearly as broad; wings obliquely obovate, obtuse, cuneate at base, not stipitate, without auricles, two-thirds as long as the keel; keel tubular, falcate, the mouth oblique; anthers rectangular in outline, notched

at base, in two series as to length; style beard short-haired, continuous below the stigma for 3 mm.; stigma roundish, terminal, oblique; pods linear, terete, long-beaked, sparsely strigillose, about 5-seeded, 5 mm. long.

Type in the herbarium of the Field Museum of Natural History, no. 95557, collected at Hacienda Coahuayula, Michoacán, Mexico, February, 1901, by G. M. Emrick (no. 97).

***Vigna myrtifolia* Piper, sp. nov.**

A somewhat woody vine; stems terete, pilose; stipules lanceolate, broadest at base, 5 to 7 nerved, pubescent, 5 mm. long; petioles hirtellous, about as long as the leaflets; stipels like the stipules but only 3-nerved and 3 mm. long; leaflets lanceolate, broadest in the middle, coriaceous, reticulate-veined, obtusish at each end, sparsely appressed-pubescent on each side, 5 to 7 cm. long; peduncles slender, pubescent with reflexed hairs, 20 cm. long, bearing about 12 rather crowded sessile flowers; bracts lanceolate, 3-nerved, pubescent, 2 mm. long; calyx turbinate, pubescent, 3 mm. long, the upper lip with 2 short, broad, triangular teeth, the lower with 3 narrower, triangular, acute teeth about two-thirds as long as the tube; bracteoles linear, one-third as long as the calyx; corolla 6 mm. long, yellowish; standard orbicular, the two edges attached in bud; keel strongly incurved at tip, not at all twisted; free stamen enlarged to near the base, then obliquely stipitate; anthers oblong, yellow; ovary linear, glabrous, 5-ovuled; style at nearly a right angle to the ovary, and elbowed near the tip, glabrous except a small tuft of hairs below the stigma on the inner side, the hairs successively longer toward the stigma; stigma globose, obliquely terminal.

Type in the herbarium of the New York Botanical Garden, collected at Buena Vista, Sara, Santa Cruz, Bolivia, May 10, 1921, by J. Steinbach (no. 5635).

The very scanty material, not yet in full bloom, permitted only an incomplete examination of the flowers. As at present predicated, the plant falls in the genus *Vigna*, but it is very different from any other species known.

***Vigna strophiolata* Piper, sp. nov.**

Herbaceous vine; stems slender, terete, sparsely pilose; stipules narrowly triangular-lanceolate, acute, 5 to 7 nerved, pilose beneath, 6 mm. long, each bearing a basal appendage 2 mm. long; petioles sparsely pilose, shorter than the leaflets; stipels triangular-oblong, acute, 1 mm. long; leaflets membranaceous, somewhat rectangularly oblong, abruptly acuminate, truncate at base, sparsely pubescent on both sides, 5 to 6 cm. long; peduncles about as long as the leaves, sparsely pilose; racemes 10 to 15 flowered, the pedicellar glands not large, the flowers mostly in pairs; pedicels a little shorter than the calyx; bracts not seen, quickly fugacious; bracteoles lanceolate, 1-nerved, one-third as long as the calyx; calyx turbinate, nearly glabrous, the upper lip bidentate, the lower lip with 3 subequal triangular acute teeth as long as the tube; corolla yellow, 12 mm. long; pods linear, sparsely puberulent, 3 cm. long, bearing a very short recurved beak, 7-seeded; seeds rhomboidal, brown, shiny, 3 to 4 mm. long, prominently strophiolate.

Type in the herbarium of the New York Botanical Garden, collected in Barbados, West Indies, by J. R. Bovell (no. 443).

This species is readily distinguished by its peculiar leaflets, produced stipules, and particularly by its strophiolate seeds.

***Vigna populnea* Piper, sp. nov.**

Herbaceous, apparently vining; stems terete, 2 to 4 mm. in diameter, pale, minutely appressed-puberulent; stipules triangular, acute, striate, 3 mm. long; petioles equaling or exceeding the leaflets, puberulent; stipels lanceolate, acute, curved, 3-striate, 3 mm. long; leaflets membranaceous, broadly ovate, acuminate with the tip blunt and long-apiculate, rounded or truncate or somewhat cuneate at base, 5 to 10 cm. long, very sparsely strigillose on both surfaces, a little paler

beneath; peduncles 30 to 40 cm. long; racemes many-flowered, the pedicellar glands subglobose; pedicels glabrous, nearly as long as the calyx; calyx campanulate, glabrous except the sparsely ciliate margin, the upper lip short and emarginate, the lower lip with subequal oblong obtuse lobes about as long as the calyx tube; corolla white (?), 12 mm. long; standard orbicular, emarginate, short-stipitate, transversely thickened near the base, the basal auricles short and inflexed; wings as long as the standard, oblong, obtuse, thickened on the upper margins, the stipe one-third as long as the blade; keel falcate, ciliate on the upper margin, the beak short and blunt, the stipe short; free stamen geniculate at base, broadened at the angle; style bearded on the inner side below the tip; stigma oblique; pods linear, compressed, glabrous, tipped with a stout curved beak, 10 cm. long, 1 cm. broad.

Type in the U. S. National Herbarium, no. 461986, collected near Monterrey, Nuevo León, Mexico, June 18, 1889, by C. G. Pringle (no. 2839). Duplicate in the Gray Herbarium.

The habit of the plant is very unlike that of any other American *Vigna*, the leaflets much resembling the leaves of species of *Populus*.

CONDYLOSTYLIS

Condylostylis Piper, gen. nov.

Twining herb; leaves trifoliolate; leaflets 3, each 3-nerved from the base; stipules and stipels striate-nerved; peduncles with pedicellar glands; bracteoles striate-nerved; calyx campanulate, the teeth broad, obtuse, short; standard orbicular, thickish, auricled; wings long-stipitate, oblong, constricted below the middle; keel long-stipitate, the lower portion broad, constricted and slightly twisted above the middle, the beak bottle-shaped; stamens diadelphous, the free one thickened at base and geniculate at a right angle; anthers oblong; style thickened toward the tip, beginning with a globose enlargement above the middle, constricted at the tip and bearing a spatulate appendage, bearded about the stigma and below a short bare space on the inner side; stigma roundish, lateral; pods linear, short-beaked, slightly compressed; seeds cylindrical, the linear hilum more than half as long as the seed.

Type species, *Condylostylis venusta* Piper.

The form of the style and peculiar keel amply distinguish the plant from either *Phaseolus* or *Vigna*.

Condylostylis venusta Piper, sp. nov.

PLATE 64.

Herbaceous vine, glabrous throughout; leaves trifoliolate; petioles about as long as the leaflets; stipules broadly triangular, 2 mm. long, 7-nerved; stipels oblong, 3-nerved; leaflets thin, membranaceous, ovate, strongly acuminate, the tip obtuse and apiculate, rounded to truncate at base, 5 to 7 cm. long; peduncles stout, about as long as the leaves, 5 to 12 flowered; pedicels as long as the calyx; bracts suborbicular, strongly 11-nerved; bracteoles suborbicular, obtuse, 11 to 13 nerved, less than half as long as the calyx; calyx campanulate, 5 mm. long, finely ciliate, the broad upper lip emarginate, the 3 lower teeth broad and obtuse, about one-fourth as long as the tube; corolla apparently purple; standard nearly orbicular, emarginate at tip, 25 mm. long, short-stipitate, reflexed about the middle, the basal portion concave and much thickened, a wide flaplike auricle on each side but not marginal; wings oblong, curved, constricted below the middle, the upper portion oblong, the lower portion much thicker and folded to form a groove down the middle, the slender stipe 8 mm. long, the basal angle bearing a crenulate appendage 2 mm. long; keel curved, the slender stipe 7 mm. long, the basal half of the blade very broad and swollen, much constricted near the middle and slightly twisted, the tubular beak thickened; stamens diadelphous, the free stamen with the filament greatly thickened toward the base and geniculate at a right angle, the basal arm 6 mm. long; anthers oblong, 2 mm. long; style with

a somewhat heart-shaped swelling above the middle, constricted near the tip to form a spatulate sterile appendage bearded about the roundish lateral stigma and, after a short intervening bare space, on the inner side one-third of the distance to the swelling; pods linear, short-beaked, slightly compressed, 5 mm. long, 6 or 7 seeded; seeds cylindrical, mealy, 5 mm. long, 2 mm. thick, the linear hilum more than half as long as the seed.

Type in the herbarium of the Jardin Botanique, Brussels, collected at Surubres near San Mateo, Province of Alajuela, Costa Rica, by P. Biolley (no. 7034).

Another specimen in the Brussels herbarium was collected on the Río Ceibo near Buenos Aires, Province of Punta Arenas, Costa Rica, Pittier 4981; and one in the Gray Herbarium on Upper Moho River, British Honduras, Peck 745.

EXPLANATION OF PLATE 64. *Condylostylis venusta*. 1. Portion of shoot with leaves and raceme. 2. Lateral view of flower. 3. Standard. 4. Wings. 5. Keel petal. 6. Stamens. 7. Pistil. 8. Upper part of style. 9. Tip of style. 10. Stamen. 1, natural size; 2-10, enlarged.

***Condylostylis phlebophylla* Piper, sp. nov.**

Twining herb; stems slender, terete, glabrous or nearly so; stipules triangular-oblong, obtuse, thickish, brown, pubescent, 5-nerved, 2 to 3 mm. long; petioles slender, sparsely pubescent, shorter than the leaflets; stipels oblong, brown, 2 mm. long; leaflets 3, membranous, ovate, acuminate to a blunt apiculate tip, rounded to truncate at base, the lateral slightly oblique, puberulent on both sides, paler beneath, reticulate-veined, 6 to 8 cm. long; peduncles shorter than the leaves, pubescent; pedicellar glands prominent; raceme few-flowered; bracts not seen; bracteoles broadly ovate, puberulent, 9-nerved, the nerves not reaching the thinner margin, nearly half as long as the calyx; calyx campanulate, minutely puberulent, 7 mm. long, the short upper lip emarginate, the lateral lobes broadly rounded, the median lobe ovate, acutish, thick, as long as the lateral and about one-third as long as the calyx tube; corolla "white"; standard orbicular, emarginate, thickish, 10 mm. long and broad, thickened and sulcate in the middle of the basal half, short-stipitate from a broad shallow basal sinus, a large inflexed auricle on each side of the base of the blade; wings as long as the keel, the blades broad, strongly curved, constricted in the middle, rounded at apex, truncate at base and produced on the upper angle, the rather broad stipe 4 mm. long; keel slightly twisted, broad, strongly curved, the basal half flat, truncate, with a stipe 5 mm. long, the terminal half narrower, inflated, and tipped with a short narrow tube 3 mm. long; free stamen much thickened at base and geniculate at a right angle; stamen tube much broadened at base, the filaments united for two-thirds their length; anthers oblong, yellow; style with a globose enlargement at two-thirds its length from the base; style beard dense, the hairs somewhat reflexed, extending 3 mm. below the stigma; stigma round, lateral, a flat oblong appendage extending beyond; ovary linear, scabrous, several-ovuled.

Type in the U. S. National Herbarium, no. 1,143,493, collected at Cuchilla, east of Zarzal, Cauca Valley, Colombia, altitude 1,200 to 1,600 meters, July 27, 1922, by Pennell, Killip, and Hazen (no. 8550).

STROPHOSTYLES

This genus seems to contain but three species, largely confined to the United States, but one, *S. helvola* (L.) Britton, ranges northward into Quebec, and another southward into Mexico. The last needs modification in its name.

***Strophostyles leiosperma* (Torr. & Gray) Piper.**

Phaseolus leiospermus Torr. & Gray, Fl. N. Amer. 1: 280. 1838.

Phaseolus pauciflorus Benth. Comm. Leg. Gen. 76. 1837. Not *P. pauciflorus* Don, 1832.

Strophostyles pauciflora S. Wats. in A. Gray, Man. ed. 6. 145. 1890.



E. J. Schott. Walms.

CONDYLOSTYLIS VENUSTA PIPER

RAMIREZELLA

This genus is seemingly valid, being based primarily on its rostrate curved keel, crowded large flowers, and large many-nerved bracts. The species are confined to Mexico, except one in Salvador. Six of the eight species are very closely related one to another.

KEY TO THE SPECIES

- Lower calyx lip half as long as tube..... 1. *R. lozani*.
 Lower calyx lip less than half as long as tube.
 Bracteoles 1-nerved; pods narrow; rachis not thickened..... 2. *R. nitida*.
 Bracteoles 3-nerved; pods broad; rachis thickened.
 Leaflets pubescent beneath.
 Calyx glabrous except the ciliation; pods glabrous... 3. *R. strobilophora*.
 Calyx pubescent; pods pubescent..... 4. *R. pubescens*.
 Leaflets glabrous or nearly so.
 Pedicels three times as long as calyx..... 5. *R. buseri*.
 Pedicels short.
 Leaflets thin, shiny beneath..... 6. *R. glabrata*.
 Leaflets thickish, dull.
 Corolla 2 cm. long..... 7. *R. ornata*.
 Corolla 1.5 cm. long..... 8. *R. occidentalis*.

1. *Ramirezella lozani* (Rose) Piper.

Phaseolus lozani Rose, Contr. U. S. Nat. Herb. 12: 274. 1909.

MEXICO: Uruapan, Michoacán, Pringle 10358 (type; N).

2. *Ramirezella nitida* Piper, sp. nov.

Vine, somewhat woody below, glabrous to the inflorescence; stems terete, up to 2 mm. in diameter; stipules ovate, acute, firm, striate, persistent, 5 mm. long; petioles slender, not as long as the leaflets; stipels narrowly triangular, striate, persistent; petiolules pubescent; leaflets very thin and pellucid, ovate, attenuate-acuminate, apiculate, rounded at base, 3-nerved, reticulately veined, shiny on both sides, 6 to 8 cm. long, 3 to 4 cm. broad; peduncles appressed-puberulent, exceeding the leaves; racemes 10 to 15 flowered; bracts firm, ovate, acuminate, striate, quickly deciduous, 6 to 10 mm. long; pedicellar glands small; pedicels longer than the calyx, 3 to 4 mm. long; bracteoles oblong, minute, about one-fourth as long as the calyx; calyx campanulate, glabrous, 4 mm. long, the upper lip very short, emarginate, the lower lip 3-toothed, the lateral ones broadly triangular, acute, the median narrower and longer, two-thirds as long as the tube; corolla violet; standard orbicular, emarginate, reflexed, 12 mm. long, stipitate, the short broad stipe as long as the basal sinus, the auricles not inflexed, the prominent callosities linear; wings 10 mm. long, much shorter than the keel, oblong-spatulate the margins inrolled, the blade tapering into the stipe; keel rostrate, strongly curved, twisted one-half turn toward the tip, broadened near the middle, tapering into the stipe, 20 mm. long along the line of the curve; vexillar stamen free, thickened and geniculate at base; anthers oblong; ovary linear, glabrous; style villous in the uppermost coil; stigma terminal, globose, surrounded by a circlet of a few hairs; pods straight or slightly curved, terete, glabrous, 8-seeded, papery within, 10 cm. long, the tip with a slender curved beak; seeds oblong, reddish marbled with brown, dull, 6 mm. long, 3 mm. wide, 2 mm. thick, the linear hilum two-thirds as long as the seed.

Type in the U. S. National Herbarium, no. 397766, collected near Los Caños, San Luis Potosí, Mexico, October, 1902, by Edward Palmer (no. 217).

3. *Ramirezella strobilophora* (Robinson) Rose, Contr. U. S. Nat. Herb. 8: 44. 1903.

Vigna strobilophora Robinson, Proc. Amer. Acad. 27: 167. 1892.

ILLUSTRATION: Gard. & For. 7: 155.

MEXICO: Guadalajara, Jalisco, *Pringle* 5163 (type; G, N), 4503 (N); *Rose & Painter* 7361 (N). Sierra Madre near Seven Star Mine, *Safford* 07, 136 (N). Chihuahua, *Townsend & Barber* 412 (N).

4. *Ramirezella pubescens* Rose, Contr. U. S. Nat. Herb. 8: 45. 1903.

MEXICO: Road between Tlapa and Taliscatilla, Guerrero, *Nelson* 2046 (type, N).

5. *Ramirezella buseri* (Micheli) Rose, Contr. U. S. Nat. Herb. 12: 274. 1909.

Phaseolus buseri Micheli, Mém. Soc. Phys. Nat. Genève 34: 263. pl. 13. 1903.

Ramirezella pringlei Rose, Contr. U. S. Nat. Herb. 12: 274. 1909.

MEXICO: Sierra Madre, Michoacán or Guerrero, *Langlassé* 799. La Bateele, Michoacán or Guerrero, *Langlassé* 661 (type collection of *P. buseri*; N). Tula, *Pringle* 10218 (type of *R. pringlei*; N).

6. *Ramirezella glabrata* Rose, Contr. U. S. Nat. Herb. 8: 45. 1903.

MEXICO: Bolaños, Jalisco, *Rose* 2853 (type; N). Between Huejuquilla and Mesquitec, Jalisco, *Rose* 2562 (N).

7. *Ramirezella ornata* Piper, sp. nov.

Perennial, herbaceous vine; stems terete, glabrous or sparsely strigulose; stipules oblong-ovate, acute, many-nerved, 5 mm. long; petioles mostly shorter than the leaflets, appressed-pubescent; leaflets three, membranous, ovate, the lateral slightly oblique, long-acuminate, the tip cuspidate, rounded at base, similarly green on both sides, sparsely strigulose on each side, 5 to 8 cm. long; peduncles 6 to 8 cm. long, about equaling the raceme; rachis of the inflorescence thick, nearly glabrous; raceme crowded, 15 to 20 flowered; bracts chartaceous, ovate, acute, many-nerved, 1 cm. long; pedicels 2 cm. long; calyx campanulate, glabrous, 7 to 8 mm. long, the lobes subequal, rounded, ciliate, less than half as long as the tube; corolla 2 cm. long; pods cylindrical, straw-colored, glabrous, thick-valved, 15 cm. long, twisting 3 times in dehiscence; seeds lenticular, 1 cm. in diameter, 4 mm. thick, shiny, reddish brown, mottled darker; hilum oblong, white, half as long as the seed.

Type in the U. S. National Herbarium, no. 1,152,147, collected August, 1922, at San Salvador, Salvador, where cultivated under the name "choncho," by Dr. Salvador Calderón (no. 1174). Also collected in June, 1925 (no. 2304), in flower, and February, 1923, in ripe fruit.

Allied to *R. strobilophora*, but at once distinguished by the glabrous stipules, nearly glabrous leaves, and larger flowers, the largest in the genus.

8. *Ramirezella occidentalis* Rose, Contr. U. S. Nat. Herb. 8: 45. 1903.

MEXICO: Acapulco, *Palmer* 179 (type; N); *Thiebaud* 1163 (P).

MINKELERSIA

This genus was based on a single species, *M. galactoides* Mart. & Gal., from the Cordillera of Oaxaca near the Pacific Ocean, 1,200 to 1,800 meters altitude, Mexico, collected by Galeotti (no. 3175). A second species, *M. biflora*, was proposed by Hemsley,¹ the type from the Valley of Mexico, collected by Schaffner. Both are figured by Hemsley in the *Biologia Centrali-Americana*.² The essential difference between the two supposed species was that the peduncles of the former

¹ Diag. Pl. Mex. 48. 1880.

² 5: pl. 16.

were 1-flowered, of the latter 2-flowered. This character breaks down completely, some of the specimens in the National Herbarium having both types of peduncles on the same plant.

Rose¹ added two species with racemose inflorescence to the genus, *M. multiflora* and *M. pauciflora*, both from Mexico. An additional species, *M. vulcanica*, is described here.

The most striking character of the genus is the calyx, the five subequal lobes of which are much longer than the calyx tube.

KEY TO THE SPECIES

Peduncles each bearing one or two flowers. Bracteoles wanting.

1. *M. galactoides*.

Peduncles each bearing a raceme.

Bracteoles minute; stipules and bracts small, lanceolate... 2. *M. pauciflora*.

Bracteoles wanting; stipules and bracts large, broadly ovate.

Herbage glabrous or nearly so..... 3. *M. multiflora*.

Herbage pubescent..... 4. *M. vulcanica*.

1. *Minkeliersia galactoides* Mart. & Gal. Bull. Acad. Brux. 10¹: 200. 1843.

Minkeliersia biflora Hemsl. Diag. Pl. Mex. Pl. 48. 1880.

The specimens examined are all in the National Herbarium.

CHIHUAHUA: Pine lands, base of Sierra Madre, *Pringle* 1232. Marsh Lake, September 19, 1903, *Jones*. Near Colonia García, *Townsend & Barber* 319.

SINALOA: Tres Hermanos, Concordia, *Dehesa* 1548.

ZACATECAS: Near Plateado, on road from Colotlán, *Rose* 2696.

JALISCO: Sierra Madre, west of Bolaños, *Rose*.

MICHOACÁN: Morelia, *Arsène* 5841, 2579. Cerro Azul, *Arsène* 6576. Carocal, *Altamirano* 859.

2. *Minkeliersia pauciflora* Rose, Contr. U. S. Nat. Herb. 5: 142. 1897.

The specimens examined are all in the National Herbarium.

JALISCO: Sierra de los Morones, near Plateado, *Rose* 2722. Sierra Madre, near Bolaños, *Rose* 2967.

OAXACA: Eighteen miles northeast of Oaxaca, *Nelson* 1362 (type).

3. *Minkeliersia multiflora* Rose, Contr. U. S. Nat. Herb. 5: 142. 1897.

The specimens examined are all in the National Herbarium.

MEXICO: Valley of Mexico, *Pringle* 6471 (type); *Bourgeau* 576. El Oro, *Pringle* 9551a. Tolma, *Rose & Painter* 6884, 6771. Guadalupe, *Rose & Painter* 7299.

MORELOS: El Parque, *Orcutt* 3835; *Rose & Painter* 7228.

OAXACA: Cumbre de Istepec, *Liebmann* 5317.

WITHOUT DEFINITE LOCALITY: *Dugès*.

4. *Minkeliersia vulcanica* Piper, sp. nov.

Stems erect (?), terete, pubescent with spreading hairs; stipules ovate, obtuse, pubescent beneath, 9-nerved, 6 mm. long; petioles pubescent, shorter than the leaflets; leaflets ovate, acute, rounded at base, pubescent on both sides, 2 to 2.5 cm. long; peduncles bearing racemes of 12 to 20 flowers; bracts like the stipules; pedicels shorter than the calyx; bracteoles wanting; calyx 10 mm. long, the tube campanulate, minutely pubescent, the lanceolate acutish lobes subequal, twice as long as the tube; corolla 14 mm. long; standard orbicular; keel with two and one-half close coils.

¹ Contr. U. S. Nat. Herb. 5: 142. 1897.

Type in the herbarium of the Muséum d'Histoire Naturelle, Paris, collected on the Volcano Batea, Mexico, 2,000 to 2,200 meters altitude, in 1872, by M. E. Guillemin-Tarayre.

The specimen is fragmentary, consisting of two racemes, one of them bearing a single leaf. The species is nearest *M. multiflora* Rose, from which it is at once distinguished by the pubescence.

ALEPIDOCALYX

Alepidocalyx Piper, gen. nov.

Perennial from a globose tuber; stems erect or twining above, 15 to 60 cm. high; leaves pallid, rather thickish; bracteoles wanting; petals long-stipitate; callosity on the standard transverse; otherwise as in *Phaseolus*.

Type species, *Phaseolus parvulus* Greene.

This genus is intermediate between *Phaseolus* and *Minkeliersia*. As in all but one of the species of *Minkeliersia*, the bracteoles are absent. If *Alepidocalyx* be merged into *Phaseolus*, *Minkeliersia* could hardly be consistently maintained.

KEY TO THE SPECIES

- Leaflets ovate; calyx teeth very obtuse 1. **A. amblyosepalus**.
 Leaflets lanceolate; calyx teeth acute or acutish.
 Bracts deciduous, small; stipules small 2. **A. parvulus**.
 Bracts persistent, larger; stipules larger 3. **A. anisophyllus**.

1. Alepidocalyx amblyosepalus Piper, sp. nov.

Tuber globose, 1 cm. in diameter; stems erect, thick, 15 cm. high, densely puberulent with somewhat reflexed hairs; leaves few; stipules ovate, obtuse, striate-nerved, nearly glabrous, 5 to 10 mm. long; petioles minutely puberulent, a little longer than the leaflets; leaflets ovate, obtuse, truncate at base, 3-nerved, minutely strigillose on both sides, 1.5 cm. long; peduncles puberulent, 2 to 3 times as long as the leaves; racemes 1 to 3 flowered; bracts broadly oval, 5 mm. long; pedicels densely puberulent, 2 mm. long; calyx campanulate, puberulent at base, 3 mm. long, the broad upper lip emarginate, the lower lip with 3 broad rounded lobes, shorter than the tube; corolla violet, 10 mm. long.

Type in the U. S. National Herbarium, no. 1,013,387 in part, collected in the State of Durango, Mexico, by P. Ibaña García (no. 456 in part). The type specimen consists of but a single plant.

2. Alepidocalyx parvulus (Greene) Piper.

Phaseolus parvulus Greene, Bot. Gaz. 6: 217. 1881.

New Mexico and Arizona, southward into Mexico.

3. Alepidocalyx anisophyllus Piper, sp. nov.

Stems twining, terete, glabrous, 30 cm. high; stipules oblong, acute, glabrous, nerved, 8 to 10 mm. long; petioles glabrous, about as long as the leaflets; stipules lanceolate, acute, 2 to 3 mm. long; petiolules puberulent; leaflets lance-oblong, the lateral ones usually with a lobe on the outer side near the base, obtuse and apiculate at apex, glabrous, 2 to 6 cm. long; peduncles (in fruit) exceeding the leaves, few (3 to 5) flowered, minutely retrorse-puberulent; bracts ovate, acute, nerved, persistent, 3 to 4 mm. long; calyx campanulate, puberulent, the lobes acute; pods linear, compressed, 3 cm. long, 4 mm. wide, glabrous, short-beaked, 6-seeded; seeds ellipsoid-cylindric, 4 mm. long, reddish brown, shiny; hilum minute, circular.

Type in the U. S. National Herbarium, no. 332953, collected on Mount Mohinora, Chihuahua, Mexico, September 1, 1898, by E. W. Nelson (no. 4911). The specimen is in ripe fruit.

PHASEOLUS

Phaseolus is the largest and most complex genus in the group. No extensive treatment of the genus is more recent than those of Bentham in 1840 (Ann. Wien. Mus. Naturg. 2: 136-142) and in 1859 (in Mart. Fl. Bras. 15¹: 180-191). Since then many isolated species have been proposed, and in various floras of limited areas the native species have been considered.¹

Nearly all the species of *Phaseolus* show great variation in the form of the leaflets. Very commonly these will range from broadly ovate to lanceolate or to linear in the same species; or from entire to lobed, usually by production of the basal angles, that is, hastate or 3-lobed. Such variants are scarcely worthy of taxonomic recognition. Of more significance are the bracts, which in some species may be either long or short.

Many species and subspecies have been based on leaflet form or on slight differences in pubescence, characters which in *Phaseolus* are decidedly untrustworthy.

The relationships of the different groups in the genus are not very clear. For the present the groups established by Bentham are in the main recognized, but it is probable that the difference between a curled keel and a coiled keel is of greater significance than are the calyx characters.

KEY TO THE SECTIONS OF PHASEOLUS

- Keel loosely curled like the letter S..... **Sigmoidotropis.**
 Keel coiled in one or more close turns.
 Stipules produced. Corolla yellow or yellowish.
 Left keel petal with a lateral hornlike process; annuals (Old World).
Ceratotropis.
 Left keel petal without process; perennials (American)..... **Lasiospron.**
 Stipules not produced.
 Calyx subtubular. Wings much elongated..... **Macroptilium.**
 Calyx campanulate.
 Flowers small; calyx teeth subequal, as long as or longer than the tube.
Microcochle.
 Flowers middle-sized to large; calyx teeth unequal or all shorter than the tube.
 Keel tip coiled into 5 to 7 turns..... **Cochliasanthus.**
 Keel tip coiled into 1 to 3 turns.
 Calyx tube not longer than at least the ventral tooth... **Leptospron.**
 Calyx tube longer than the teeth..... **Euphaseolus.**

¹ Since this paper has been in press there has appeared a review of the South American species of *Phaseolus* by E. Hassler (Candollea 1:417-472. 1923), based largely on the rich herbarium material available at Geneva. Some of the conclusions reached in the present paper were anticipated by Hassler, and these are acknowledged in the appropriate places. Some recently proposed species are not included in Hassler's paper.

PHASEOLUS: SECTION SIGMOIDOTROPIS

This section of *Phaseolus* seems a natural assemblage, and is distinguished by the loose S-form of the keel. Most of the species are large-flowered and showy. Bentham included this group of species in *Euphaseolus*, but it seems preferable to limit that section to species with the keel closely coiled. *Sigmoidotropis* embraces the following species: *P. speciosus* H. B. K., *P. grandiflorus* Steud., *P. pius* Mart., *P. firmulus* Mart., *P. appendiculatus* Benth., *P. cochleatus* Vell., *P. vignoides* Rusby, *P. antillanus* Urban, *P. peduncularis* H. B. K., *P. clitorioides* Mart., and probably *P. obliquifolius* Mart. and *P. latidenticulatus* Harms, besides the following new species here described: *P. elegans*, *P. pulchellus*, *P. robustus*, *P. megatylus*, *P. halophilus*, *P. ligulatus*. *Phaseolus speciosus* H. B. K., a common species, may be considered typical of the section, and most of the other species resemble it closely.

Phaseolus peduncularis H. B. K. and *P. antillanus* Urban are referred by Fawcett and Rendle (Fl. Jam. 4: 68-69. 1920.) to *Vigna*. Such a course would logically involve the same reference for all the species of the section here discussed. It would perhaps be better to consider *Sigmoidotropis* as a genus, even if largely on the basis of convenience.

Phaseolus speciosus H. B. K. Nov. Gen. & Sp. 6: 452. 1823.

This species, originally described from the Orinoco River, ranges through much of Mexico, throughout Central America, to Colombia, Ecuador, and Venezuela.

Phaseolus elegans Piper, sp. nov.

Stems terete, glabrous, rather woody; stipules narrowly triangular, acute, 4 mm. long, strongly 7-nerved; petioles slender, shorter than the leaflets; stipels, oblong, obtuse, 2-nerved; leaflets membranous, narrowly ovate, gradually acuminate, rounded at base, glabrous, 4 to 6 cm. long; calyx 6 mm. long, broadly campanulate, glabrous or nearly so, the upper lip short and emarginate, the lower lip with broadly lanceolate, acutish lobes as long as the tube; corolla purple, 2 cm. long and broad; keel tubular, strongly curved, curled into nearly a complete turn; pod linear, glabrous, straight, 10 to 16 cm. long, 5 mm. wide, tipped with a long straight beak; seeds ellipsoid, compressed, ochraceous speckled with black, 5×3×1 mm.; hilum small, central, white, encircled by a black border.

Type in the U. S. National Herbarium, no. 427961, collected in the vicinity of Mona Mountain, near Kingston, Jamaica, April 29, 1903, by William R. Maxon (no. 1666).

JAMAICA: Without special locality, March 399 (G), 1645 (K).

HONDURAS: San Pedro Sula, Thieme 5203 (G, N).

YUCATÁN: Izamal, Gaumer 450 (N, Mo., F), 525 (F). Lake Chichankanab, Gaumer 23665 (F). Kancabonot, Gaumer 23534 (F). San Anselmo, Gaumer 1823 (F). Encina de Sisal, Schott 882 (F). Sayi, Seler 3892 (F).

Closely allied to *P. speciosus* H. B. K., and perhaps to be considered merely a glabrous subspecies.

Phaseolus pulchellus Piper, sp. nov.

Vine, herbaceous or perhaps somewhat woody; stems terete, glabrous; petioles shorter than the leaflets; stipules oblong, rather firm, 3 mm. long; stipels oblong, 3-nerved, 2 mm. long; leaflets rhomboic-ovate, broadly cuneate at base, long-

acuminate to a blunt apiculate tip, sparsely strigillose on both surfaces; peduncles stout, 10 cm. long, the pedicellar glands large; pedicels very short, 2 mm. long; bracts oblong, strongly 5-nerved, 2 mm. long; bracteoles not seen; calyx campanulate, 6 mm. long, glabrous, the margin thin and paler, the short upper lip emarginate, the lower lip with 3 broadly triangular obtuse teeth about one-fourth as long as the tube; corolla 3 cm. long; standard orbicular, emarginate, reflexed from above the middle; wing broadly oblanceolate; keel loosely curled in less than one complete turn.

Type in the U. S. National Herbarium, no. 860619, collected at Semacoch, Alta Verapaz, Guatemala, March 8, 1905, by George P. Goll (no. 264).

The single complete flower was not dissected.

Phaseolus appendiculatus Benth. Ann. Wien. Mus. Naturg. 2: 137. 1840.

?*Phaseolus candidus* Vell. Fl. Flum. 311. pl. 125. 1825.

Phaseolus membranaceus Benth. Ann. Wien. Mus. Naturg. 2: 137. 1840.

Phaseolus amplus Benth. Bot. Voy. Sulph. 85. 1844.

All the above seem to represent forms of one species, which occurs in Colombia, Venezuela, Brazil, Peru, Bolivia, Uruguay, and Paraguay. The type of *P. amplus* is said to be from Central America.

Hassler accepts Vellozo's name, which is based upon a plant collected near Rio de Janeiro, but imperfectly described and badly figured.

Phaseolus clitorioides Mart. Ann. Wien. Mus. Naturg. 2: 137. 1840.

Phaseolus oblongifolius Micheli, Mém. Soc. Phys. Hist. Nat. Genève, 28: 27. 1883.

This species occurs in Brazil and Paraguay. Hassler considers it a variety of *P. peduncularis* H. B. K. (*P. peduncularis* var. *clitorioides* Hassler, Candollea 1: 435. 1923).

Phaseolus megatylus Piper, sp. nov.

Woody-stemmed vine; stems terete, pubescent with short pale spreading hairs; stipules broadly oblong, obtuse, thick, striate, pubescent beneath, 5 mm. long; petioles pubescent like the stems, shorter than the leaflets; stipels oblong, obtuse, 2 mm. long; leaflets membranaceous, ovate, the lateral very oblique, acuminate and long-apiculate, rounded or subcordate at base, densely soft-pubescent on both sides, 3-nerved, 6 to 8 cm. long; peduncles stout, 20 to 25 cm. long, floriferous on the upper part; pedicellar glands very large, 1 to 3 cm. apart in fruit; pedicels about as long as the calyx; bracts not seen; bracteoles oval, 7 to 9 striate, pubescent, one-third as long as the calyx; calyx campanulate, pubescent, ciliate, 10 mm. long, the broad upper lip notched, the 2 lower teeth oblique-ovate, obtuse, shorter than the tube, the median tooth triangular, acute as long as the tube; corolla violet(?), 3 cm. long; standard orbicular, emarginate, short-stipitate; keel in one nearly complete, loose spiral; stigma globose, on the ventral side at the tip, encircled at base by a ring of hairs, and below a short naked interspace, the style densely bearded with long hairs for 2 mm.; pod (immature) appressed-pubescent, 14 cm. long, the straight beak 1.5 cm. long.

Type in the U. S. National Herbarium, no. 604818, collected at Santa Ana, Peru, altitude 900 meters, July 4, 1915, by O. F. Cook and G. B. Gilbert (no. 1634). Also collected at Chachapoyas, *Matthews* 3260 (K).

Owing to the half-decayed condition of the flowers, complete dissection was not successful.

Phaseolus halophilus Piper, nom. nov.

Phaseolus membranaceus var.? *maritimus* Benth. in Mart. Fl. Bras. 15¹:184. 1840. Not *P. maritimus* Benth. 1840.

Stems slender, glabrous or nearly so; leaflets 3, thickish, broadly ovate, obtuse to acute, truncate to rounded at base, glabrous, 4 cm. long and nearly as broad

sometimes obscurely 3-lobed; peduncles stout, sparsely strigose, 15 to 20 cm. long; raceme short, 6 to 20 flowered; calyx narrowly campanulate, sparsely strigillose, 8 mm. long, the upper lip emarginate, the lower with 3 oblong-ovate obtuse ciliate teeth; bracteoles oblong, obtuse, strongly 7-nerved, half as long as the calyx; corolla 15 mm. long; keel loosely twisted in a single turn; pods linear, with prominent marginal ridges, sparsely puberulent, compressed, nearly straight, 9 cm. long, the straight slender beak 1.5 cm. long.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in maritime marshes near Bahia, Brazil, by Salzmann; duplicate in the herbarium of the Missouri Botanical Garden.

Readily distinguished from *P. appendiculatus* Benth. by its very different leaflets, smaller, rather crowded flowers, and broader pods.

Phaseolus vignoides Rusby, Bull. N. Y. Bot. Gard. 4: 345. 1907.

This species is apparently confined to Bolivia. Besides the type collected at Corioco, *Rusby* 2328, it has been found at Asolo, *Williams* 1472, and Sacramento, Yungas, *Bang* 2382.

Phaseolus cochleatus Vell. Fl. Flum. 312. 1825.

Hassler (*Candollea* 1:426. 1923) considers that Vellozo's name refers to *P. caracalla*, but although the descriptions and figures are poor, the species appears valid and is represented by the following two specimens:

BRAZIL: Province Sao Paulo, *Weir* 472 (K). Rio de Janeiro, *Glaziou* 11875 (K).

Phaseolus ligulatus Piper, sp. nov.

Perennial, herbaceous, from a thick vertical root, glabrous up to the inflorescence; stems slender, terete, somewhat angled, apparently twining above, 60 to 90 cm. high; stipules firm, oblong-ovate, acute, strongly 11 to 15 nerved, 5 to 7 mm. long; petioles slender, about as long as the leaflets; stipels broadly linear, acute, curved, 5-nerved, 3 mm. long; leaflets 3, rather firm, long-linear, attenuate to an obtuse apiculate tip, 3-nerved at base, reticulate-veined, nearly sessile, 8 to 10 cm. long, 3 to 7 mm. wide; peduncles exceeding the leaves; raceme rather densely few-flowered, the rachis strigillose; pedicellar glands prominent; pedicels as long as the calyx; bracts lanceolate, acute, 5-nerved, 2 mm. long; bracteoles oblong, obtuse, 13-nerved, as long as the calyx tube; calyx campanulate, nearly glabrous, the short upper lip emarginate, the lateral teeth broadly triangular, acute, half as long as the tube, the median tooth subulate, as long as the tube; corolla violet, 13 mm. long; standard orbicular, not reflexed, short-stipitate; keel tubular, loosely curled into nearly a complete turn; pods not seen.

Type in the U. S. National Herbarium, no. 1,192,596, collected at Ixiamas, Bolivia, altitude 240 meters, December 19, 1921, by O. E. White (no. 2000).

Phaseolus robustus Piper, sp. nov.

Herbaceous, densely short-tomentose on the stems, petioles, and under surfaces of the leaves; stems stout, terete; stipules oblong, obtuse, 4 mm. long; petioles about as long as the leaflets; stipels oblong, obtuse, 1 mm. long; leaflets membranaceous, broadly ovate, acuminate, rounded at base, densely canescent-tomentose beneath, strigose and greener above, 6 to 10 cm. long, the lateral ones larger than the median; peduncle stout, bearing about 15 flowers; pedicels shorter than the calyx; calyx campanulate, densely tomentose, 5 to 6 mm. long, the short upper lip emarginate, the lower lip with 3 triangular acutish teeth shorter than the tube; corolla apparently purple; standard 2 cm. broad, 1.5 cm. long, notched at apex, thickened near the auricled base, the stipe stout and longer than the sinus; wings obovate, 2 cm. long, incurved at the margin, not auricled at the stipitate base; keel curved into a nearly complete, loose spiral; free stamen thickened at base, but not geniculate; immature pod densely white-tomentose, 1.5 cm. long.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at San Antonio, near Petropolis, in the vicinity of Rio de Janeiro, Brazil, November, 1879, by M. Glaziou (no. 10566).

Readily distinguished from any related species by the dense close tomentum. It was called *Pachyrhizus angulatus* Rich. by Glaziou (Mém. Soc. Bot. France 3b: 141. 1906).

On account of the rather scanty material, a flower was not dissected.

Phaseolus grandiflorus Steud. Nom. Bot. ed. 2. 2: 817. 1841.

Phaseolus violaceus Vell. Fl. Flum. 311. pl. 124. 1825.

This seems a valid species, represented by *Glaziou* 5823, collected near Rio de Janeiro. This is the only species in the group with the lower calyx lip longer than the tube. Vellozo's description calls for a spirally twisted keel, but one of the figures shows it as sigmoid. Hassler considers it a variety of *P. linearis* H. B. K. (*P. linearis* var. *violaceus* Hassler, Candollea 1: 445. 1923).

PHASEOLUS: SECTION COCHLIASANTHUS

This name was long ago proposed for *Phaseolus caracalla* L. (Trew. Pl. Rar. 14. pl. 10. 1763). The section contains but two known species, *P. caracalla* L. and *P. lobatus* Hook.

KEY TO THE SPECIES

Leaflets entire..... **P. caracalla** L.
 Leaflets 3-lobed..... **P. lobatus** L.

Phaseolus caracalla L. Sp. Pl. 725. 1753.

Phaseolus caracallensis St. Lag. Ann. Soc. Bot. Lyon 7: 131. 1880.

Phaseolus bertonii Franceschi, Anal. Cienc. Paraguay 2: 139. 1918.

Phaseolus longirostratus Ducke, Arch. Jard. Bot. Rio Janeiro 3: 174. 1922.

This species is known to occur as a native in Brazil, Bolivia, Paraguay, Argentina, and perhaps in Guatemala (Suchitepéquez, *Shannon* 565) and Mexico (Durango, *Palmer* 289). It is widely cultivated as an ornamental. The form cultivated in California is like that wild in Paraguay and is the basis of *P. bertonii* Franceschi. In the light of the material at hand it does not seem sufficiently distinct.

Phaseolus lobatus Hook. in Curtis's Bot. Mag. 70: pl. 4076. 1844.

URUGUAY: Banda Oriental (Rio Negro), *Tweedie*, type. Without locality, *Herb. Parker* 63 (G).

Reported from Rondoma, Matto Grosso, Brazil, *Kuhlmann* 2019.

Phaseolus lobatus Roxb. (in Wight & Arn. Prodr. Fl. Ind. 1: 427. 1834) is merely mentioned in synonymy.

The Parker specimen has nearly mature pods. These are linear, glabrous, compressed, 8.5 cm. long, tipped with a slender straight beak; seeds ellipsoid, 7×4×2 mm., dark reddish and marbled, the linear hilum two-thirds as long as the seed.

PHASEOLUS: SECTION LASIOSPRON

This group of perennials is well marked by the yellow flowers and produced stipules.

KEY TO THE SPECIES

Herbage densely pubescent, velutinous to villose or densely or sparsely strigose; pods terete, thick-valved, densely hirsute; seeds strophiolate. **P. hirsutus.**
 Herbage sparsely pilose; pods compressed, thin-valved, sparsely pilose; seeds not strophiolate.

Leaflets oblong to ovate, nearly glabrous; calyx 2 mm. long. — *P. campestris*.
Leaflets lanceolate to ovate, acute; calyx 3 to 4 mm. long. — *P. schottii*.

Phaseolus hirsutus Mart.; Benth. Ann. Wien. Mus. Naturg. 2: 140. 1840.

Phaseolus lasiocarpus Mart.; Benth. Ann. Wien. Mus. Naturg. 2: 140. 1840.

Phaseolus balansae Micheli, Mém. Soc. Phys. Hist. Nat. Genève, 28: 29. 1883.

Phaseolus lasiocarpus balansae Chod. & Hassl. Bull. Herb. Boiss. II. 4: 909. 1904.

Phaseolus lasiocarpus igatimianus Chod. & Hassl. Bull. Herb. Boiss. II. 4: 909. 1904.

This widespread species ranges from Mexico to Argentina. It is highly variable as to both leaf contour and pubescence, but in all forms has the blunt calyx lobes nearly as long as the tube. The leaflets vary from oblong-linear to lanceolate and broadly ovate, usually obtuse but sometimes acute or even acuminate. The herbage may be nearly glabrous, as in *Burchell* 9358, puberulent-tomentose, as in *Fiebrig* 6177 and *Pittier* 2347, villose, as in *Pennell & Killip* 8328, or hirsute, as in *Pittier* 5225. Strophiolate seeds are known in no other species. The southernmost forms tend to have broad leaflets and short-tomentose pubescence.

MEXICO: Laguna de Curahueso, Tabasco, *Rovirosa* 442 (K, N).

PANAMA: San Felix, *Pittier* 5225 (N). Gorgona to Mamei, *Pittier* 2247 (N, L). Río Tecumen, *Standley* 2669 (N). Red Tank to Pueblo Nuevo, *Piper* 5170 (N).

COLOMBIA: Villavicencio, *Sprague* 100 (K). Aganche, Cauca River, *Pennell & Killip* 8328 (Y, N).

TRINIDAD: *Crueger* (K).

BRITISH GUIANA: Demerara, *Parker* (K). Numatta, *Jenman* 5506 (K). Kotinga Valley, *Quelch & McConnell* 177 (K). Riverside, *Pollard* 54 (K). Courantyne River, *im Thurm* (K). Without locality, *Schomburgk* 715 (L), 116 (K), 413 (P).

BRAZIL: Obidos, *Spruce* 467 (K). San Carlos, Rio Negro, *Spruce* 3677 (K). Isle Marajo, Pará, *Huber* 2682 (L). Bos Cuyaba, *Robert* 705a (L). Without locality, *Sellow* (K). Sao Joao, *Burchell* 9258 (K, Y; leaflets ovate, thin, nearly glabrous). Rio de Janeiro (cultivated), *Glaziou* 9721, 9722 (K). Curunta, Matto Grosso, *Moore* 1001 (L).

PARAGUAY: Asunción, *Balansa* 1548 (K; type of *P. balansae*). Alto Paraná River, *Fiebrig* 6177 (L, K, N). Río Y-Aca, *Hassler* 6828 (K, L). Igatim, *Hassler* 5535 (K; type of var. *igatimianus*). Sierra de Amambay, *Hassler* 10147 (L).

ARGENTINA: Formosa, *Jørgensen* 2959 (Mo.).

Phaseolus pilosus H. B. K. Nov. Gen. & Sp. 6: 453. 1823.

The type specimen in the herbarium of the Muséum d'Histoire Naturelle, Paris, is a very poor specimen, as indeed is noted in the original description. The best match for it in the Paris herbarium is *Schomburgk* 413 from British Guiana. Apparently it can not be differentiated from *Phaseolus hirsutus* Mart. If this be true, *Phaseolus pilosus* H. B. K. must be adopted as the name of the species, a conclusion reached by *Hassler* (*Candollea* 1: 465. 1923).

Phaseolus campestris Mart. Ann. Wien. Mus. Naturg. 2: 141. 1840.

Phaseolus juruanus Harms, Notizbl. Bot. Gart. Berlin 7: 506. 1921.

Phaseolus schottii campestris Hassler, *Candollea* 1: 464. 1923.

This species occurs in British Guiana, Brazil, and perhaps Honduras (a somewhat doubtful specimen, Tela River near Puerto Sierra, *Wilson* 669; Y).

Phaseolus schottii Benth. Ann. Wien. Mus. Naturg. 2: 139. 1840.

Phaseolus longifolius Benth. Ann. Wien. Mus. Naturg. 2: 139. 1840.

Phaseolus ovatus Benth. Ann. Wien. Mus. Naturg. 2: 139. 1840.

Phaseolus ovatus glabratus Benth. in Mart. Fl. Bras. 15¹: 188. 1859.

Phaseolus trichocarpus Wright in Sauvalle, Fl. Cub. 30. 1873.

Phaseolus lanceolatus Bello, Anal. Soc. Esp. Hist. Nat. 10: 262. 1881.

All the above names seem clearly to represent a single species with the leaflets varying from lanceolate to broadly ovate. The first name has priority of position, and since the other two of the same date are misleading as to the character of the species, the first is here adopted. The species occurs in Cuba, Porto Rico, Guiana, Bolivia, Brazil, and Paraguay.

PHASEOLUS: SECTION MICROCOCHLE

This group is characterized by having small flowers and the campanulate calyx somewhat equally five-lobed, the lobes about as long as the tube.

KEY TO THE SPECIES

Leaflets parted into linear lobes; cleistogamous flowers present. **P. pedatus** Rose.

Leaflets entire; cleistogamous flowers none.

Plants low, not twining.

Calyx lobes triangular, as long as the tube..... **P. fraternus** Piper.

Calyx lobes subulate, longer than the tube..... **P. heterophyllus** Willd.

Plants slender, twining.

Leaflets orbicular. Peduncles elongate..... **P. sabaerensis** Hoehne.

Leaflets ovate.

Peduncles short; leaves densely pubescent..... **P. psammodes** Lindm.

Peduncles long; leaves thinly pubescent..... **P. acariseanthus** Harms.

Phaseolus pedatus Rose, Contr. U. S. Nat. Herb. 8: 48. 1903.

In the original description the fact was overlooked that this species produces subterranean pods from cleistogamous flowers. These flowers are smaller than the normal ones and pale yellowish, like the roots. The pods are linear, very short-beaked, tumid, glabrous, white, 2 or 3 seeded, 5 to 7 mm. long. The seeds are pale brown, smooth, dull, oval, somewhat compressed, 2 mm. long, the hilum small and circular. Mature pods of the petaliferous flowers have not been seen. The young pods are linear, glabrous, and long-beaked.

Phaseolus fraternus Piper, sp. nov.

Perennial from a thick oblong tuber; stems herbaceous, spreading or ascending, slender, 30 to 50 cm. long, pilose, the hairs somewhat yellow; stipules broadly lanceolate, acuminate, pubescent, 7-nerved, 5 to 7 mm. long, persistent; petioles about as long as the leaflets, pilose; stipels subulate, 2 mm. long; leaflets 3, oval, acute, broadly cuneate to rounded at base, 2 to 3 cm. long, sparsely appressed-pilose, usually entire but the basal angles sometimes produced into rounded lobes; peduncles much exceeding the leaves, pubescent with retrorse hairs; racemes short, dense, 5 to 8 flowered; pedicels very short; bracts lanceolate, pubescent, 1-nerved, 2 mm. long; bracteoles subulate, pubescent, less than half as long as the calyx; calyx obconic, pubescent, 3 mm. long, the upper lip bidentate, the lanceolate teeth nearly as long as the tube, the lower lip with 3 narrowly triangular attenuate subequal teeth as long as the tube; corolla 5 mm. long; standard orbicular, reflexed at the middle; pods sessile, linear, compressed, hirtellous, short-beaked, 4 to 6 seeded, 20 to 25 mm. long; seeds oval in outline, compressed, smooth, brown, 3 mm. long, the short hilum central.

Type in the U. S. National Herbarium, no. 942260, collected on the plateau of Bolivia in 1891 by Miguel Bang (no. 1011). The same collection is represented in the Gray Herbarium and in the herbarium of the Missouri Botanical Garden.

The following specimens also are referred to this species:

PERU: Without locality, Ruiz & Pavón (L).

PARAGUAY: Cerros de Tobaty, *Hassler* 6380 (K). Without definite locality, *Hassler* 1099 (K). Duarte near Carapegua, *Hassler* 1239 (K, Y).

URUGUAY: Without definite locality, *Tweedie* (K).

Very similar to *P. heterophyllus* H. B. K. The characters here relied upon as specific are the acute leaflets and the triangular, not subulate, shorter calyx lobes.

Phaseolus heterophyllus Willd. Enum. Pl. Hort. Bot. Berol 2: 753. 1809.

Phaseolus parviflorus Schlecht. Linnaea 12: 325. 1838.

†*Phaseolus macropus* Benth. Ann. Wien. Mus. Naturg. 2: 140. 1840.

Phaseolus micranthus Mart. & Gal. Bull. Acad. Brux. 10²: 196. 1843.

Phaseolus bilobatus Engelm. in Wislitz. Mem. North. Mex. 109. 1847.

Phaseolus macropoides A. Gray, Pl. Wright. 2: 33. 1852.

This very variable species ranges from Arizona and New Mexico southward through Mexico into Guatemala. The original specimens of Humboldt and Bonpland from Valladolid (Morelia) have faintly lobed, linear-oblong leaflets, and those of the type of *P. micranthus*, from the Cordillera of Oaxaca, are very similar. The leaflets vary from entire and linear to entire and orbicular, but more commonly are basally 2 or 3 lobed. The plant is perennial from a deep-seated oblong tuber. The pods vary from hispidulous to hirtellous.

Phaseolus heterophyllus rotundifolius (A. Gray) Piper.

Phaseolus rotundifolius A. Gray, Pl. Wright. 2: 34. 1834.

The only character by which this may be distinguished is the villous pubescence of the pods, but even this seems to break down, since both hirtellous pods and villous pods occur in Pringle's 359. The leaflets are usually orbicular and entire, but range to oblong, and in either form may be lobed. The following specimens, all in the U. S. National Herbarium, belong here:

NEW MEXICO: Organ Mountains, *Wooton* 536; September 28, 1902, *Wooton*; September 17, 1893, *Wooton*. Mogollon Mountains, *Rusby* 2017.

ARIZONA: Mexican border, *Pringle* 359. Fort Huachuca, *Wilcox* 284. Santa Rita Mountains, *Griffiths & Thornber* 295. Bowie, *Jones* 592, 4304.

MEXICO: Fronteras, Sonora, *Hartman* 24. Casas Grandes to Sabinal, Chihuahua, *Nelson* 6372. Jaral, *Schumann* 198.

PHASEOLUS: SECTION MACROPTILIUM

This is a well-marked group of species, all native to America. Two new species are here described, and some changes are made due to synonymy.

Phaseolus rubidus Piper, nom. nov.

Phaseolus rufus Micheli, Mém. Soc. Phys. Hist. Nat. Genève 28: 29. 1883.

Not *P. rufus* Jacq. 1770.

Hassler regards this plant as a variety of *P. monophyllus* Benth. (*P. monophyllus* var. *rufus* Hassler, *Candollea* 1: 449. 1923), a conclusion with which I do not agree.

Phaseolus gracilis Poepp.; Benth. Ann. Wien. Mus. Naturg. 2: 141. 1840.

Phaseolus savannarum Britt. & Wils. Mem. Torrey Club 16: 70. 1920.

P. gracilis Poepp. and *P. longepedunculatus* Mart. are apparently extreme forms of a single species, intermediate examples being plentiful. *P. gracilis* has "priority of position." Originally described from Cuba, it occurs also in Isle of Pines, Mexico, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guiana, and perhaps Paraguay.

Phaseolus atropurpureus DC. Prodr. 2: 395. 1825.

Phaseolus schiedeianus Schlecht. Linnaea 12: 323. 1838.

Phaseolus canescens Mart. & Gal. Bull. Acad. Brux. 10²: 196. 1843.

Phaseolus dysophyllus Benth. Pl. Hartw. 287. 1848.

Phaseolus atropurpureus sericeus A. Gray, Proc. Amer. Acad. 5: 156. 1861.

Phaseolus semierectus atropurpureus Gómez, Anal. Hist. Nat. Madrid 23: 255. 1894.

This very variable species occurs rarely in extreme southern Texas, and abundantly throughout Mexico, Guatemala, and Salvador. The numerous Mexican and Central American specimens are not cited here.

NEW MEXICO: Donana, Parry, Bigelow, Wright & Schott (N).

TEXAS: Cibola Canyon, Havard 43, 44 (G). Cibola of Rio Grande, Bigelow 210 (G).

The leaflets range from entire and lanceolate to entire and orbicular, but more frequently are lobed, the lobes shallow or deep, acute or obtuse. The pubescence is always canescent, usually thin and appressed, but often denser and sericeous, as in specimens from the west coast of Mexico (var. *sericeus* A. Gray).

Phaseolus vestitus Hook. Bot. Misc. 2: 216. 1831.

It is very doubtful if this can be kept distinct from *P. atropurpureus* DC., but there is a gap between the ranges of the two, namely, from Salvador to southern Colombia. Hassler, perhaps correctly, reduces this to varietal rank under *P. atropurpureus*.

PERU: Lurin near Lima, Matthews (K; type). Lima, Cuming 1087 (K). Tarapoto, Spruce 4852 (G). Chosica, Holway 783½ (N); Macbride & Featherstone 526 (F). Callao, Wilkes Expedition.

ECUADOR: Jervis Island, Galápagos, Baur 86 (G).

COLOMBIA: Pasto, Triana (K).

Phaseolus scolecocarpus Piper, sp. nov.

Herbaceous vine; stems slender, terete, pilose with yellowish hairs; stipules subulate, attenuate-acuminate, strongly 5-nerved, pubescent, 6 mm. long; petiole slender, longer than the leaflets, rusty-pilose; stipels subulate; leaflets membranous, oblong-ovate, obtuse and apiculate, rounded at base, densely pubescent on both sides, 3 cm. long; small tufts of bractlike phyllomes at the base of the peduncles and in the leaf axils, these like the stipules but narrower; peduncles pilose, much exceeding the leaves, 10 to 20 cm. long, bearing at the tip a rather close spike of 8 to 10 flowers; flowers sessile; bracts subulate, 3-nerved, pubescent, 4 mm. long; bracteoles subulate, 1-nerved, as long as the calyx tube; calyx turbinate, rusty-pubescent, 5 mm. long, the upper lip with 2 broadly triangular, acute teeth, the lower with 3 narrowly triangular teeth over half as long as the calyx tube; corolla purple, 12 to 15 mm. long; standard 10 mm. long, the upper portion orbicular, reflexed, the basal portion deltoid, without auricles or callosities; wings 15 mm. long, the oblong blade twice as long as the stipe, not auricled; keel 10 mm. long, tubular, the tip in one close coil; style with a sparse short beard just below the stigma; stigma lateral, roundish; filament of free stamen gradually enlarged at base; ovary linear, puberulent; pod linear, pendent, more or less contorted, stipitate, the stipe as long as the calyx, pubescent, long-beaked, 10 to 12 seeded, tipped with the shrunken corolla; seeds ellipsoid, brown speckled with black, 3 × 2 × 1 mm., the very small hilum central, surrounded by a black border.

Type in the herbarium of the Field Museum of Natural History, no. 37272, collected at Izamal, Yucatán, Mexico, by G. F. Gaumer (no. 924). The same collection is represented in the herbarium of the Missouri Botanical Garden.

YUCATÁN: Buena Vista, Gaumer in 1899 (F). Without locality, Gaumer 1670 (F).

Nearest related to *P. longepedunculatus* Mart. The plant was referred to *P. dysophyllus* Benth. by Millspaugh (Field Mus. Bot. 1: 369. 1898).

Phaseolus affinis Piper, sp. nov.

Herbaceous vine; stems terete, pubescent with retrorse hairs; stipules triangular-lanceolate, attenuate, 7-nerved, pubescent beneath, 5 to 6 mm. long; petioles shorter than the leaflets; stipels subulate, 2 mm. long; leaflets oblong to ovate, obtuse, entire or faintly lobed at base, appressed-pubescent on both sides, not paler beneath, 3 to 5 cm. long; peduncles greatly elongate, 15 to 35 cm. long, puberulent, bearing at base a small tuft of bractlike phyllomes; inflorescence of 5 to 10 rather crowded, sessile flowers; bracts subulate, pubescent, 4 mm. long; calyx turbinate-campanulate, densely rusty-pubescent, 8 mm. long, the upper lip with 2 broad triangular acute teeth half as long as the tube, the lower lip with 3 narrower teeth nearly as long as the tube; bracteoles subulate, pubescent, half as long as the calyx; corolla 2 cm. long, "red turning blue"; standard broadly obovate, emarginate, reflexed above, 12 mm. long, the base deltoid, without auricles or callosities; wings 18 mm. long, the blade broadly obovate, incurved at the margins, without auricles, the slender stipe one-third as long as the blade; keel tubular, falcate, the tip in one complete close coil; style with a dense short beard separated by an interspace from the stigma; stigma lateral at the tip; anthers oblong, yellow; free filament gradually enlarged at base; ovary linear, silvery-sericeous; immature pods ascending, linear, densely pubescent, short-beaked, 4 cm. long.

Type in the herbarium of the New York Botanical Garden, collected at El Tambo, near Ambato, Tungurahua, Ecuador, May, 1919, by A. Pachano (no. 248). A duplicate specimen is in the U. S. National Herbarium.

ECUADOR: Quito, Jameson (L). Pomasqui and San Antonio, Jameson 876 (L), 877 (K). Tamante, Spruce 5791 (K).

Closely allied to *P. atropurpureus* DC. and *P. longepedunculatus* Mart., but distinguished by characters of foliage and calyx, and by the larger flowers. *Spruce 5791* is the type of *P. atropurpureus* var. *ecuadoriensis* Hassler (*Candollea* 1:458. 1923).

PHASEOLUS: SECTION CERATOTROPIS

This is a natural group of oriental annuals with yellow or yellowish flowers. Bentham included them in his section *Strophostyles*, which is in large part *Strophostyles* Meyer, but not at all *Strophostyles* Elliott, the latter commonly recognized as a valid genus. Only one species of this section has been considered to be American.

Phaseolus hernandezii Savi, Nuov. Giorn. Lett. 3:310. 1882.

Savi's detailed description and figures of the pod and seed of the plant he grew point unmistakably to the urd or urid, *Phaseolus mungo* L., not to the mung, *Phaseolus aureus* Roxb.

Savi was led to believe that his plant was a Mexican species by an unfortunate error. He cites "*Phaseolus orthocaulis Mungo persarum*, Hernández *Rer. Medic. Novae. Hisp. Thes.* p. 887 cum icone." This citation is really to a commentary entitled "Annotationes et Additiones" by Fabio Colonna and not written by Hernández himself. Colonna does not imply that the plant of which he gives a figure is a Mexican species, but apparently merely suggests that the mung might prove a valuable plant in Mexico. The details of the matter, as cleared up by the studies of Sir David Prain, may be found in a paper by C. V. Piper (*The Name of the Soy Bean*, *Journ. Amer. Soc. Agron.* 6:75-84. 1914).

Phaseolus hernandezii Savi is therefore not founded on a Mexican plant at all, but on one which Savi cultivated and which he supposed to be the same as that described and figured by Fabio Colonna in his addition to Hernández's text. The name can be considered only as a synonym of the urd, *Phaseolus mungo* L.

PHASEOLUS COCCINEUS AND ITS ALLIES

There are several species with rather large scarlet flowers, rarely white or yellowish, that in general may resemble *Phaseolus coccineus* L., but all are perennials. These species may be thus distinguished:

KEY TO THE SPECIES

- Bracteoles minute, much shorter than the calyx.
Herbage glabrous, except the petioles; calyx glabrous, ciliate; ovary glabrous. 1. *P. glabellus*.
Herbage puberulent; calyx puberulent; ovary pubescent..... 2. *P. griseus*.
Bracteoles not minute, usually as long or longer than the calyx.
Bracteoles broadly elliptic to suborbicular, as broad as the calyx.
Bracteoles pubescent, usually tomentose..... 3. *P. obvallatus*.
Bracteoles glabrous or nearly so..... 4. *P. formosus*.
Bracteoles oblong to elliptic, not nearly as broad as the calyx.
Calyx and bracteoles glabrous.
Bracteoles oblong, obtuse..... 5. *P. leiiosepalus*.
Bracteoles lanceolate, acute..... 6. *P. strigillosus*.
Calyx puberulent or pubescent.
Bracteoles about as long as the calyx.
Bracts longer than the buds..... 7. *P. polyanthus*.
Bracts not longer than the buds..... 8. *P. coccineus*.
Bracteoles twice as long as the calyx.
Primary bracts 10 mm. long, the secondary little shorter. 9. *P. leucanthus*.
Primary bracts 6 to 7 mm. long, the secondary ones minute. 10. *P. flavescens*.

1. *Phaseolus glabellus* Piper, nom. nov.

Phaseolus glaber Schlecht. *Linnaea* 12: 327. 1838. Not *P. glaber* Roxb. 1832.

VERACRUZ: Jalapa, *Schiede*, type collection (P); *Rose & Hay* 6105 (N); *Linden* 676 (K). Orizaba, *Bourgeau* 2919, 3173 (K, P); *Botteri* 738 (K, P).

SAN LUIS POTOSÍ: Los Caños, *Palmer* 216 in 1902 (N).

Palmer's specimen has mature fruits and a vertical woody root over 2 feet long, showing the plant to be perennial. Pods linear, curved, compressed, 4 cm. long, 6 mm. wide, the tip with a stout straight beak; seeds 6 to 8, oblong, slightly curved, gray thickly mottled with black, $4 \times 3 \times 1.5$ mm.; hilum concave, median, oblong, white, 2 mm. long.

2. *Phaseolus griseus* Piper, sp. nov.

Herbaceous vine; whole herbage covered with fine grayish pubescence; stems slender, terete, pubescent with spreading hairs; leaves ample; stipules triangular, acute, striate, reflexed, somewhat pubescent, 3 mm. long; petioles puberulent, shorter than the leaves; stipels triangular-lanceolate, 3-veined, 2 mm. long; leaflets membranous, broadly ovate, acuminate and apiculate, rounded to truncate at base, 3-nerved, inconspicuously veined, minutely puberulent above, paler and densely puberulent beneath, 5 to 6 cm. long; bracts lanceolate, broadest at base, the primary ones 3 mm. long, persisting; pedicellar glands inconspicuous; pedicels sparsely puberulent, several times as long as calyx; bracteoles oblong, obtuse, 3 to 5 nerved, less than half as long as the calyx; calyx campanulate, minutely puberulent, the hairs longer ventrally, the very short upper lip entire, the lower with 3 broad triangular teeth much shorter than the tube; corolla crimson, 12 mm. long; ovary linear, densely canescent.

Type in the U. S. National Herbarium, no. 450954, collected near Guadalajara, Jalisco, Mexico, September 28, 1903, by Rose and Painter (no. 7369).

A fruiting plant collected by Holway (no. 5770, October 18, 1903) at Santa Fe, Federal District, is apparently the same. The mature pods are compressed, curved at base, sparsely pubescent, 5 cm. long; seeds oblong, compressed, shiny, orange-brown, $8 \times 5 \times 3$ mm., the hilum central, white, lanceolate, one-fourth as long as the seed.

Bourgeau 581 from Santa Fe (G), and 940 from El Desierto, Valley of Mexico (B), also seem referable here. These two specimens clearly represent the same species, but the leaflets differ from the type of *P. griseus* in being somewhat hastate, that is, having the basal angles more or less produced. Another specimen of *Bourgeau* 940 is *P. pedicellatus* Benth.

3. *Phaseolus obvallatus* Schlecht. *Linnaea* 12: 328. 1838.

This species was collected originally by Ehrenberg at Mineral del Monte, near Pachuca, Hidalgo, Mexico. The type specimen was very kindly lent by the University of Halle. Many specimens will be found in different herbaria under two unpublished names, one by Rose and one by Piper. The plant is perennial from a thick rough-barked woody root, usually fusiform in shape. The corolla is typically scarlet but occasionally violet-purple.

MEXICO: Pedregal, *Pringle* 6430* (N). Eslava, *Pringle* 11431 (N). Santa Fe, *Rose & Hay* 5357* (N). Valley of Mexico, *Bourgeau* 734 (G, K); *Rose & Painter* 8633, 6515, 5357 (N). Tucubay, *Bourgeau* 580 (K, N). Chalco, *Kempton & Collins*, August 4, 1921 (N). Popocatepetl, *Rose & Hay* 6258 (N). Toluca, *Rose & Painter* 6789 (N). Ixtaccihuatl, *Pringle* 311 (N). Tultenango, *Rose & Hay* 5439, 7834 (N). Salto de Agua, *Purpus* 1748 (N). Amecameca, *Holway* 5788 (N).

HIDALGO: Metepec, *Pringle* 11968 (N).

ZACATECAS: Monte Escobedo, *Rose* 2631 (N).

OAXACA: Cerro San Felipe, *Conzatti* 4186 (N); *Nelson* 1162 (N). Oaxaca, *Conzatti & Gonzales* 976 (N).

SAN LUIS POTOSÍ: Álvarez, *Palmer* 63 (N).

DURANGO: Otinapa, *Palmer* 332 (N).

MICHOACÁN: Morelia, *Arsène* 2871, 5234 (N).

TLAXCALA: Contadero, *Pringle* 8606 in part (N).

COSTA RICA: Rancho Redondo, *Jiménez* 996 (N). Ochozogo, *Tonduz* 10914 (N).

Specimens marked with an asterisk have the corolla violet-purple instead of scarlet.

4. *Phaseolus formosus* H. B. K. *Nov. Gen. & Sp.* 6: 449. 1823.

Phaseolus sylvestris H. B. K. *Nov. Gen. & Sp.* 6: 450. 1823.

The types of these two species are in the Jardin des Plantes, Paris. Both are rather scrappy specimens and the technical differences are very slight. They differ from *P. obvallatus* Schlecht. primarily in that the bracteoles are glabrous or but slightly pubescent. The real doubt is not that *P. formosus* and *P. sylvestris* are conspecific but whether *P. obvallatus* is distinct enough to be maintained as a good species. Specimens occur which are essentially intermediate between the two. This species is widespread in Mexico and occurs in Guatemala. There are two specimens in the Jardin des Plantes collected by Hahn (nos. 147 and 501) in the Valley of Mexico, with the information "haricots comestibles" and "grosses tubercules comestibles." The roots are very similar to those of *P. obvallatus*, which are not edible according to information received from the School of Agriculture, Chapingo, Mexico.

The type specimen of *Phaseolus proriferus* Jones (*Contr. West. Bot.* 12: 14. 1908) is from Guayanapa Canyon, Sierra Madre, Chihuahua, and is in young fruit. It seems to be *Phaseolus formosus* H. B. K., which occurs in the vicinity.

CHIHUAHUA: Soldier Canyon, *Jones*, September 16, 1903 (N).

DURANGO: Otinapa, *Palmer* 332 (N).

HIDALGO: Trinidad, *Pringle* 13426 (N).

MICHOACÁN: Morelia, *Arsène* 10042, 2871 (N). Cerro Azul, *Arsène* 6577 (N).

ZACATECAS: Los Morones, *Rose* 2724, 2725 (N).

TLAXCALA: Contadero, *Pringle* 8606 in part (N).

PUEBLA: Puebla, *Arsène* 358 (N).

OAXACA: Yalalag, *Nelson* 975 (N). San Juan del Estado, *Smith* 15 (N).

MEXICO: Monte Orizaba, *Rose & Hay* 5694 (N). Popocatapetl, *Rose & Hay* 6319 (N). San Angel, *Rose, Painter & Rose* 9479 (N).

CHIAPAS: San Cristóbal, *Nelson* 3177 (N).

GUATEMALA: Santiago, *Gómez* 1017 (N).

5. *Phaseolus leiosepalus* Piper, sp. nov.

Herbaceous vine, sparsely leafy; stems slender, terete, striate-sulcate, sparsely strigillose with ascending hairs; stipules ovate, obtuse, glabrous, striate, 4 mm. long; petioles equaling the leaflets; stipels linear, acute; leaflets small, membranous, ovate, obtuse but apiculate, rounded at base, 3-nerved, finely reticulate, sparsely strigillose on both sides, slightly paler beneath, 1.5 to 2.5 cm. long; peduncles hirtellous, much exceeding the leaves; flowers 5 to 10 in a short raceme; bracts broadly lanceolate, acuminate, glabrous, the primary 4 to 6 mm. long, persistent; pedicellar glands small; pedicels glabrous or nearly so, 3 to 5 times as long as the calyx; bracteoles oval, faintly 7-striate, obtuse, as long as the calyx tube, glabrous, purple; calyx glabrous, the very short upper lip entire, the lower lip with 3 broad triangular obtuse teeth much shorter than the tube; corolla red, 12 mm. long.

Type in the U. S. National Herbarium, no. 43734, collected 18 miles northwest of Oaxaca, Oaxaca, Mexico, altitude 2,250 to 2,850 meters, September, 1894, by E. W. Nelson (no. 1358).

6. *Phaseolus strigillosus* Piper, sp. nov.

Herbaceous vine; stems slender, terete, striate, sparsely strigillose with reflexed hairs; stipules lanceolate, broadest at base, glabrous, striate, 5 mm. long; petioles strigillose with ascending hairs, about as long as the leaflets; stipels linear, acute, glabrous, 2 to 3 mm. long; leaflets membranous, angularly ovate, acuminate and apiculate, rounded or somewhat truncate at base, 4 to 7 cm. long, sparsely strigillose on both sides, scarcely paler beneath; peduncles pubescent like the stem, slender, much exceeding the leaves; racemes short, 10 to 15 flowered; bracts lanceolate, acute, 7-veined, the primary ones 7 mm. long; pedicellar glands obscure; pedicels sparsely pilose, 4 to 5 times as long as the calyx; bracteoles linear-oblong, acute, 7-veined, longer than the calyx; calyx campanulate, glabrous or nearly so, the very short upper lip entire, the lower lip with 3 broad triangular ciliate teeth much shorter than the tube; corolla red, 12 mm. long.

Type in the U. S. National Herbarium, no. 301132, collected near Santa Teresa, Tepic, Mexico, in the Sierra Madre, August 12, 1897, by J. N. Rose (no. 2218).

7. *Phaseolus polyanthus* Greenm. Field Mus. Bot. 2: 253. 1907.

The type is from Jalapa, Veracruz, Mexico. The species was long ago collected at Monte Azul, Orizaba, *Bourgeau* 3173 (P).

8. *Phaseolus coccineus* L. Sp. Pl. 724. 1753.

Phaseolus multiflorus Willd. Sp. Pl. 3: 1030. 1810.

This species is widely cultivated for food and as an ornamental. The following specimens may be from wild plants:

PUEBLA: Puebla, *Arsène* 320, 1381, 2093 (N).

ZACATECAS: Monte Escobedo, *Rose* 2643 (N).

COAHUILA: Saltillo, *Palmer* 444 (N).

MEXICO: Tacuba, *Rose & Hough* 4553 (N).

JALISCO: San Juan Capistrano, *Rose* 2513 (N).

CHIAPAS: Tumbalá, *Nelson* 3308 (N).

GUATEMALA: Frajanco, Santa Rosa, *Heyde & Lux* 6130 (N).

9. *Phaseolus leucanthus* Piper, sp. nov.

Annual (?) herbaceous vine; stems stout, terete, sulcate, sparsely strigose with reflexed hairs; stipules triangular, acute, glabrous above, puberulent beneath, 7-nerved, 6 mm. long; petioles much longer than the leaflets; stipels lanceolate, curved, 4 mm. long; leaflets 3, membranous, broadly ovate, abruptly short-acuminate, truncate to rounded at base, sparsely strigillose on both surfaces, scarcely paler beneath, 10 cm. long and nearly as broad; peduncles striate, nearly glabrous, about equaling the leaves; rachis pubescent; raceme dense, many-flowered; bracts narrowly lanceolate, acute, pubescent, 7-nerved, the primary ones 10 mm. long, the lateral ones little smaller; pedicellar glands prominent; pedicels sparsely hirsute, longer than the calyx; bracteoles lanceolate, pubescent, 5-nerved, much longer than the calyx; calyx campanulate, glabrous except ventrally, 5 mm. long, the upper lip short and emarginate, the lower with 3 broadly triangular teeth shorter than the tube; corolla white, 15 mm. long; standard orbicular, emarginate, 12 to 13 mm. long, reflexed from below the middle, thickened at the point of flexure, narrowed at base to a short broad stipe, a short broad auricle on each side at base; wings obovate, involute on the margin, 16 mm. long, the stipe half as long as the blade; keel tubular, the tip spiral in two and one-half close coils; filament of the free stamen much enlarged at base; ovary linear, puberulent; style sparsely bearded just below the lateral stigma; immature pod linear.

Type in the U. S. National Herbarium, no. 773886, collected at San Cristóbal, Veracruz, Mexico, September 3, 1857, by Charles Mohr (no. 123).

10. *Phaseolus flavescens* Piper, sp. nov.

Twining herb; stems stout, terete, sparsely short-pilose; stipules ovate, acute, 7-nerved, glabrous, 5 to 6 mm. long; petiole longer than the leaflets, sparsely short-pilose; stipels lance-ovate, acute, 4 mm. long; leaflets membranous, ovate-orbicular, rounded to truncate at base, abruptly short-acuminate, sparsely pubescent, strigillose above, short-pilose beneath, strongly reticulate, 7 to 9 cm. long; peduncles stout, reflexed-pilose, exceeding the leaves; racemes many-flowered; bracts lanceolate, broadest above the base, sparsely pubescent, the primary ones 5 to 7 mm. long, persistent, the secondary bracts small; pedicels 1 cm. long; calyx 6 mm. long, campanulate, glabrous except the lowermost lobe, the upper lip short, emarginate, the lower lip with subequal triangular acute lobes shorter than the tube; corolla white, becoming yellow in age, 12 to 15 mm. long; standard orbicular, emarginate, strongly reflexed at about the middle and thickened along the line of flexure, narrowed at base to a short broad stipe, an inflexed auricle at the base of the blade on each side; wings oblong-ovate, the blade truncate at base, produced on the upper angle, twice as long as the slender stipe; keel tubular, the tip with 2 complete close coils; filament of free stamen enlarged just above the base into a heart-shaped swelling; stigma capitate, oblique; style beard dense, short, extending halfway about first turn; mature pods compressed, sparsely strigose, 8 cm. long, 1.5 cm. broad, the stout beak straight, 1 cm. long; seeds oval in outline, much compressed, red, $12 \times 7 \times 3$ mm., the hilum nearly central, one-third as long as the seed.

Type in the U. S. National Herbarium, no. 1,143,511, collected at Río San Rafael, below Cerro Tatamá, Caldas, Colombia, altitude 2,400 to 2,600 meters, September, 1922, by F. W. Pennell (no. 10334).

COLOMBIA: Cauca, Coconuco, *Killip* 6842 (N). Cauca, San Antonio, *Pennell* 7646 (N). Tolima, Azufral to Moral, *Killip & Hazen* 9602 (N).

PHASEOLUS ANGUSTISSIMUS, P. FILIFORMIS, AND P. WRIGHTII

These three species seem closely related. The leaflets are more or less lobed; the pods of all are linear, compressed, thin-walled, and tipped with a very slender, straight beak; and the seeds are rugose, a character confined to this group of species.

KEY TO THE SPECIES

Herbage pallid, glaucescent. Leaflet linear to oblong, usually hastately lobed; perennial ----- 1. *P. angustissimus*.

Herbage green, not pallid.

Plants annual; pods 2 to 2.5 cm. long ----- 2. *P. filiformis*.

Plants perennial; pods 3 cm. long ----- 3. *P. wrightii*.

1. *Phaseolus angustissimus* A. Gray, Pl. Wright. 2: 33. 1852.

Phaseolus angustissimus latus Jones (Contr. West. Bot. 12: 14. 1908) is a form with short narrow triangular leaflets, three times as long as broad, the basal angles sometimes produced. *Phaseolus dilatatus* Woot. & Standl. (Contr. U. S. Nat. Herb. 16: 139. 1913) is merely a form with broad leaflets.

The species occurs in western Texas, New Mexico, and Arizona, but apparently does not range into Mexico.

2. *Phaseolus filiformis* Benth. Bot. Voy. Sulph. 13. 1844.

This species occurs chiefly in Lower California but is found also on the eastern shores of the Gulf of California. The leaflets are very variable in form.

3. *Phaseolus wrightii* A. Gray, Pl. Wright. 1: 43. 1852.

In the original description and especially in a later account of *P. wrightii* (Pl. Wright. 2: 33), Dr. Gray confused two species, as pointed out by Wootton and Standley (Contr. U. S. Nat. Herb. 16: 139). The segregated species is *P. grayanus* Woot. & Standl. Typical *P. wrightii* is confined to Texas.

PHASEOLUS METCALFEI AND ITS CLOSE RELATIVES

Phaseolus metcalfei and its relatives include a small group of perennials with deep woody roots, somewhat coriaceous reticulate leaflets, middle-sized flowers, short calyx teeth, red-purple corollas, and broad, much compressed, 3 or 4-seeded pods. The four known species closely resemble one another, and occur from Texas to Arizona and southward into Mexico.

KEY TO THE SPECIES

Bracts orbicular ----- 1. *P. venosus*.

Bracts lanceolate.

Calyx glabrous ----- 2. *P. ovatifolius*.

Calyx pubescent.

Bracts 0.5 to 1 mm. long; bracteoles one-third as long as the calyx, linear. ----- 3. *P. metcalfei*.

Bracts very small; bracteoles minute, lanceolate ----- 4. *P. ritensis*.

1. *Phaseolus venosus* Piper, sp. nov.

Herbaceous vine; stems terete, striate, strigillose with retrorse hairs; stipules lanceolate, broadest at base, acute, striate, puberulent, 3 mm. long; petioles mostly shorter than the leaflets, pubescent with short spreading hairs; stipels linear, not striate; leaflets 3, rhombic-ovate, firm, acute and strongly apiculate, truncate at the very base, 3-nerved, reticulate, minutely and sparsely hirtellous on both surfaces, especially on the veins, 2 to 5 cm. long and nearly as broad; peduncles pubescent with minute spreading hairs, longer than the leaves; racemes

20 to 30 flowered; bracts glabrous, the primary ones orbicular, 2 mm. long, the secondary ones oblong and much smaller; pedicellar glands becoming prominent; pedicels pubescent, about as long as the calyx; bracteoles oblong-ovate, acute, ciliate, one-third as long as the calyx; calyx campanulate, nearly glabrous except ventrally, 4 mm. long, the short upper lip emarginate, the lower lip with 3 broad rounded teeth shorter than the tube; corolla violet; standard orbicular, emarginate, reflexed above, thickened basally, 10 mm. long, the auricles inflexed, the stipe short and broad; wings 15 mm. long, broadly obovate, inrolled at the margins, angled at base, stipitate, the auricle inflexed; keel when coiled shorter than the wings, stipitate, without auricles, the beak in 2 complete close coils; vexillar stamen free, thickened and geniculate at base; stigma terminal, oblique.

Type in the U. S. National Herbarium, no. 301614, collected near Colotlán, Jalisco, Mexico, on the road to Plateado, August 31, 1897, by J. N. Rose (no. 2688).

ZACATECAS: Near Monte Escobedo, *Rose* 2648 (N). Near Plateado, *Rose* 2802 (N).

JALISCO: Guadalajara, *Rose & Painter* 7430 (N).

2. *Phaseolus ovatifolius* Piper, sp. nov.

Herbaceous vine; stems sparsely strigillose with retrorse hairs; stipules triangular, acute, glabrous, 5-nerved, 2.5 mm. long; petioles about as long as the leaflets; stipels linear, minute; leaflets firm, rhombic-ovate, obtuse and apiculate, truncate at base, reticulate, green on both sides, glabrous except for a few appressed hairs on the veins beneath, 3 cm. long, nearly as broad; peduncles about 4 times as long as the leaves; racemes dense in anthesis, about 20-flowered; primary bracts lanceolate, acute, striate, glabrous, persisting, 3 mm. long, the secondary ones similar but smaller; pedicellar glands small; pedicels twice as long as the calyx; bracteoles linear, minute, much shorter than the calyx; calyx campanulate, glabrous except ventrally, 2.5 mm. long, the short upper lip emarginate, the lower lip with 3 broadly triangular, obtuse teeth shorter than the tube; corolla violet; standard orbicular, emarginate, reflexed, thickened below, 10 mm. long, the auricles inflexed, the stipe short and thick; wings spatulate-oblong, angled at base, stipitate, the auricle incurved, 15 mm. long; keel stipitate, the beak with 2 close coils.

Type in the U. S. National Herbarium, no. 300967, collected in the Sierra Madre between Santa Gertrudis and Santa Teresa, Tepic, Mexico, August 8, 1897, by J. N. Rose (no. 2067).

Closely related to *P. metcalfei* Woot. & Standl. but easily distinguishable by the smaller flowers, smaller leaflets, and different pubescence.

3. *Phaseolus metcalfei* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 140. 1913.

Phaseolus retusus Benth. Pl. Hartw. 11: 1839. Not *P. retusus* Moench, 1794.

Phaseolus maculatus Scheele, Linnaea 2: 465. 1848. Not *P. maculatus* Mart. 1829.

This species ranges from Texas to Arizona and Mexico. It is known from the Mexican States of Sonora, Chihuahua, San Luis Potosí, Aguascalientes, Hidalgo, Zacatecas, Puebla, and Oaxaca.

4. *Phaseolus ritensis* Jones, Contr. West. Bot. 12: 14. 1908.

This hardly distinct species replaces *P. metcalfei* Woot. & Standl. in Arizona. It has been collected also in Mexico near Santa Teresa, Tepic, in the Sierra Madre, *Rose* 2153.

PHASEOLUS PEDICELLATUS AND ITS ALLIES

The species of this large group are in some cases very closely allied. It may well develop that with the accumulation of further material some of them will have to be reduced.

KEY TO THE SPECIES

Leaflets distinctly lobed, at least the basal angle produced.

Bracts foliaceous, more than 5 mm. long.

Leaflets deeply lobed; bracts 5 to 8 mm. long..... 1. *P. foliaceus*.

Leaflets faintly lobed; bracts 5 mm. long..... 2. *P. floribundus*.

Bracts not foliaceous, about 2 mm. long.

Nerves of the bracteoles prominent, 3 to 5. Bracteoles elliptic to obovate, nearly half as long as the calyx, strongly 3-ribbed; leaflets 3-lobed.

3. *P. schaffneri*.

Nerves of the bracteole one or none.

Bracts 3-lobed toward tip, the middle lobe awnlike... 4. *P. oaxacanus*.

Bracts entire.

Bracteoles ovate.

Leaflets faintly 3-lobed..... 5. *P. pedicellatus*.

Leaflets deeply lobed..... 6. *P. polymorphus*.

Bracteoles linear to oblong..... 7. *P. palmeri*.

Leaflets deeply 3-lobed.

Bracteoles 1-nerved; calyx pruinose-puberulent. 8. *P. scabrellus*.

Bracteoles nerveless; calyx short-pubescent..... 9. *P. grayanus*.

Leaflets faintly 3-lobed. Calyx puberulent..... 10. *P. esperanzae*.

Leaflets usually entire, the basal angles rarely produced.

Leaflets lanceolate, broadest at base, densely pubescent beneath.

11. *P. salicifolius*.

Leaflets ovate or, if narrow, not pubescent beneath.

Pedicels 3 to 4 times as long as the calyx.

Bracteoles minute, nerveless..... 12. *P. laxiflorus*.

Bracteoles half as long as calyx, striate..... 13. *P. viridis*.

Pedicels at most twice as long as the calyx.

Pods 10 to 12 times as long as broad. Annual..... 14. *P. acutifolius*.

Pods 4 to 5 times as long as broad.

Leaflets acute.

Pods puberulent; leaflets puberulent..... 15. *P. mollis*.

Pods glabrous; leaflets glabrous or nearly so..... 16. *P. falciformis*.

Leaflets acuminate.

Standard puberulent outside..... 17. *P. lunatus*.

Standard glabrous.

Bracts 3-lobed, the middle lobe much elongate and awnlike.

4. *P. oaxacanus*.

Bracts entire.

Herbage glabrous..... 18. *P. rosei*.

Herbage puberulent..... 19. *P. bolivianus*.

1. *Phaseolus foliaceus* Piper, sp. nov.

Herbaceous vine; stems slender, terete, sparsely puberulous with reflexed hairs; stipules triangular-lanceolate, 3-nerved, glabrous, 4 mm. long; petioles puberulous, as long as the leaflets; stipels subulate, minute; leaflets 3, membranous, deeply lobed, the median 3-lobed, the lateral 2-lobed, the lobes oblong-ovate, acute, the median longest, sparsely pustulate-strigillose above, puberulous along the veins beneath, 3 to 4 cm. long; peduncles slender, 15 cm. long; bracts green, lanceolate, attenuate-acute, usually with a lateral lobe, 7-veined, scaberulous beneath, glabrous above, 7 mm. long; pedicels puberulent with spreading hairs, twice as long as the calyx; bracteoles linear-lanceolate, acute, nerveless, glabrous, nearly one-third as long as the calyx; calyx campanulate, 3 to 3.5 mm. long, ciliate, bearded ventrally, the upper lip short and emarginate, the lower lip 3-lobed, the lateral lobes rounded, the median acute and half as

long as the tube; corolla 10 mm. long; standard orbicular, the upper two-thirds reflexed, thickened at the place of flexure; wings oblong, the blades truncate at base and produced on the upper basal angle, the slender stipe half as long as the blade; keel tubular, with 2 complete close coils, the blades truncate at base and stipitate; free stamen with a globose enlargement above the base; anthers small, yellow; style beard sparse, extending halfway around the first coil; stigma lateral; ovary linear, pubescent, 5-ovuled; old pod valves falcate, compressed, short-beaked, sparsely pubescent, 7 cm. long, 1 cm. broad.

Type in the U. S. National Herbarium, no. 333018, collected near La Providencia, Sierra Madre, and Sierra Santa Bárbara, Mexico, altitude 1,950 to 2,400 meters, September 11-12, 1898, by E. W. Nelson (no. 4990).

2. *Phaseolus floribundus* Piper, sp. nov.

Herbaceous vine; stems slender, terete, glabrous or with a few scattered small hairs; stipules ovate, obtuse, 7-nerved, 5 mm. long; petioles sparsely hirtellous, about as long as the leaflets; stipules linear, 1 to 3 nerved, 2 mm. long; petiolules 2 to 3 mm. long, pubescent; leaflets membranous, ovate, obtuse and apiculate, truncate to broadly cuneate at base, more or less 3-lobed, the basal angles rounded and produced, usually much shorter than the triangular middle lobe, very sparsely puberulent on both faces, scarcely paler beneath, 2 to 4 cm. long; peduncles slender, longer than the leaves; raceme loosely many-flowered, the rachis puberulent; bracts lanceolate, persistent, 5 to 7 nerved, the principal ones 5 mm. long; pedicels slender, twice as long as the calyx; bracteoles oblong, 1-nerved, one-third as long as calyx; calyx 5 mm. long, the tube campanulate, somewhat pubescent, especially on the lower side, the upper lip short and entire, the lower lip with 3 broadly ovate, obtuse teeth less than half as long as the tube, the median tooth longer and larger than the lateral; standard orbicular, 10 mm. long, strongly reflexed and somewhat thickened at about the middle, a small inflexed auricle on each side of the short broad stipe; wings 12 mm. long, the blade obovate, with a semicircular projection on the upper side at base, the slender stipe 5 mm. long; keel narrow, its tip with 2 complete close coils; filament of free stamen with a circular enlargement just above the base; style beard short and sparse; stigma lateral; ovary linear, pubescent; pods (immature) linear, densely and loosely pubescent, the beak short and recurved.

Type in the U. S. National Herbarium, no. 397669, collected at Álvarez, San Luis Potosí, Mexico, September 5 to 10, 1902, by Edward Palmer (no. 121). A duplicate of this collection is in the herbarium of the Field Museum of Natural History.

3. *Phaseolus schaffneri* Piper, sp. nov.

Herbaceous vine, glabrous to the inflorescence; stems slender, terete; stipules lance-ovate, acute, glabrous, 3 to 5 nerved, 2 to 3 mm. long; petioles about as long as the leaflets; stipels lanceolate, 1-nerved; leaflets 3, membranous, 2 to 3 cm. long, basally 3-lobed, the central lobe oblong-lanceolate, obtuse and apiculate, longer than the broader oblong lateral lobes, glabrous except the scabrous margin, scarcely paler beneath; peduncles twice as long as the leaves; flowers few in racemes; bracts lanceolate, small, about one-fourth as long as the pedicels; pedicels appressed-puberulent, 2 to 3 times as long as the calyx; bracteoles oblong, obtuse, slightly broader above, 3-nerved, half as long as the calyx; calyx campanulate, 3 mm. long, glabrous except the ciliate margin, the broad upper lip emarginate, the lower lip with 3 broad triangular acute teeth, nearly half as long as the tube; corolla 8 to 10 mm. long; keel in 2 complete close coils; pod falcate, compressed, glabrous, 4 cm. long, 1 cm. broad, the beak short and straight.

Type in the U. S. National Herbarium, no. 939707, collected at San Luis Potosí, Mexico, in 1879 by J. G. Schaffner (no. 606). In the herbarium of the New York Botanical Garden is a duplicate and also *Schaffner* 605, collected at the same place.

The description is based on all three specimens. The species is distinguished at once from any closely related one by the large 3-nerved bracteoles.

4. *Phaseolus oaxacanus* Rose, Contr. U. S. Nat. Herb. 8: 48. 1903.

This species is sharply marked by the peculiar 3-lobed bracts. Besides the type, collected by Pringle on the Sierra de San Felipe, Oaxaca, it has been found at the same place also by Nelson (no. 1181) and at La Parada, Oaxaca (*Nelson* 996).

5. *Phaseolus pedicellatus* Benth. Ann. Wien. Mus. Naturg. 2: 137. 1840.

The type of this is in the Herbarium of the Botanisches Museum in Munich, and I am indebted to Dr. Hermann Ross for a photograph and fragment of it. It was collected somewhere in Mexico by Karwinski. The plant is perennial, with a deep fusiform root, as shown by Bourgeau specimens.

COAHUILA: Monclova, *Palmer* 2122 (N, G, K).

MORELOS: Cuernavaca, *Pringle* 9769 (N, K).

MEXICO: Sierra de Ajusco, *Pringle* 6616 (N, K). Santa Fe, *Bourgeau* 581 (G). Desierto, *Bourgeau* 940 (N, B, P). San Nicolás, *Bourgeau* 940 (K).

6. *Phaseolus polymorphus* S. Wats. Proc. Amer. Acad. 17: 346. 1822.

Phaseolus purpusi T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 271. 1912.

This species is known only by the original specimens, from San Luis Potosí, *Parry & Palmer* 188, the type of *P. polymorphus*; and Minas de San Rafael, San Luis Potosí, *Purpus* 5196, the type of *P. purpusi*.

7. *Phaseolus palmeri* Piper, sp. nov.

Herbaceous vine; stems slender, terete, purple, sparsely puberulent; stipules ovate, obtuse, strongly 5-nerved, glabrous, 2 mm. long; petioles slender, shorter than the leaves; stipels oblong, acute, 1-nerved, 1 mm. long; leaflets membranous, deeply 3-lobed, squarely truncate at base, 2 to 2.5 cm. broad, minutely puberulent above, nearly glabrous and not paler beneath, the median lobe oblong-ovate, the lateral lobes triangular-ovate, each sometimes obscurely 2-lobed, all obtuse and apiculate; peduncles puberulent, mostly exceeding the leaves; racemes 4 to 12 flowered; principal bracts broadly ovate, 3 to 5 nerved, 1.5 mm. long; pedicels longer than the calyx; bracteoles ovate, acute, 1-nerved, one-fifth as long as calyx; calyx campanulate, minutely puberulent, 3 mm. long, the short upper lip shallowly emarginate, the lower lip with 3 broad acutish teeth one-third as long as the tube; corolla violet; standard orbicular, shallowly emarginate at apex, short-stipitate, 1 cm. broad, cuneate at base, without auricles, reflexed from below the middle, thickened along the zone of flexure, at each end of which is a double fold; wings 15 mm. long, the blade broadly obovate, truncate at base, inrolled at margin, the slender stipe 4 mm. long; keel cylindrical, 2-lobed at orifice, the tip with one and one-half close coils; ovary linear, appressed-puberulent; pods slightly falcate, much compressed, short-beaked, nearly glabrous, 3 cm. long, 1 cm. broad, 3 or 4-seeded.

Type in the U. S. National Herbarium no. 471163, collected near Concepción del Oro, Zacatecas, Mexico, August 11 to 14, 1904, by Edward Palmer (no. 294).

8. *Phaseolus scabrellus* Benth.; S. Wats. Proc. Amer. Acad. 17: 346. 1881-2.

In the original description Watson cites two specimens as follows: "In the Caracol Mountains, Coahuila (2122); also collected by Coulter in Sonora Alta." The first specimen is *Palmer* 2122, which really is *P. pedicellatus* Benth. The second is the one on which Bentham had written his name *Phaseolus scabrellus*, and it is therefore accepted as the type of this species.

SONORA: Sonora Alta, *Coulter* (G, K). Papago Tanks, *MacDougal* 48 (N).

HIDALGO: Ixmiquilpan, *Purpus* 1365 (Y, G, F).

QUERÉTARO: Cadereyta, *Rose & Painter* 9723 (Y, N). Cadereyta to Vizarrón, *Altamirano* 1660 (N).

SAN LUIS POTOSÍ: Álvarez, *Palmer* 121 (N; this same number in the Field Museum is *P. esperanzae* Seaton).

9. *Phaseolus grayanus* Woot. & Standl. *Contr. U. S. Nat. Herb.* 16: 139. 1913.

This species is common in New Mexico and Arizona. In Mexico it is known from Colonia García, Chihuahua, *Townsend & Barber* 80.

10. *Phaseolus, esperanzae* Seaton, *Proc. Amer. Acad.* 28: 118. 1893.

PUEBLA: Esperanza, *Seaton* 371 (type, G); *Purpus* 3639 (G, N). Cortadero, *Pringle* 9623 (N):

SAN LUIS POTOSÍ: Álvarez, *Palmer* 121 (N, T; Palmer's 121 consisted of both *P. esperanzae* and *P. floribundus*. The specimen in the Field Museum herbarium is the latter).

11. *Phaseolus salicifolius* Piper, sp. nov.

Herbaceous vine, pubescent throughout; stems terete, slender, pilose with yellow hairs; leaves rather widely scattered; stipules triangular, broadest at base, acute, pubescent, striate, 3 mm. long; petioles densely pubescent, much shorter than the leaflets; stipels minute, ovate, striate, glabrous; leaflets 3, triangular-lanceolate, broadest at the truncate base, obtusish and apiculate, 1-nerved, hispidulous above, paler and densely pubescent beneath, 3 to 5 cm. long; peduncles exceeding the leaves; racemes rather closely 8 to 15 flowered; bracts lanceolate, pubescent, promptly deciduous, about 2 mm. long; pedicels pubescent, as long as the calyx; bracteoles lanceolate, pubescent, longer than the calyx; calyx campanulate, loosely pubescent, 3 mm. long, the very short upper lip emarginate, the lower lip with 3 broadly triangular teeth much shorter than the tube; corolla reddish; standard reflexed, 10 mm. long; wings oblong, 14 mm. long; keel with 2 close coils.

Type in the U. S. National Herbarium, no. 1,083,789, collected in the Sierra de Chabarría, Sinaloa, Mexico, in 1921 by Jesús G. Ortega (no. 4065).

Owing to the scantiness of the material, a flower was not dissected.

12. *Phaseolus laxiflorus* Piper, sp. nov.

Herbaceous vine; stems slender, terete, retrorsely strigillose; leaves rather sparse; stipules lanceolate, broadest at base, obtuse, glabrous above, puberulent beneath, striate, 5 mm. long; petioles glabrous, longer than the leaflets; stipels linear-oblong, glabrous, 2.5 mm. long; leaflet 3, thin, angularly ovate, attenuate-acuminate, apiculate rounded or truncate at base, sparsely strigillose above, glabrous beneath, 4 to 5 cm. long; peduncles much exceeding the leaves; inflorescence a loose panicle, about 25-flowered; bracts linear-oblong, acutish, striate, glabrous, deciduous, the primary ones 4 mm. long, the secondary much smaller; pedicellar glands small; pedicels slender, 4 to 5 times as long as the calyx; bracteoles minute, oblong, about one-fifth as long as the calyx; calyx campanulate, puberulent or ventrally pubescent, ciliate, the short upper lip emarginate, the lower lip with 3 subequal, broadly triangular teeth much shorter than the tube; corolla violet; standard 10 mm. long, orbicular, emarginate, sharply reflexed, the upper margins inrolled, the lower central part thickened, concave, yellow, the auricles sharply inflexed, the stipe short and broad; wings obliquely oblong-spatulate, 14 mm. long, inrolled at the margins, angled at base, stipitate; keel 10 mm. long when coiled, with two and a half close turns to the spiral, stipitate, not auricled; vexillar stamens free, the filament enlarged just above the base into a circular yellow organ.

Type in the U. S. National Herbarium, no. 462384, collected at the Trinidad Iron Works, Hidalgo, Mexico, August 21, 1905, by C. G. Pringle (no. 13690).

Allied to *P. esperanzae* Seaton but easily distinguished by the very long pedicels and by the leaflets. In both species the pedicellar glands are minute or wanting.

13. *Phaseolus viridis* Piper, sp. nov.

Herbaceous vine, glabrous throughout except a minute ciliation of the youngest leaflets; stems slender, terete; stipules firm, irregularly triangular-oblong, 4-nerved, 2 mm. long; petioles shorter than the leaflets; stipels linear, curved, 1.5 mm. long; leaflets 3, membranous, ovate, acuminate, with a blunt apiculate tip, cuneate to rounded at base, not paler beneath, 6 to 10 cm. long; peduncles mostly exceeding the leaves; racemes 10 to 20 flowered; primary bracts oblong-ovate, acute, firm, 7-nerved, 2 mm. long, the secondary ones narrower and much smaller; pedicels slender, 5 to 10 mm. long, 2 to 4 times as long as the calyx; bracteoles oblong, strongly 3-nerved, about half as long as the calyx; calyx campanulate, 2 mm. long, the short upper lip emarginate, the lower lip with 3 broad triangular subequal teeth about half as long as the tube; corolla glabrous, purplish, 12 mm. long; standard 8 mm. long, orbicular, strongly concave, reflexed above, transversely thickened at the line of flexure, the basal portion compressed and trough-shaped, short-stipitate, a small inflexed auricle at base of blade on each side; wings exceeding the standard, narrowly obovate, involute at the margins, a small rounded process at base, the slender stipe half as long as the blade; keel tubular, the tip in 2 complete close coils; anthers yellow, small, 5 mm. long; style beard short-haired, extending nearly halfway around the first turn; stigma lateral; pods (immature) falcate, much compressed, the beak short and straight, 5-seeded, 2.5 cm. long.

Type in the U. S. National Herbarium, no. 576636, collected at Cubilquitz, Guatemala, February, 1904, by H. von Tuerckheim (no. II.897; *J. D. Smith* no. 8510).

Other specimens examined:

MEXICO: Zacuapan, Veracruz, *Purpus* 8002 (N, Y, Mo.).

Closely related to *P. lunatus* L.

14. *Phaseolus acutifolius* A. Gray, Pl. Wright. 1: 43. 1852.

Phaseolus acutifolius tenuifolius A. Gray, Pl. Wright. 2: 33. 1853.

Phaseolus tenuifolius Woot. & Standl. Contr. U. S. Nat. Herb. 16: 140. 1913.

Phaseolus latifolius Freeman, Bot. Gaz. 56: 412. 1913.

In its wild form this species ranges from Western Texas to Arizona and southward in Mexico to Guadalajara, Jalisco. The leaflets range in form from narrowly linear to broadly ovate. In the cultivated varieties (the tepary bean) the leaflets are broad and the seeds variously colored—white, yellow, brown, violet, or black—and variously mottled.

15. *Phaseolus mollis* Hook. Trans. Linn. Soc. Bot. 20: 228. 1847.

This species, apparently confined to the Galápagos Islands, was first collected on James Island by Charles Darwin. It has recently been found on Albemarle Island, *Stewart* 1603, 1604. Baur's 86, a mere scrap from Jarvis Island, referred by Robinson (Proc. Amer. Acad. 38: 153. 1902) to *P. mollis*, is *P. vestitus* Hook.

16. *Phaseolus falciformis* Piper, sp. nov.

Herbaceous vine; stems slender, terete, hirtellous with many short hairs and hirsute with few yellow hairs; stipules ovate-triangular, acute, 3-nerved, puberulent, 3 mm. long; petioles shorter than the leaflets; leaflets 3, firm-membranaceous, oblong to ovate, obtuse and apiculate, rounded at base, sparsely appressed-pubescent on both sides, 2 to 5 cm. long; stipels oblong, 1-nerved; peduncles exceeding the leaves, 5 to 10 cm. long, pubescent like the stems; bracts persistent, lanceolate, acute, pubescent beneath, 3-nerved, the principal ones 3 mm. long; pedicels shorter than the calyx; bracteoles lance-linear, pubescent, 1-nerved, one-third as long as the calyx; calyx campanulate, 2.5 mm. long, pubescent, especially on the ventral part, the upper lip emarginate, the lower with subequal triangular acute lobes about as long as the tube; corolla purple (?), glabrous, 7 mm. long; keel tubular, the tip in 2 complete close coils; pods falcate, compressed, short-beaked, finely puberulent, 3 cm. long; seeds 3 to 5.

Type in the U. S. National Herbarium no. 763711, collected near Compostela, Tepic, Mexico, altitude 1,500 to 1,800 meters, April 7-8, 1897, by E. W. Nelson (no. 4173).

Closely related to *P. lunatus* L., but distinguished by the pubescence, the form of the leaflets, the glabrous corolla, and the small puberulent pods.

17. *Phaseolus lunatus* L. Sp. Pl. 724. 1753.

This is a very diverse aggregation of both wild and cultivated forms whose status is variously interpreted by different botanists. In the writer's judgment it is but a single botanical species. The leaflets vary from narrowly lanceolate or nearly linear to broadly rhombic-ovate. The pods display wide variation in size and shape, while the seeds are very diverse in color and size. Wild forms occur in Cuba, Porto Rico, and Guadeloupe, from Mexico to Panama, and in Colombia, Venezuela, Brazil, and Peru, and doubtfully in Argentina.

Phaseolus lunatus is the Lima bean of cultivation. There is an endless number of cultivated forms, varying in shape and color of seeds. In some forms the plants are bushy and erect, in others long and scandent. The various varieties are cultivated widely in most temperate regions and also in the Tropics.

18. *Phaseolus rosei* Piper, n. sp.

Herbaceous vine, glabrous except for puberulence fugitive on the young stems and leaves but persistent in the inflorescence; stem slender, terete; stipules lanceolate, acute, 3-nerved, 2 mm. long; petioles slender, shorter than the leaflets; stipels oblanceolate, 1-nerved; leaflets 3, thin-membranaceous, ovate, acuminate with the tip blunt and apiculate, rounded to truncate at base, 4 to 6 cm. long, the lateral ones oblique; peduncles shorter than the leaves; racemes few (3 to 8) flowered; bracts lance-linear, acute, puberulent, 1-nerved, small; pedicels puberulent, several times as long as calyx; bracteoles oblong, puberulent, 3-nerved, one-third as long as calyx; calyx campanulate, 2.5 mm. long, puberulent, the upper lip very short and emarginate, the lateral teeth broadly ovate, short, the median tooth triangular and a little longer but only one-fourth as long as the tube; corolla 8 mm. long; standard violet, orbicular, emarginate at apex, tapering to a broad wedge-shaped base, short-stipitate, reflexed from below the middle, a transverse thickening at place of flexure, the auricles marginal, inflexed, forming sac-like pouches; wings cream-color, cuneate-obovate, the margins inrolled, angled at base, the stipe 3 mm. the blade 7 mm. long; keel cream-color, cylindrical, the tip coiled in 2 close turns; filament of the free stamen with a globose enlargement above the base; style filiform, with a short sparse beard on the ventral side below the stigma; stigma lateral, the tip of the style terete; ovary linear, appressed-pubescent; pods falcate, compressed, glabrous, straw-color, 1 cm. broad, 4 cm. long including the slender straight (5 mm. long) beak, 2-seeded; seeds black, shiny, much compressed, obscurely marked with radiate ridges, 10×7×2 mm., the concave white hilum nearly half as long as the seed.

Type in the U. S. National Herbarium no. 1,241,201, the specimen grown in the greenhouse at Washington, D. C., from seeds collected on a dead vine twining over shrubs at Huigra, Ecuador, by J. N. Rose (no. 24067).

This species is probably annual, as indicated by the field note. The roots are fibrous, but the plants have lived two years in the greenhouse.

19. *Phaseolus bolivianus* Piper, sp. nov.

Vine, apparently perennial, woody at base; stems terete, densely puberulent with rusty reflexed hairs; stipules triangular, acute, pubescent beneath, 7 mm. long; petioles puberulent, not as long as the leaflets; stipels linear, pubescent; leaflets ovate, the lateral oblique, rounded at base, acuminate, thinly puberulent above, densely so and paler beneath, 6 to 10 cm. long; peduncles puberulent, not as long as the leaves; racemes interrupted, 10 to 12 flowered; principal bracts lanceolate, pubescent, acute, 4 to 6 mm. long, persistent; pedicels pubescent,

nearly twice as long as the calyx; bracteoles lance-linear, pubescent, two-thirds as long as the calyx; calyx broadly campanulate, 3.5 mm. long, rusty-pubescent, the upper lip short, emarginate, the lower with 3 broad triangular acute teeth half as long as the tube; corolla 1 cm. long, puberulent on the back of the standard; standard violet, orbicular, emarginate, 1 cm. broad, reflexed from below the middle and thickened transversely at the flexure, puberulent below the thickening, the stipe short and broad and the marginal auricles inflexed; wings pale, narrowly obovate, inrolled at the margins, angled at base, the stipe slender, 5 mm. long, the blade 10 mm. long; keel cylindrical, white, the tip in 2 close coils; anthers oblong, white; stigma linear, oblique, lateral; style short-bearded ventrally for about twice the length of the stigma; ovary lanceolate, densely rusty-strigose; pods falcate, much compressed, short-beaked, finely puberulent, 6 cm. long, 1.5 cm. broad; seeds oval, much compressed, $8 \times 6 \times 2$ mm., brown, minutely speckled, somewhat shiny; hilum central, white, ovate, one-fifth as long as the seed.

Type in the U. S. National Herbarium, no. 1,058,964, collected at Cochabamba, Bolivia, March 14, 1920, by E. W. D. and Mary M. Holway (no. 411).

BOLIVIA: Sorata, *Mandon* 746 (L, G).

PERU: Ollantaytambo, *Cook & Gilbert* 511 (N). Chachapaya, *Mathews* (L).

PHASEOLUS MICRANTHUS, P. BREVICALYX, AND P. OPACUS

These three species are very similar in having the flowers small and the calyces black-bristly.

KEY TO THE SPECIES

Stems both bristly and puberulent; young pods densely puberulent; calyx densely bristly, 3 mm. long. Bracts longer than the pedicels.

1. *P. micranthus*.

Stems bristly, not puberulent; young pods glabrous; calyx sparsely bristly.

Calyx 2 mm. long; bracts shorter than the pedicels; racemes few-flowered.

2. *P. brevicalyx*.

Calyx 2.5 mm. long; bracts longer than the pedicels; racemes many-flowered.

3. *P. opacus*.

1. *Phaseolus micranthus* Hook. & Arn. Bot. Beechey Voy. 287. 1836-9.

This, originally collected by Lay and Collie in Jalisco, is matched by *Palmer* 17 from Tepic. *P. micranthus* Mart. & Gal. is a form of *P. heterophyllus* H. B. K. with linear leaflets.

2. *Phaseolus brevicalyx* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 261. 1902-5.

This is known only by the type specimen, collected in the Sierra Madre, Mexico. There is a specimen in the Gray Herbarium.

3. *Phaseolus opacus* Piper, sp. nov.

Herbaceous vine; stems slender, pilose with yellow hairs; stipules triangular-lanceolate, acute, sparsely hairy beneath, 7 to 9 nerved, 3 to 4 mm. long; petioles pilose, about as long as the leaflets; stipels linear; leaflets 3, membranous, lance-ovate, obtuse and apiculate, rounded at base, sparsely pilose on both surfaces, paler beneath, 2 to 6 cm. long; peduncles pilose, exceeding the leaves; racemes 10 to 12 flowered; bracts lanceolate, acute, ciliate, 3-nerved, persistent, the principal ones 3 mm. long, projecting beyond the buds at the tip; pedicels as long as the calyx; calyx campanulate, sparsely hirsute, especially on the lower lip, 3 mm. long, the upper lip emarginate, the lower with 3 subequal acute teeth over half as long as the tube; corolla violet, 8 to 9 mm. long; standard orbicular, emarginate, reflexed, thickened at the point of flexure, stipitate, not auricled; wings oblong, obtuse, short-stipitate; keel with 2 complete close coils; ovary pubescent; style beard short, extending halfway around first coil; stigma oblique; pods reflexed, linear, falcate, compressed, 6-seeded, glabrous, 2 cm. long.

Type in the U. S. National Herbarium, no. 567441, collected at Barranca de Tenampa, Zacuapan, Veracruz, Mexico, March, 1914, by C. A. Purpus (no. 7081).

MISCELLANEOUS SPECIES, SECTION EUPHASEOLUS

Phaseolus tenellus Piper, sp. nov.

Herbaceous vine, apparently perennial, glabrous throughout; stems terete, very slender; stipules oblong-ovate, acute, striately 5-nerved, 6 mm. long; petioles longer than the leaflets; stipels linear; leaflets 3, rhombic-ovate, sometimes obscurely lobed on the angles, rather firm, acutish and short-apiculate, broadly cuneate at base, paler beneath, 3-nerved, finely reticulate, minutely scabrous on the nerves and margins, 15 to 25 mm. long; peduncles about as long as the leaves; racemes with few (usually 2 or 3) flowers; primary bracts oblong, acute, only the midnerve prominent, 3 mm. long, the secondary ones linear, minute; pedicels longer than the calyx; bracteoles exceedingly minute or sometimes apparently wanting; calyx campanulate, very oblique, 5 mm. long, the upper lip short, emarginate, the lower shorter than the tube, with 3 broad flat rounded teeth; corolla violet; standard 15 mm. long, broadly oblong, notched at apex, somewhat reflexed, angled at base but not auricled, the stipe very broad, 3 mm. long; callosities none, but 2 triangular appendages on the inside near the base, pointing toward the tip; wings spatulate, as long as the standard, angled at base but not auricled, the stipe 4 mm. long; keel coiled at tip with one and one-half close turns, about two-thirds as long as the wings; vexillar stamen free, the base of the filament much thickened but not geniculate, the others united for two-thirds their length; anthers oblong; ovary linear, scaberulous, with about 10 ovules; style glabrous to the coils, then long-hairy nearly to the stigma; stigma terminal, oblong, slightly inflexed.

Type in the U. S. National Herbarium, no. 1,003,657, collected at Campanario, near Morelia, Michoacán, Mexico, altitude 2,200 meters, September 12, 1912, by Bro. G. Arsène (no. 8310). Also collected at the same place September 14, 1911 (*Arsène* 6782).

Phaseolus intonsus Piper, sp. nov.

Herbaceous vine; stems slender, terete, hirsute with yellow hairs; stipules oblong-ovate, acutish, pubescent beneath, 1 to 7 nerved, 6 mm. long; petioles pubescent like the stems, shorter than the leaflets; stipels lanceolate, broadest in the middle, acute, 3-nerved, pubescent beneath, 3 mm. long; leaflets membranaceous, ovate, entire or obscurely 3-lobed at base, acutish, slightly paler beneath, pustulate-hirsute on both surfaces, 3 to 3.5 cm. long; peduncles longer than the leaves; racemes dense, about 12-flowered; bracts lanceolate, acute, pubescent beneath, 5-nerved, 5 to 6 mm. long; pedicels shorter than the calyx; bracteoles linear, pubescent, 1-nerved, one-third as long as the calyx; calyx campanulate, hirsute, 2.5 to 3 mm. long, the short upper lip slightly notched, the lower lip with triangular acute subequal lobes not half as long as the tube; corolla 8 mm. long; standard stipitate, orbicular, somewhat curled, sharply reflexed from below the middle, apparently without auricles or appendages; wings stipitate, the blade oblong, with an oblong appendage on the upper side near the base; free stamen with a transverse enlargement near the base, not geniculate; keel tubular, the tip coiled in 2 close turns; style sparsely bearded; stigma oblique; ovary villous, short, linear.

Type in the herbarium of the Muséum d'Histoire Naturelle, Paris, collected in the Sierra de Guanajuato, Mexico, altitude 2,000 meters, in 1872, by M. E. Guillemin-Tarayre.

The relationships of this species are uncertain; it is perhaps near *P. pilosus* H. B. K.

Phaseolus sempervirens Piper, sp. nov.

Perennial vine; stems somewhat woody, 40 cm. high, slender, terete, puberulous; petioles slender, as long as the leaflets; stipules triangular, acute, 2 mm. long; stipels subulate; leaflets coriaceous, lanceolate to lance-ovate, obtuse, rounded at base, the margin revolute, strongly reticulate, paler beneath, finely hirtellous when young; peduncles puberulous, 6 to 10 cm. long; raceme rather closely 8 to 12 flowered; primary bracts triangular, 3-nerved, 2 mm. long; pedicels 2 to 3 mm. long; bracteoles linear, minute, about one-fifth as long as the calyx; calyx campanulate, puberulous, 2.5 mm. long, the emarginate upper lip very short, the lower lip with 3 broadly triangular acute teeth about half as long as the tube; corolla 10 mm. long, apparently purple or violet; standard orbicular, short-stipitate, reflexed from below the middle, bearing a callosity near the place of bending, a flaplike appendage on each side near the base back from the margin; wings oblong, truncate at base, not auricled, the blade 7 mm. and the stipe 3 mm. long; keel tubular, not broadened in the middle, twisted at tip into nearly 2 close coils; free stamen enlarged near the base of the filament into a circular expansion, not geniculate; stigma lateral, the style short-bearded both above and below for a short distance; immature pod linear, glabrous, much compressed, short-beaked, 5-ovuled.

Type in the herbarium of the British Museum of Natural History, collected in the Sierra Madre, Mexico, by Seemann.

Phaseolus jaliscanus Piper, sp. nov.

Slender vine; stems terete, sparsely puberulent when young; petioles puberulent, much shorter than the leaflets, about 1 cm. long; stipules lanceolate, acute, 3-nerved, 3 mm. long; stipels linear, 2 mm. long; leaflets coriaceous, oblong to oblong-lanceolate, obtuse, apiculate, rounded at base, similarly green on both sides but with a pale band along the central rib above, finely and sparsely puberulent, 3 to 4 cm. long; peduncles 6 to 8 cm. long; racemes 6 to 8 flowered; primary bracts lanceolate, puberulent, 2 mm. long; pedicels as long as the calyx; bracteoles minute, linear, ciliate, one-fourth as long as the calyx; flowers violet; calyx campanulate, glabrous except the lowest lobe, 3 mm. long, the short upper lip emarginate, the lower lip with 3 broad ovate acute teeth half as long as the tube; standard orbicular, emarginate at apex, 7 mm. in diameter, reflexed from below the middle, thickened along the zone of flexure, an intramarginal auricle on each side near the base, the stipe short and broad; wings obovate, 1 cm. long, the blade right-angled at base, the margin inrolled, the slender stipe 3 mm. long; keel cylindric, oblique at orifice, the tip with 2 close coils, a small projection on the upper side of each petal near the base; filament of free stamen thick at base; style beard short and sparse, the tip extending beyond the lateral stigma; immature pod linear, compressed, straight-beaked, glabrous, 4-seeded.

Type in the U. S. National Herbarium, no. 763708, collected in the mountains near Talpa, Jalisco, Mexico, March 7, 1897, by E. W. Nelson (no. 4030).

Phaseolus revolutus Piper, sp. nov.

Stems slender, terete, puberulent with spreading minute hairs; stipules triangular, acute, glabrous, 3 mm. long; petioles glabrous, shorter than the leaflets; stipels linear, curved, minute; leaflets linear, 1-nerved, obtuse and short-apiculate, glabrous, dark green above, paler beneath, the margin narrowly revolute and closely appressed, 5 to 7 cm. long, 4 mm. wide, the midrib with a narrow flange-like margin its whole length; peduncels elongate, much longer than the leaves, puberulent like the stems, bearing racemes of 5 to 8 flowers; bracts ovate, acute, puberulent, 1 to 2 mm. long; pedicels 1 to 3 times as long as the calyx; bracteoles ovate, minute, one-sixth as long as the calyx; calyx campanulate, puberulent, 5 mm. long, the upper lip emarginate, the lower with 3 ovate obtuse teeth about

half as long as the tube; corolla 12 mm. long; standard orbicular, stipitate, thickened and reflexed below the middle, a pair of intramarginal auricles near the base; wings oblong, stipitate, a short lobe on the upper basal angle; keel narrow, stipitate, the tip with 2 complete close coils.

Type in the herbarium of the Muséum d'Histoire Naturelle, Paris, labeled "Provenant de l'herbier Pavon, 1868, No. 68." It is probable that the specimen is from Peru.

Phaseolus oligospermus Piper, sp. nov.

Herbaceous vine; stems terete, covered with short spreading rusty hairs when young; petioles rusty-pilose, nearly as long as the leaflets; stipules narrowly triangular, acute, pubescent, 3 mm. long; stipels similar, 2 mm. long; leaflets membranaceous, ovate, truncate to broadly cuneate at base, acuminate, the tip acute, pubescent with sparse short hairs on both sides, paler beneath, 3 to 5 cm. long; peduncles rusty-puberulent, about as long as the leaves; racemes few-flowered; pedicels as long as the calyx or in fruit 1 cm. long; primary bracts triangular-lanceolate, acute, rusty-pubescent, 5-nerved, 5 to 6 mm. long, persisting; bracteoles lanceolate, strongly 1-nerved, two-thirds as long as the calyx; calyx campanulate, pubescent with reddish hairs, the lips subequal, the upper broad and emarginate, the lower with 3 triangular acute teeth, the middle one longest; corolla evidently purple, striate with darker veins; standard orbicular, 12 mm. long, sharply reflexed, short-stipitate, bearing a transverse callosity near the angle of reflexion and a flaplike auricle on each side of the base back from the margin; wings obovate, stipitate, truncate at base, not auricled, 15 mm. long, the stipe 4 mm. long; keel tubular, not broadened in the middle, coiled at tip into 2 close turns; free stamen with a globose enlargement on the filament near the base, but not geniculate; stigma lateral behind the sterile conical tip of the style, the style bearded on the inner side a short distance below the stigma; immature pods linear, beaked, densely covered with ferruginous hairs, few-ovuled.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at Cartago, Costa Rica, in 1857, by Oersted.

Phaseolus macrolepis Piper, sp. nov.

Herbaceous vine; stems slender, terete, sparsely strigillose with reflexed hairs, apparently about a meter high; stipules oblong, acutish, 7-nerved, 3 to 4 mm. long, persistent; petioles slender, puberulent, shorter than the leaflets; stipels oblong, broadest at base, acute, 3-nerved; leaflets membranaceous, thin, angularly ovate, long-acuminate and apiculate, truncate at base, sparsely strigillose on both sides, not paler beneath, 7 to 9 cm. long; peduncles 10 cm. long; racemes with few crowded flowers; bracts elliptical, long-acuminate, faintly nerved, strigillose, persistent, concealing the full-grown flower buds, 15 mm. long; pedicels puberulent, 8 mm. long; bracteoles ovate, obtuse, one-fifth as long as the calyx; calyx campanulate, 4 mm. long, puberulent, the upper lip emarginate, much shorter than the tube, the lower with 3 broad obtuse teeth not half as long as the tube; corolla apparently red or violet, 2 cm. long; wings apparently a little longer than the standard; keel with one complete close coil; pods not seen.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected on a ridge above Calderas, Volcán de Fuego, Guatemala, altitude 2,490 meters, October 20, 1873, by Salvin. A second specimen from apparently the same locality was collected in 1861 by Salvin and Godman.

The species is very distinct in its large foliaceous bracts, and is perhaps nearest related to *P. vulgaris* L. The leaflets are much like those of *P. lunatus* L. Because of the paucity of material, no dissection of the flower was attempted.

Phaseolus xanthotrichus Piper, sp. nov.

Herbaceous vine; stems slender, terete, pilose with spreading yellow-brown hairs; stipules ovate, acutish, pubescent above, glabrous beneath, prominently

7-nerved, 3 mm. long; petioles pilose like the stems, shorter than the leaflets; lower pair of stipels ovate, 1-nerved, the upper ones much narrower; leaflets membranaceous, ovate, acuminate narrowed to a blunt apiculate tip, broadly rounded at base, 3-nerved, strigose-pilose on both surfaces but more densely near the margins above, 2 to 3 cm. long; peduncles slender, pilose, 2 to 3 cm. long; racemes loosely few-flowered; primary bracts elliptic, acute, 1 to 3 nerved, ciliate with a few hairs, 2 mm. long; pedicels slender, twice as long as the calyx; bracteoles minute, ovate, soon falling; calyx campanulate, pilose, 3 mm. long, the upper lip very short, emarginate, the lateral teeth rounded, the median acute, all 3 about half as long as the tube; corolla 13 mm. long; standard orbicular, emarginate, sharply reflexed at the middle, cuneate at base, without auricles, bearing at the middle 2 linear callosities, the stipe short and broad; wings oblong, long-stipitate, without auricles; keel spiral with two and one-half close coils; vexillar stamen free; stigma terminal, oblique, the style sparsely hairy in the uppermost coil; pods linear, falcate, compressed, glabrous, 8 to 10-seeded, 4 cm. long, the beak short.

Type in the U. S. National Herbarium, no. 247544, collected at Laguna de Ayarza, Jalapa, Guatemala, October, 1892, by *Heyde & Luz* (no. 4171); distributed as *P. lunatus* L.

COSTA RICA: Cartago, *Pittier & Durand* 8999 (B, N).

***Phaseolus spiralis* Piper, sp. nov.**

Herbaceous vine; stems slender, terete, sparsely puberulent; stipules broadly triangular, acute, 7-nerved, glabrous; petioles sparsely puberulent, shorter than leaflets; stipels ovate-oblong obtuse, 3 or 4 nerved; leaflets membranaceous, ovate, acuminate, with an apiculate tip, rounded to cuneate at base, sparsely strigillose above, paler and glabrous beneath, 4 to 5 cm. long; peduncles shorter than or equaling the leaves; racemes with 6 to 10 rather crowded flowers; bracts and bracteoles not seen, fugacious; pedicels glabrous, as long as the calyx; calyx campanulate, ciliolate, 5 mm. long, the upper lip emarginate, the lower 3-lobed, the lobes ovate, obtuse, the median longest and about one-fourth as long as the tube; standard twisted in 2 complete turns, about 14 mm. long when straightened, thickened and sharply reflexed toward base, not auricled, the stipe very short; wings 14 mm. long, much shorter than the keel, slender-stipitate, the blade oblong, curved, involute on the margins, a short blunt lobe on the upper side near the base; keel narrow, slightly broadened at base, short-stipitate, twisted in one loose turn, the tip deflexed; stamens oblong, yellow; style slender, terete, sparsely bearded on the inner side with long hairs, the extreme tip in 2 close coils; pods linear, glabrous, thick-walled, 10 cm. long, short-beaked; seeds lenticular, black and brown-marbled, 5 mm. in the broad diameter.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in the woods of Paraná, Argentina, by Tweedie.

Closely resembling *P. cochleatus* Vell., but differing in its leaflets, short racemes smaller flowers, and coiled keel.

***Phaseolus rigidus* Piper, sp. nov.**

Shrubby, with erect or spreading branches, 30 cm. high or perhaps more; stems terete, pilose with rusty hairs; stipules broadly lanceolate, acute, 7 to 9 striate, 3 mm. long; petioles pubescent like the stems, shorter than the leaflets; stipels oblong, 3-striate, quickly deciduous; leaflets firm, ovate-oblong, the lateral slightly oblique, obtuse and minutely apiculate, cuneate or rounded at base, 3-nerved, reticulate and prominently veined, especially beneath, sparsely appressed-pubescent on both sides, 4 to 5 cm. long, not paler beneath; peduncles a little longer than the leaves, pubescent with reflexed hairs; racemes short, few-flowered; pedicellar glands prominent; bracts not seen; flowers sessile; bracteoles oval, obtuse, 9-nerved, 3 mm. long; calyx 5 mm. long, shallow, campanulate, very

oblique, sparsely appressed-pubescent, ciliate, the upper lip as long as the tube and bidentate, the lower lip with 3 lanceolate teeth twice as long as the tube; corolla 3 cm. long; standard orbicular, emarginate; wings oblong, longer than the standard; keel spiral, with one and one-half close turns; ovary linear, glabrous.

Type in the U. S. National Herbarium, no. 1,155,906, collected at Milluhuaya, La Paz, Bolivia; altitude 1,300 meters, December, 1912, by Otto Buchtien (no. 4600).

BOLIVIA: Without locality, *Bang* 2269 (N).

Phaseolus pachyrhizoides Harms, Notizbl. Bot. Gart. Berlin 7: 504. 1921.

The type is from Huacapistana, Junín, Peru. The species has been collected recently at Cani, near Mito, Junín, Peru (*Macbride* 3442).

Phaseolus anisotrichos Schlecht. *Linnaea* 12: 326. 1838.

? *Phaseolus leptostachyus* Benth. *Ann. Wien. Mus. Naturg.* 2: 136. 1840.

Phaseolus fulvus T. S. Brandeg. *Univ. Calif. Publ. Bot.* 4: 87. 1910.

This species is abundant through much of Mexico and Central America. In all its variations it is easily distinguishable by its rather large, setose-ciliate bracts.

P. leptostachyus Benth. is probably the same as *P. anisotrichos*, as are all the specimens at Kew so labeled, and cited by Hemsley in the *Biologia Centrali-Americana*. The type of *P. leptostachyus* has not been examined, however.

Phaseolus anisotrichos incisus Piper, subsp. nov.

Leaflets incisely 3-lobed from near the base, the central lobe 2 or 3 times as long as the lateral ones.

Type in the U. S. National Herbarium, no. 301734, collected near Plateado, Zacatecas, Mexico, September 4, 1897, by J. N. Rose (no. 2801).

Incision of leaflets is a rare variation in *Phaseolus*. In the species the leaflets are entire or obscurely 3-lobed by the broadening of the basal angles.

Phaseolus tuerckheimii Donn. *Smith, Bot. Gaz.* 56: 54. 1913.

Phaseolus chiriquinus Standl. *Contr. U. S. Nat. Herb.* 18: 109. 1916.

Phaseolus adenanthus Meyer, *Prim. Fl. Esseq.* 239. 1818.

Phaseolus cuernavacanus Rose, *Contr. U. S. Nat. Herb.* 8: 311. 1905.

Phaseolus occidentalis Rose, *Contr. U. S. Nat. Herb.* 8: 312. 1905.

The synonymy of this widespread American species, now introduced generally in the Old World tropics, contains about 15 names, to which the above two must apparently be added. The species is variable in its leaflets and pubescence, but the calyx character holds remarkably true. Two of the extreme variants are worthy of nomenclatorial recognition.

Phaseolus adenanthus latifolius (Benth.) Hassler, *Candollea* 1:443. 1923.

Phaseolus latifolius Benth. *Ann. Wien. Mus. Naturg.* 2: 139. 1840.

Phaseolus truxillensis forma *velutinus* Chod. & Hassl. *Bull. Herb. Boiss.* II. 4: 908. 1904.

This differs from *P. adenanthus* only in the dense, rather tomentose pubescence.

MEXICO: Tequila, Jalisco, *Pringle* 4615 (N). Cerro Verde, Michoacán or Guerrero, *Langlassé* 582 (K, G). Mirador, Veracruz, *Sartorius* (N).

ECUADOR: Portovelo, *Hitchcock* 21230 (N).

PARAGUAY: Ypacaray, *Hassler* 11589 (N). Without locality, *Page* (N); *Morong* 198 (N).

BRAZIL: Caldas, Minas Geraës, *Regnell* 1125 (K).

The broken distribution of var. *latifolius* rather tends to emphasize that it is a mere variant of *P. adenanthus*.

Phaseolus adenanthus radicans (Benth.) Hassler, *Candollea* 1: 443. 1923.

Phaseolus radicans Benth. *Ann. Wien. Mus. Naturg.* 2: 138. 1840.

Phaseolus barbulatus Benth. *Wien. Mus. Naturg.* 2: 138. 1840.

Phaseolus truxillensis minor Benth. in *Mart. Fl. Bras.* 15¹: 186. 1859.

A variant with creeping stems which root at each joint, small leaflets, and smaller flowers.

This occurs in Guatemala (Cerro Redondo, *Heyde & Lux* 6121, N), and Costa Rica (Nicoya, *Tonduz* 13563, N), as well as in Brazil.

Phaseolus microcarpus Mart. *Amoen. Bot. Monac.* 18. 1829-31.

Phaseolus monospermus Robins. & Greenm. *Proc. Amer. Acad.* 29: 385. 1894.

This peculiar species has pods much like those of *Meibomia*. The type of *P. microcarpus* was grown from seed collected by Karwinsky at Tlalpujahua, Mexico, the specimen in the Jardin de Botanique, Brussels.

PUEBLA: Tehuacán, *Purpus* 5780 (N). Coxcatlán, *Purpus* 4203 (N).

JALISCO: Tequila, *Pringle* 5446 (type of *P. monospermus*, G).

OAXACA: Monte Alban, *Smith* 931 (N). Valley of Oaxaca, *Nelson* 1308 (N).

GUERRERO: Acapulco, *Palmer* 524 (N).

Phaseolus linearis H. B. K. *Nov. Gen. & Sp.* 6: 445. 1823.

Phaseolus elongatus Rose, *Contr. U. S. Nat. Herb.* 8: 311. 1905.

The species is known from Mexico, Panama, Colombia, Guiana, Venezuela, Peru, Bolivia, Brazil, and Paraguay.

Phaseolus linearis coriaceus (Desv.) Chodat & Hassl. *Bull. Herb. Boiss.* II. 4: 908. 1904.

Phaseolus coriaceus Desv. *Ann. Sci. Nat.* 9: 419. 1826.

Phaseolus asper Benth. *Ann. Wien. Mus. Naturg.* 2: 139. 1840.

Phaseolus linearis latifolius Benth. in *Mart. Fl. Bras.* 15¹: 187. 1859.

This is merely a variant with broad leaflets. Every form from linear to broadly oblong or ovate occurs. Hassler (*Candollea* 1: 445. 1923) refers here *P. violaceus* Vell. (*Fl. Flum.* 311. *pl.* 124. 1825), a disposition with which I do not agree.