

## ASTRAGALUS IN ARGENTINA, BOLIVIA AND CHILE

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ONLY IN SOUTH AMERICA does the great genus *Astragalus* have an extensive development in the southern hemisphere. There are ten species reported from the mountains and plateaus of tropical Africa. In the temperate southern parts of that continent the genus is represented only by one species in Natal. In South America, however, there are nearly ninety species. The genus is represented along the cordilleras from Ecuador to the Straits of Magellan, and has two important centers of speciation, one in the high country of northwestern Argentina and adjacent Bolivia and another in adjoining Chile and Argentina along the cordilleras south of the peak of Aconcagua.

Though the present paper treats the species known from south of Peru, all the South American species of *Astragalus* were studied during its preparation. Accounts of the two Ecuadorean species, and of seven of the Peruvian species have already been published, Jour. Arnold Arb. 19: 88-96 (1938). The present paper treats the remaining seventy-seven species of the genus known to me from South America.

In general structure and appearance the South American *Astragali* are rather similar to those found in North America. Their relations are with the North American and not with the Old World members of the genus. They are probably the products of an ancient southern migration and subsequent differentiation of various types originating in North America where the genus has one of its major evolutionary centers. In North America, *Astragalus* is represented from Alaska and Baffinland south to northern Guatemala, with most of its more than three hundred species concentrated in western United States. The areas occupied by North and South American species are, accordingly, separated by Colombia and nearly all of Central America, and their major areas of speciation by the great distance between Argentina and the United States.

The close relationship between North American species and others in Argentina and Chile is frequently very clear. Indeed, some of the southern plants seem to be more closely related to the northern ones than they are to any found on their own continent. None, however, seems to be specifically identical with North American plants. Though there are many close similarities between northern and southern species, evolution in South America has not closely paralleled that in North America. This becomes very clear if an attempt is made to apply to the South American species the system of segregate genera set up for the North American species by Rydberg, No. Am. Fl. 24: 251-462 (1929), and Am. Jour. Bot. 15: 584-595 (1928), 16: 197-206 (1929), and 17: 231-238 (1930). Some of the South American species fall readily into the Rydbergian

segregates, but many straddle the arbitrary lines between these so-called genera, and others simply do not fit into any of them.

No satisfactory subgeneric classification of the South American species has been worked out. Rydberg's classification seems artificial at many places and furthermore is to be condemned as provincial, since it is based almost exclusively on species of one region and without full consideration of those in other parts of the world. It would have to be modified considerably, as well as amplified by the addition of comparable new groups, before it could accommodate the South American species satisfactorily. That, however, is a task that should be left to a monographer with a wide acquaintance of the genus as developed in all parts of the world. *Astragalus* has only one clean line of cleavage in South America. This breaks the genus into two natural groups probably worthy of generic recognition. One, the section *Phaca*, with fifteen species, is readily distinguished by its well separated, distinct, herbaceous stipules. The other, the section *Euastragalus*, has more or less united, membranous, ochraceous stipules and includes over seventy species.

In the present paper the synonymy given for the species is complete except for certain names published by Otto Kuntze, *Rev. Gen.* 2: 940-949 (1891), and 3<sup>2</sup>: 73 (1898). Substituting the name *Tragacantha* for *Astragalus*, Kuntze published hundreds of new combinations under the former invalid name. It has seemed a waste of space to reprint the scores and scores of useless binomials he applied to South American species. Only when he coined new specific epithets for South American species, are Kuntze's names of any taxonomic significance and only the latter are listed in the synonymy given in this paper.

Among the large number of specimens studied, only about half are cited. Under well understood species, of which I have seen numerous specimens, I have cited only selected collections to show geographic range. Only under new, rare, or poorly understood species has all the examined material been cited. The particular herbaria in which the examined specimens are located are indicated by abbreviations, in parentheses, following the collector's name.

During the preparation of this paper the specimens in many herbaria have been examined. The basic herbarium and library work was carried on at the Gray Herbarium. During a visit to Europe the genus was studied at Kew, London, Hamburg, Berlin, Munich, Geneva, and Paris, and loans of selected material from these botanical centers were later studied at the Gray Herbarium in conjunction with loans of South American *Astragali* from Stockholm, Upsala, New York, Washington, and Chicago. From South America much interesting material has been received on loan and for identification. Dr. Angel Cabrera of La Plata, sent specimens and arranged the loan of Spegazzini's *Astragalus*. To Prof. L. R. Parodi, Dr. Arturo Burkart, Prof. Alberto Castellanos, Sr. A. Ruiz Leal, and Sr. Juan V. Monticelli I am indebted for many interesting specimens. Prof. Marcial R. Espinosa sent me some of the collections

and very obligingly loaned me fragments of certain critical specimens in the Philippi Herbarium. Other very interesting and useful Chilean collections have been received from Sr. Gualterio Looser, Sr. Gilberto Montero, and Dr. C. Grandjot. I have had help from many sources and I am grateful to the many botanical friends in Europe and America who have aided in this work on the genus *Astragalus*.

The abbreviations for the herbaria cited in this paper are as follows: BD=Herb. Bot. Mus., Berlin-Dahlem, Germany; Behn=Herb. Dr. K. Behn, Valparaiso, Chile; BM=Herb. British Mus. Nat. Hist., London, England; Boiss=Boissier Herb., Geneva, Switzerland; Burkart=Herb. Inst. Bot. Darwinion, Buenos Aires, Argentina; Calif=Herb. Univ. California, Berkeley, California; Del=Delessert Herb., Geneva, Switzerland; FM=Herb. Chicago Nat. Hist. Mus. [Field Mus.], Chicago, Illinois; G=Gray Herb., Harvard Univ., Cambridge, Massachusetts; Gottenburg=Herb. Hort. Bot. Gottenburg, Gottenburg, Sweden; Grandjot=Herb. Dr. C. Grandjot, Santiago, Chile; Hamb=Herb. Inst. Allg. Bot., Hamburg, Germany; K=Herb. Roy. Bot. Gard., Kew-Surrey, England; LP=Herb. Mus. La Plata, La Plata, Argentina; Munich=Herb. Bot. Mus., Munich, Germany; NY=Herb. New York Bot. Gard., New York, New York; Paris=Herb. Mus. Hist. Nat., Paris, France; Parodi=Herb. Dr. L. R. Parodi, Buenos Aires, Argentina; Santiago=Herb. Mus. Nac., Santiago, Chile; Speg=Herb. Mus. La Plata, La Plata, Argentina; Stock=Herb. Riksmus., Stockholm, Sweden; US=United States Nat. Herb., Washington, D. C.; Upsala=Herb. Upsala Univ., Upsala, Sweden.

#### KEY TO SPECIES

- A. Stipules herbaceous, not united, separated by a quarter of the circumference of the stem.
- Legumes compressed, scarcely if at all inflated, rather closely investing the 1-3 seeds, 5-13 mm. long.....1. *A. Chamissonis*
- Legumes distinctly inflated, 8-40 mm. long; seeds more numerous and at maturity rattling about within the mature pod.
- Pods evidently stipitate, the stipe 3-10 mm. long; pedicels becoming 5-7 mm. long; standard yellow.
- Fruit distinctly pendulous.....2. *A. Pissisi*
- Fruit strict or ascending.
- Pods broadest above middle; leaves flat; flowering inflorescence short and dense.....3. *A. Edmonstonei*
- Pods broadest below middle; leaves conduplicate; flowering inflorescence becoming loose and elongate.....4. *A. limariensis*
- Pods sessile or with a stipe less than 3 mm. long.
- Legumes small, 8-15 mm. long, usually strict or ascending.
- Pedicels 3-5 mm. long at anthesis, becoming 5-7 mm. long in fruit; standard yellow; leaflets frequently verticillate.....5. *A. verticillatus*
- Pedicels 0.5-1.5 mm. long at anthesis, becoming 1-2.5 mm. long in fruit; standard purple or violet; leaflets in simple pairs.
- Herbage glabrous; leaflets thickish; plant montane.....6. *A. Looserii*
- Herbage hairy; leaflets not very thick nor fleshy; plants of low altitudes.....7. *A. Berterianus*

Legumes medium to large, 15–40 mm. long.

Plants annual or at least short-lived; corolla pinkish; arid coastal regions of northern Chile.

Herbage pallid with a dense velvety indument...8. *A. paposanus*

Herbage green or somewhat cinereous, strigose.....

.....9. *A. coquimbensis*

Plant strongly perennial, montane.

Legumes strictly erect, lancoid, tough and rigid, opaque, lustrous brown at maturity.....10. *A. curvicaulis*

Legumes spreading and becoming pendulous, ovoid or ellipsoid, papery, translucent, pale or mottled at maturity.

Ovary and fruit glabrous.

Leaves glabrous or with the hairs confined to the margins and midrib of the leaflets...11. *A. pehuenches*

Leaves sparsely but evidently strigose.....

.....12. *A. valerianensis*

Ovary distinctly strigose and fruit at least sparingly so.

Corolla pinkish; flowers dense, 15–30; pods 15–20 (–25) mm. long, numerous and congested in globose clusters; northern Chile.....13. *A. vagus*

Corolla with at least the standard conspicuously purple or violet; pods not in dense clusters.

Leaflets smooth, strigose with closely appressed silky hairs; pods 2–4.5 mm. long.....

.....14. *A. Darumbium*

Leaflets somewhat shaggy with short ascending to spreading hairs; pods 2–3 cm. long.....

.....15. *A. monticola*

AA. Stipules membranous, more or less united into an amplexicaul sheath.

B. Fruit with the sutures not inflexed nor recessive, or with the lower one more prominent than the upper.

Peduncles 2–15 cm. long, equalling or surpassing the subtending leaf; flowers numerous; Patagonia and the andes of middle and southern Chile and Argentina.

Fruit not compressed about the margin of the valves, the sutures not salient.

Plant densely short villous, the hairs more or less curly and spreading; leaflets obcordate, plicate; pods short villous...16. *A. vesiculosus*

Plant strigose to glabrous, hairs appressed; leaflets acute to weakly retuse, elliptic to lanceolate, revolute; pods mottled, prevailingly glabrous.

Leaflets more or less strigose above; wings conspicuously surpassing the keel.....17. *A. Arnottianus*

Leaflets glabrous above; wings shorter than the keel or of about equal length.....18. *A. palenae*

Fruit compressed at least about the margin of the valves, tough and leathery, the sutures prominent, elevated on the compressed rim of the fruit.

Pod somewhat compressed dorso-ventrally, more or less triangular in cross-section, lower suture most prominent; corolla ca. 12 mm. long, petals all broad; eastern Argentina.....19. *A. argentinus*

Pod flattened laterally, linear to lenticular in cross-section, sutures equally prominent; corolla 15–20 mm. long, the petals narrow and elongate.

Plant villous, pallid; calyx with pale hairs; fruit valves wider than long.....20. *A. Illini*

- Plant short strigose or glabrous; calyx usually with black hairs; fruit valves longer than broad.
- Leaflets elliptic to oblanceolate, apex rounded or emarginate.  
.....21. *A. Cruckshanksii*
- Leaflets oblanceolate to linear, apex acute.
- Stems elongate, 1-5 dm. long, internodes well developed, bearing scattered leaves; peduncles obviously axillary.....22. *A. Amunategui*
- Stems short, usually 0.5-5 cm. long, slender, with very much shortened internodes; leaves appearing to be tufted and the peduncle scapose...23. *A. patagonicus*
- Peduncles very short, 0-1.5 cm. long, conspicuously shorter than the subtending leaf, 1-7-flowered; high altitudes in Bolivia and northern Chile and Argentina.
- Ovary glabrous; fruit glabrous, 10-15 mm. long; plant caespitose with green 2-6-jugate leaflets; peduncles 2-4-flowered, becoming 1-5 mm. long; northwestern Argentina.....24. *A. Burkartii*
- Ovary strigose; fruit pallid, strigose, 4-7 mm. long; plants with dense appressed pale indument; leaflets 5-9-jugate.
- Plant densely caespitose, the leaf-tufts usually springing from an evident collar of tough flavescent stipules; fruit sessile, solitary, remaining hidden among stipular sheaths, 3-4 mm. long, valves 2-3 mm. broad; northern Argentina.....25. *A. crypticus*
- Plant with elongating leafy stems, 1-15 cm. long; fruit becoming evident, 6-7 mm. long, valves 5-6 mm. wide.
- Fruit usually solitary in the leaf-axils, becoming exposed along the older parts of the coarse trailing stems; northern Argentina and adjacent Chile.....26. *A. cryptobotrys*
- Fruits several to many on evident axillary peduncles; peduncles 1-15 mm. long.
- Plant coarse; leaflets lanceolate, 3-10 mm. long, apex acute; corolla 14 mm. long; valves broadest below middle; Bolivia.....27. *A. Asplundii*
- Plant slender; leaflets oblong or elliptic, 3-4 mm. long, apex rounded or obtuse; corolla ca. 6 mm. long; valves broadest at or above the middle; Andes of Coquimbo and San Juan.....28. *A. bellus*
- BB. Fruit with the lower suture inflexed, or at least less prominent than the upper one.
- C. Fruit distinctly pendulous or reflexed.
- D. Plants of Argentina.
- Leaflets cuneate to deltoid, broadest at apex and very deeply and conspicuously emarginate; fruit 25-30 mm. long, falcate, upper edge convex in outline.....29. *A. tehuelches*
- Leaflets linear to elliptic, broadest near middle, the apex acute to inconspicuously retuse; fruit with upper edge straight or concave in outline, except in *A. Ruiz-Lealii*.
- Plant abundantly appressed villous, pallid, caespitose, the pods apparently short and not much surpassing the calyx; Chubut.  
.....30. *A. chubutensis*
- Plant prevailingly short strigose, cinereous to green, stems elongated and slender, loosely branched; pods elongate.
- Fruit plump, in cross-section more or less circular or elliptic, valves distinctly convex, lower suture depressed in a shallow narrow groove; corolla ochroleucous and merely spotted with blue or purple.

Valves swollen on either side of the dorsal suture, the suture appearing to be inflexed, pods becoming leathery or somewhat woody; central and northern Argentina.....31. *A. distinens*

Valves not swollen on either side of the dorsal suture, the suture prominent its whole length, pods less tough and more elongate; northern Patagonia.....32. *A. Bergii*

Fruit angular and more or less laterally compressed, in cross section more or less sagittate or cordate to triangular, valves plane on the sides, lower suture inflexed.

Corolla 8-14 mm. long, bright colored; ovary and fruit glabrous.

Plant annual; fruit more than 6 times as long as broad; Rio Negro.....33. *A. Spegazzinii*

Plant perennial; fruit 2-4 times as long as broad.

Pod 10-18 mm. long, strongly and acutely triangular, lateral angles much more prominent than the lower suture; valves readily and completely separating at maturity; Mendoza and Cordoba.....34. *A. carinatus*

Pod 5-9 mm. long, lateral angles rounded and less acute than the lower suture; valves much tougher than in the last, very tardily if at all separating at maturity; Cordoba.....35. *A. Parodii*

Corolla 4-7 mm. long, coloring pale.

Inflorescence with numerous rather crowded flowers; stems elongate, 1-4 dm. long; northwestern Argentina.....36. *A. Joergensenii*

Inflorescence with few (2-7) distinctly scattered flowers; stems 1.5 dm. long or less.

Ovary glabrous; fruit oblong, valves 3-4 times as long as broad, upper suture straight or concave in lateral outline; leaflets glabrous above; Rio Negro and Chubut.....37. *A. pauranthus*

Ovary strigose; fruit falcate, valves 6-10 times as long as broad, upper suture convex in lateral outline; leaflets strigose above.....38. *A. Ruiz-Lealii*

DD. Plants of Chile.

Wings much shorter than the keel.

Fruit and ovary glabrous; plant prostrate, green; leaflets 6-9-jugate; Cautin.....39. *A. Monteroi*

Fruit and ovary strigose; plant prostrate or erect; leaflets 6-16-jugate; Concepcion north to Coquimbo.....40. *A. amatus*

Wings much surpassing the keel.

Leaflets 3; plant densely silky strigose....41. *A. valparadisiensis*

Leaflets 12-31.  
Plant prostrate, stems slender and widely spreading; peduncles scarcely if at all surpassing subtending leaf; corolla large, standard 12-18 mm. long; coast of Antofagasta.....42. *A. cachelensis*

Plant erect or decumbent; peduncles usually much surpassing the subtending leaf; corolla smaller, standard usually less than 12 mm. long.

Pod curved, lateral outline lunate with upper edge concave and the lower edge strongly convex, their sweeping curves continuing into the style, hence apex of pod gradually attenuate; Coquimbo to Antofagasta.

Fruit loosely and abundantly tomentose; plant perennial, stems 2-6 dm. long; leaflets 8-14-jugate; Coquimbo.....43. *A. nudus*

Fruit strigose to subglabrous; plant prevailingly annual; stems 1-4 dm. long; leaflets 5-10-jugate; Atacama and Antofagasta.....

.....44. *A. Doddi*

Pod straight, in lateral outline more or less oblong, with the upper edge straight or convex and the lower edge more or less convex; style terminating the abruptly contracted apex of the fruit.

Fruit laterally much compressed, the lower suture narrowly and deeply inflexed, the sides of the pod nearly parallel; ovary usually hairy; leaflets usually rounded to acute at apex; coastal areas east to base of cordilleras.....45. *A. Berteri*

Fruit triquetrous, with three subequal faces, the lower suture medial on the flattish lower side; ovary glabrous; leaflets usually obtuse or retuse at apex; cordilleras.....46. *A. Germaini*

CC. Fruit strict or ascending, not pendulous.

E. Plants with elongating stems, not caespitose nor pulvinate.

Plant coarse; stipules very large and loosely sheathing, 5-10 mm. long; leaflets usually flat; fruit with well developed false septum.

Fruit evidently villous-strigose; corolla over 1 cm. long; plant usually erect; flowers usually projected beyond the leaves...

.....47. *A. Garbancillo*

Fruit inconspicuously strigose or glabrous; corolla 6-9 mm. long; plant spreading; flowers and fruit much surpassed by leaves.

Plant gray-green, evidently strigose; widely distributed...

.....48. *A. arequipensis*

Plant bright green, nearly glabrous, rare...49. *A. cryptanthus*

Plant slender; stipules small and not very conspicuous, usually less than 5 mm. long; leaflets usually folded or revolute.

Plants of Patagonia and the cordilleras south of Cerro Aconcagua (lat. 33° S).

Fruit slender and elongate, 1-2 cm. long, 2-2.5 mm. in diameter, with a nearly complete false septum and hence, practically 2-celled.....50. *A. Sanctae-Crucis*

Fruit short and stout, 5-15 mm. long, about half as wide as long, 1-celled, the false septum absent or weakly developed.

Leaves linear-lanceolate to narrowly oblong, apex acute to rounded; fruit becoming tough and rigid; Chile at the west base of the cordilleras.....

.....51. *A. orthocarpus*

Leaves orbiculate, strongly retuse at apex; fruit chartaceous.

Herbage green, leaflets glabrous or with only a few scattered hairs along the midrib; south of Neuquen and Talca.....52. *A. Domeykoanus*

- Herbage cinereous, younger leaflets evidently strigose beneath; Mendoza.....53. *A. complicatus*
- Plants from north of Cerro Aconcagua; with the exception of *A. triflorus*, a coastal annual of Peru and no. Chile, all from high altitudes in northwestern Argentina or the Bolivian plateau.
- Fruit densely white villous-strigose, 4-5 mm. long, 2-4-seeded, false septum completely absent; corolla more or less marcescent and investing the ovary at maturity.....
- .....54. *A. punae*
- Fruit not pallid, glabrous or somewhat strigose, usually 10 mm. long or more, 4-12-seeded; corollas not marcescent, soon deciduous.
- Flowers small, standard 3-5 mm. long; fruit with the false septum absent or inconspicuous.
- Inflorescence congested even in fruit; pods 2-3 mm. broad; prostrate perennials of high altitudes in Bolivia and Argentina.....55. *A. micranthellus*
- Inflorescence becoming racemose; pods 5-6 mm. broad; erect annual of coastal Peru and no. Chile.
- .....56. *A. triflorus*
- Flowers larger, standard 5-9 mm. long; fruit with a narrow incomplete false septum.
- Plant cinereous, conspicuously short-strigose; leaves usually shorter than the internodes; leaflets thickish, rounded or obtuse at apex.....
- .....57. *A. Famatinae*
- Plant green, glabrous or only sparsely strigose; leaves usually much surpassing the internodes; leaflets less firm and usually strongly retuse at apex.
- Ovary and fruit distinctly strigose; northwestern Argentina and adjacent Bolivia...
- .....58. *A. tarijensis*
- Ovary and fruit glabrous or practically so; Argentina to Peru, rare.....
- .....59. *A. Weddellianus*
- EE. Plant caespitose or decidedly pulvinate, leaf-bearing stems very short and not much elongating, usually less than 1 cm. long or if longer then compacted into very dense pulvinate masses (cf. alpine forms of *A. micranthellus* and *A. tarijensis*).
- Plant rhizomatose; fruit 7-13 mm. long, 4-7 mm. wide, strongly flattened laterally, intrusion of lower suture and the false septum largely confined to the attachment-end of pod.....
- .....60. *A. Bustillosii*
- Plant without rhizomes.
- Flowers pedicellate, the pedicels 1-4 mm. long, at anthesis elevating the flower above its subtending bract; peduncles usually evident at anthesis, up to 4 cm. long.
- Herbage glabrous or practically so; flower solitary; fruit completely 2-celled by a tough false septum (cf. *A. Weddellianus*).....61. *A. uniflorus*
- Herbage evidently hairy; flowers clustered; fruit 1-celled, the false septum membranous and incomplete or absent.
- Plant yellowish green; calyx-lobes with black hairs; leaflets 3-4-jugate; peduncles 1-3-flowered; ovary glabrous; caudex rather coarse.....62. *A. Venturii*

- Plant pallid, frequently somewhat silvery strigose; calyx usually with only pallid hairs.
- Ovary and fruit glabrous; leaflets 2-4-jugate; stems with internodes 2-5 mm. long; fruit with an incomplete false septum.....63. *A. confinis*
- Ovary and fruit strigose; stems with shorter internodes.
- Leaflets lanceolate to narrowly ovate, 2-3 mm. broad, 4-6-jugate; fruit somewhat lunate, 10-15 mm. long and 3-5 mm. high; false septum completely absent.....
- .....64. *A. hypsogenus*
- Leaflets linear, 1-2 mm. broad, 2-3-jugate; fruit oblong, 6-8 mm. long and 2-4 mm. high, false septum narrow but evident....
- .....65. *A. crymophilus*
- Flowers sessile or subsessile, at anthesis base of calyx closely ensheathed by its bract; peduncles extremely short or none (in fruit rarely becoming 3-7 mm. long in *A. minus* and *A. Werdermanni*).
- Flowers 4-8, in sessile subumbellate clusters in the leaf-axils, intermixed with large bracts.
- Leaflets elliptic to suborbicular, loosely clothed with non-lustrous hairs, usually glabrescent in age, apex truncate to deeply emarginate; stipules white, papery, very broad and loose, usually deciduous.....
- .....66. *A. pusillus*
- Leaflets ovate to lanceolate, densely and permanently clothed with lustrous hairs, apex acute or obtuse.
- Herbage strigose, the hairs ca. 1 mm. long; corolla ca. 6 mm. long; Bolivia and Argentina.....
- .....67. *A. Urbanianus*
- Herbage appressed villous, the hairs ca. 2 mm. long; corolla ca. 8 mm. long; Central Peru.....
- .....68. *A. Dillinghami*
- Flowers solitary or geminate in leaf-axils; bracts relatively inconspicuous.
- Fruit with a more or less incomplete membranous false septum; valves rather firm and tough.
- Leaves canescent or silvery, abundantly appressed villous even in age, not glabrescent; stipules broad and coarse, 5-7 mm. long; leaf-bearing stems coarse, usually 2-3 mm. thick.....
- .....69. *A. peruvianus*
- Leaves green or cinereous, hairs scattered or disappearing in age and frequently absent on the upper surface; stipules smaller, 2-4 mm. long; leaf-bearing stems slender, 1-1.5 mm. thick.
- Leaflets very broadly obcordate with a deeply emarginate apex, strongly folded, sparsely strigose with the hairs lying oblique to the midrib.....70. *A. Werdermanni*
- Leaflets orbicular to elliptic or lanceolate, involute-plicate, apex rounded or very weakly and obscurely emarginate, hairs paralleling midrib.

Leaves appressed short-villous, the hairs loosely appressed particularly on the rhachis, projecting beyond the leaflet-apex in a definite penicillate tuft; stems short and congested, frequently subpulvinate.....71. *A. minutissimus*

Leaves strigose with shorter more appressed hairs which scarcely, if at all, protrude beyond the leaflet-apex; stems elongating, forming prostrate mats....  
.....72. *A. minimus*

Fruit without any false septum, valves rather thin and fragile.

Plant distinctly pulvinate, the leaves strongly marcescent and persisting on even the oldest stems; young stems slender and elongate, internodes 1-10 mm. long; stipules small, not imbricate; pods 4-5 mm. long, several-seeded; Argentina...  
.....73. *A. pulviniformis*

Plant caespitose, the leaves very much less persistent; annual growth of stems short, internodes shorter than the stipules; stipular sheaths imbricate and clothing the stem; pods usually 2 mm. long and 1-2-seeded.

Stipules with ciliate margins, back glabrous or practically so even when young; calyx-tube cupulate, sparsely strigose.

Caudex dense, a mass of crowded strict stems and branches intermixed with persistent leaf-remnants; stipules albescent.....74. *A. Reichei*

Caudex a loose mass of spreading stems and branches, these more or less rope-like and covered with tightly sheathing stramineous stipules, old leaves rather promptly deciduous.....  
.....75. *A. flavocreatus*

Stipules broader and more loosely sheathing, with numerous appressed hairs at least when young; calyx-tube cylindrical, densely appressed villous.

Herbage with non-lustrous indument; stipules papery, albescent; standard with obovate blade; Bolivia and northern Argentina.....  
.....76. *A. deminutivus*

Herbage with lustrous indument; stipules firmer in texture and darkening in age; standard with a suborbicular blade; Central Peru.....77. *A. Dielsii*

1. *Astragalus Chamissonis* (Vogel) Reiche, Anal. Univ. Chile 97: 553 (1897), and Fl. Chile 2: 96 (1898).

*Phaca ochroleuca* Hooker & Arnott, Bot. Misc. 3: 186 (1832).— Type collected at Valparaiso, *Cuming* 389.

*Astragalus ochroleucus* (H. & A.) Gray, Bot. U. S. Explor. Exped. 1: 413 (1854). Not Gilbert (1782).

- Phaca Chamissonis* Vogel, *Linnaea* 10: 592 (1836).—Type collected between Talcahuano and Concepcion, *Chamisso*.
- Phaca chilensis* Nees, *Del. Sem. Hort. Vratislav.* (1833), and *Linnaea* 10: Litt. 72 (1836).—Described from garden material; perhaps from seeds originally sent to Europe from Chile by Bertero.
- Astragalus chilensis* (Nees) Reiche, *Anal. Univ. Chile* 97: 111 (1897), and *Fl. Chile* 2: 111 (1898), not Sheldon (1894).
- Astragalus placens* Clos in Gay, *Fl. Chile* 2: 109 (1846).—Type collected near Valparaiso, *Gay* 467.
- Astragalus ovalensis* Clos in Gay, *Fl. Chile* 2: 116 (1846).—Type collected in "los arroyos del departamento de Ovalle," *Gay* 491.
- Astragalus Volckmanni* Philippi, *Anal. Univ. Chile* 18: 46 (1861), and *Linnaea* 33: 45 (1864); Reiche, *Anal. Univ. Chile* 97: 547 (1897), and *Fl. Chile* 2: 90 (1898).—Type collected at Camarones, southern Atacama, *Volckmann*.
- Phaca araucana* F. Philippi, *Anal. Univ. Chile* 84: 14 (1893).—Type from sands near sea north of Rio Tolten, prov. Cautin, *F. Philippi*.
- Astragalus araucanus* (F. Phil.) Reiche, *Anal. Univ. Chile* 97: 557 (1897), and *Fl. Chile* 2: 101 (1898).
- Astragalus monospermus* Philippi, *Anal. Univ. Chile* 84: 27 (1893); Reiche, *Anal. Univ. Chile* 97: 552 (1897), and *Fl. Chile* 2: 95 (1898).—Type from Las Trancas near Angol, 1881.
- Astragalus laetevirens* Philippi, *Anal. Univ. Chile* 84: 30 (1893); Reiche, *Anal. Univ. Chile* 97: 553 (1897), and *Fl. Chile* 2: 96 (1898).—Type collected at Laja, Bio Bio, *Rahmer*.

RANGE: Widely distributed in central Chile, extending from the southern parts of Atacama south to Cautin, on hills near the coast and at lower altitudes in the Cordillera.

CHILE: Atacama: Camarones, *herb. Reed* as *A. Volckmanni* (K). Coquimbo: Coquimbo, *ex Philippi* as *P. ochroleuca* (US, K); La Serena, 1930, *Claude Joseph* 5446 (US); El Molle, 30 km. west of Vicuña, marsh land along Coquimbo River, 400 m. alt., 10–16 dm. tall, fl. white-yellow or pink, *Wagenknecht* 18495 (G); Queb. Arrayan, 25 km. south of Estacion Pelicana, 5 dm. tall, fl. yellow-white and violet, *Wagenknecht* 18406 (G); ravines of the dept. Ovalle, *Gay* 491 (type of *A. ovalensis*, Paris). Aconcagua: Valparaiso, *Cuming* 389 (type of *P. ochroleuca*, K, BM); Valparaiso, *Wilkes Exped.* (US); hills near Valparaiso, *Bertero* 824 (G, Del, Paris); Popaico near Valparaiso, Feb. 1829, *Gay* 467 (type of *A. placens*, Paris). Santiago: Cord. de Santiago, *ex Philippi* as *P. ochroleuca* (BD, Boiss). Colchagua: Cord. de Tinguiririca, 2300 m. alt., 1929, *Pirion* 73 (G). Curico: Nacimiento del Teno, Feb. 1896, *Philippi* (G). Maule: Baños de Longaví, Jan. 1888, *Schoenemann* (G); Valle del Maule superior, Cord. Linares, Jan. 1897, *Reiche* as *A. laetevirens* (FM, BD). Nuble: trail to Volcan Antuco, *herb. Reed* as *P. ochroleuca* (K); Cord. de Chillan, *Germain* (K, BM, Del, Boiss); Valle del Renegado, Jan. 1877, *ex Philippi* as *A. Chamissonis* (Speg). Concepcion: La Vega de Concepcion, *Poeppig* 97/70 (BD); Concepcion, *D'Urville* (BD), and *Cuming* 810 (K); between Talchaguano and Concepcion, *Chamisso* (type of *A. Chamissonis*, BD); Coronel, 1860, *Ochsenius* 444 (BD); Itata, Jan. 1878, *ex Philippi* as *P. chilensis* (Speg). Bio-Bio: Valle Renaico, 1897, *Neger* (Munich); San Ignacio de Pemehue, Jan. 1894, *Philippi* (G); Ercilla, Feb. 1892, *Kuntze* as *T. canescens* (NY). Cautin: Budi, Jan. 1923, *Claude-Joseph* 1879 (US, NY).

This slender erect-growing fruticose species varies from glabrescent to very densely strigose. The plants with the densest indument come from the province of Concepcion and are the typical form of *A. Chamissonis*. Philippi's *A. monospermus* appears to be this densely strigose form. Plants from beyond the province of Concepcion are much more sparingly strigose and some of these become glabrescent in age. I do not believe

that practicable segregates of this species can be found upon degree of pubescence. The older writers often used greek letters to distinguish this variation. *Phaca ochroleuca* var.  $\beta$  of Hooker & Arnott, l.c., is based upon *Cuming 810* from Concepcion. It is typical *A. Chamissonis*. At Paris Clos has labeled *Gay 586 h. Ch.*, from "Chile," as the var.  $\beta$  and has appended a note which probably indicates the source of his var.  $\delta$ . "Les deux echantillons de *Phaca ochroleuca* H. et Arn. dans l'herbier Webb sont differents en ce qu'un est glabre et l'autre est tomenteux." The var.  $\beta$  of *A. placens*, Clos, l.c. 109, is based upon *Bertero 824* from Valparaiso.

The inadequately described *P. chilensis* Nees, appears to belong to the present species. At Munich there is a good specimen of our present plant associated with a label reading "Phaca chilensis — hort Monoc. — 1838." A similar specimen at Berlin has a label, in three different scripts, which may be indicated as follows, "714 — Dalea? e Chile — var. *dubia* OK — HORT. BOT. BEROL. — 31."

2. *Astragalus Pissisi* (Phil.), comb. nov.

*Phaca Pissisi* Philippi, Anal. Univ. Chile 18: 46 (1861), and Linnaea 33: 45 (1864). —

Given as based upon material from "Chañeral in prov. Coquimbo, Volckmann; radix borealis montis de Chacabuca, ipse."

*Astragalus canescens* var. *Pissisi* (Phil.) Reiche, Anal. Univ. Chile 97: 555 (1897), and Fl. Chile 2: 98 (1898).

RANGE: Hills south of the Rio Aconcagua and north of Santiago; reported from northwestern Coquimbo.

CHILE. Coquimbo: Chañaral, herb Reed as *P. Pissisi* (K). Aconcagua: Montenegro, 1884, *Borchers* (BM, FM). Santiago: Chacabuca, fl. white, ex *Philippi* as *P. Pissisi* (BD, Del, Boiss, Stock); Cuesta de Chacabuca, 1500 m. alt., 1935-36, *Grandjot* (G); near Colina, fl. white, Sept. 1861, ex *Philippi* as *P. Pissisi* (BD, Del).

One of the collection upon which Philippi originally based this very distinct species is labeled as having come from Chañaral, in northwestern Coquimbo. Subsequently, however, the species has been found only in the region about Chacabuca Pass, to the north of Santiago. I suspect that the specimen said to have come from Coquimbo may have been mislabeled.

The coarse flower, the elongate pedicels, and the large papery long-stiped pendulous pods are outstanding characteristics of this species. It is very distinct but probably has its closest relative in *C. limariensis* from which it differs in its coarser flowers, more papery pendulous pods and broader flat closely strigose leaflets.

3. *Astragalus Edmonstonei* (Hook.) Robinson, Proc. Am. Acad. 38: 148 (1902).

*Phaca flava* Hooker & Arnott, Bot. Misc. 3: 186 (Aug. 1832). — Type collected at Valparaiso, *Cuming 611*.

*Astragalus flavus* (H. & A.) Sheldon, Minn. Bot. Studies 1: 158 (1894); Reiche, Anal. Univ. Chile 97: 564 (1897), and Fl. Chile 2: 107 (1898). Not Nuttall (1840).

*Phaca chrysantha* Moris, Mem. Accad. Torino 25: 104, t. 4 (1834). — Based upon plants cultivated at Turin, evidently grown from seed collected by Bertero.

*Astragalus chrysanthus* (Moris) Reiche, Anal. Univ. Chile 97: 565 (1897), and Fl. Chile 2: 108 (1898). Not Boiss. & Hohen. (1849).

*Astragalus affinis* Steudel, Nom. ed. 2, 1: 159 (1840), nomen. — Based upon material from near Quintero, *Bertero* 821.

*Phaca Edmonstonei* Hooker, Trans. Linn. Soc. London 20: 227 (1847). — Based upon collections incorrectly labeled as from the Galapagos Islands, *Edmonstone*.

*Phaca podocarpa* Philippi, Anal. Univ. Chile 84: 22 (1893), nom. provis.; Reiche, Anal. Univ. Chile 97: 564 (1897), and Fl. Chile 2: 107 (1898). — Based upon material from Concon. Not Meyer (1831).

*Phaca acutidens* Philippi, Anal. Univ. Chile 84: 16 (1883); Reiche, Anal. Univ. Chile 97: 564 (1897), and Fl. Chile 2: 107 (1898). — Type from near mouth of the Rio Maule, *P. Ortega*.

*Astragalus Hohenacheri* Spegazzini, Anal. Mus. Nac. Buenos Aires II, 4: 265 (1902). — A renaming of *A. flavus* (H. & A.) Reiche.

RANGE: Central Chile along the coast.

CHILE. Aconcagua: in pascuis arenosis maritimis, Quintero, fl. flavi, "Yerba loca," Jan. 1830, *Bertero* 821 (Paris, type of *A. affinis*; NY); Quintero, *Werdermann* 15 (G, US, BM, BD); in arenosis maritimis ad Quintero et Concon, *Poeppig* 199/161 (BM, BD, Geneva, Paris); Concon, Oct. 1884, *Philippi* as *P. podocarpa* (G); Reñaca, March 1916, *Jaffuel* 666 (G); Valparaiso, *Buchtien* (BD, US); Valparaiso, 1831, *Cuming* 611 (K, type of *P. flava*). Maule: Constitucion, Oct. 1892, *Reiche* (G). Indefinite: Chile, in arenosi, frequens, Sept. 1831, *Gay* 438 (Paris); Chile, *Bridges* 42 and 43 (K), 44 (BD); "Charles Island, Galapagos," *Edmonstone* (K, type of *A. Edmonstonei*; G).

I have seen specimens of this readily recognizable species from Quintero, Concon, Reñaca, Valparaiso and Constitución. Of the synonyms listed I have seen authentic material of all but *P. acutidens*. All clearly belong to the unmistakable species treated here.

Though originally given as from the Galapagos Islands, the collection by Edmonstone which is the type of *P. Edmonstonei* is unquestionably the present Chilean plant. Edmonstone was the botanist on the cruise of the *Herald* during which visits were made in Chile (Valparaiso and Concepcion) and Peru as well as on the Galapagos Island. His collections became confused after his untimely death in Ecuador in 1846. It may be noted that the other Galapagean records for *Astragalus* are also based upon falsely labeled specimens. The collection by Du Petit-Thouars, mentioned by Hooker when he described *P. Edmonstonei*, represents flowering material of *A. Menziesii* Gray, probably from Monterey, California. *Astragalus brevidentatus* Wright, Kew Bull. 200 (1906), also attributed to the Galapagos, is certainly this Californian plant. Cf. Johnston Jour. Arnold Arb. 19: 95-96 (1938).

4. *Astragalus limariensis* Muñoz, Jour. Arnold Arb. 20: 246, t. 1 (1939). — Type from Fray Jorge, *Muñoz* 2.

RANGE: Known only from the valley of the Rio Limari, prov. Coquimbo, Chile.

CHILE. Coquimbo: Fray Jorge, Sept. 26, 1939, *Muñoz* 2 (G, type); Fray Jorge, low hills near the buildings of the estancia, Sept. 26, 1939, *Muñoz* B-94 (G); west of Ovalle, Sept. 19, 1917, *Baeza* (G).

A well marked species probably most closely related to *A. verticillatus* of south central Chile. It agrees with its relative in gross habit, flower shape and size, inflorescence, and narrow elongate leaflets, but differs in its much larger, differently shaped and distinctly stiped pod.

5. *Astragalus verticillatus* (Phil.) Reiche, Anal. Univ. Chile 97: 543 (1897), and Fl. Chile 2: 86 (1898).

*Phaca verticillata* Philippi, Anal. Univ. Chile 84: 15 (1893).—Based upon material from Araucania, *Philippi* in 1887, and from Constitucion, *Reiche*.

*Phaca brachytropis* Philippi, Anal. Univ. Chile 84: 15 (1893).—Type from San Javier, prov. Maule, *P. Ortega*.

*Astragalus brachytropis* (Phil.) Reiche, Anal. Univ. Chile 97: 544 (1897), and Fl. Chile 2: 87 (1898). Not Meyer (1831).

*Astragalus maulensis* Spegazzini, Anal. Mus. Nac. Buenos Aires ser. 2, 4: 264 (1902).—Based upon *A. brachytropis* Reiche, not Meyer.

RANGE: In and along the coastal hills of Chile from Constitucion and Talca southward into northern parts of the province of Concepcion.

CHILE: Talca: Talca, *ex Philippi* as *P. brachytropis* (BD). Maule: Empedrado, Sept. 18, 1892, *Reiche* (G); Villa Alegre de Loncomilla, Oct. 24, 1931, *Espinosa* (G). Concepcion: Penco near Concepcion, Oct. 1896, *Neger* (Munich); Araucania, Nov. 1887, *Philippi* as *P. verticillata* (isotype, G, BM.)

The type of *P. verticillata* is given as collected in Nov. 1887, in "Araucania." It is very similar to the material from Penco collected by Neger. Both specimens have flower but lack fruit. The leaflets are geminate and very slender. During his "Botanische Excursion in das Araukanerland" in Nov. 1887, cf. Bericht. Ver. Naturk. Kassel vol. 41 (1896), Philippi visited San Javier, Concepcion, Angol, Traiguén and Temuco. Accordingly his type collection of *A. verticillatus* could have originated in the vicinity of Concepcion where Neger collected specimens very much resembling it.

The material I have seen from the watershed of the Rio Maule is coarser and has less slender leaflets than represented in the type of *A. verticillatus* and in Neger's plant from near Concepcion. This more northern material is that described as *P. brachytropis* upon the basis of a plant from San Javier, prov. Maule. Its leaflets are usually in pairs along both sides of the leaf-rhachis but in one collection from Talca, agreeing in all other details with the species, they are solitary along the rhachis.

The species is evidently related to *A. Pissisi* with which it agrees in such distinctive details as color, size, and structure of the corolla and unusually elongate pedicels. It differs from its relative in having much smaller (5–10 mm. long), globose or ovoid pods, that are sessile in the calyx (not stiped) and borne on erect pedicels. The pods bear scattered appressed usually pale hairs. They are usually abruptly contracted at the base. Philippi describes *P. verticillata* as having corollas in which the wings are short and only half the length of the keel. This is evidently a mistake. Authentic material of the species shows the corollas to be like those of *P. brachytropis* which he properly described as having wings almost twice as long as the keel. Reiche so described them in his Flora de Chile.

6. *Astragalus Looserii*, sp. nov.

Planta perennis; caulibus pluribus erectis sparse stricteque ramosis 3–10 dm. altis fistulosis (basim versus 3–5 mm. crassis) apicem versus sparse inconspicueque fusco-strigosis alibi glabrati; foliis glaberrimis concoloribus viridibus, rhachibus 7–15 cm. longis ascendentibus, foliolis crassiusculis

10–12-jugatis 1–2.5 cm. longis 2–4 mm. latis paulo supra medium latioribus apice obtusis vel subtruncatis basi attenuatis; stipulis liberis triangularibus; pedunculis (partibus floriferis inclusis) 15–30 cm. longis foliis duplo longioribus; floribus laxe racemosis (racemis saepe 10–15 cm. longis) stricte ascendentibus; calycibus pilis nigris brevibus abundantibus vestitis, tubo cupulato 2–2.5 mm. longo, lobis subulatis ca. 2 mm. longis, pedicellis ca. 1 mm. longis; corolla 1 cm. longa purpurea vel violacea; leguminibus ascendentibus vel rariter plus minusve recurvatis ca. 1 cm. longis inflatis leviter lateraliterque compressis sparse nigro-strigosis apice acutis basi rotundis vel obtusis infra medium crassioribus.

RANGE: Cordilleras of Santiago, Aconcagua and Coquimbo.

CHILE. Santiago: Fierro Carrera, Las Condes, much branched, up to 1 m. tall, fl. reddish, 2800 m. alt., Jan. 1930, *Gualterio Looser 1132* (type, Gray Herb.); Fierro Carrera, albino form, Jan. 1930, *Looser 1133* (G); Mina de la Disputada, Cord. de las Condes, 3500 m. alt., Dec. 1930, *Father Denys Le Manchee 256* and *257* (G); Las Condes, *herb. Reed* (BM); Cord. de Santiago, Feb. 1870, *Reed* as *P. elata* (K); Cord. de Santiago, ex *Philippi* as *P. Berteriana* (K); Cord. de Santiago, ex *Philippi* as *P. elata* ? (BD, Del); Cord. de Santiago, Jan. 1873, ex *Philippi* as *P. elata* (Speg). Aconcagua: Rio Sobrante, above Chincolco, in vega, 2700 m. alt., fl. blue-white, *Morrison 17323* (G). Coquimbo: Fraguillas, Dec. 1874, *Germain* (G); La Molloca, Cord. de Illapel, Jan. 1888, ex *Philippi* as *P. elata* (BM); Rio Rapel, Higuera, Agua Amarilla, *herb. Reed* as *P. elata* (BM); Rio Rapel, *Reed* (G); bed of the river of San Isidro [Vicuña], stems 5–7.5 dm. tall, 600 m. alt., 1836, *Gay 363* in pt. (Paris); Chile, *Gay 876* in pt. (Paris); Chile, *Gay* as *P. elata* (K, BD, Del).

A species evidently related to *A. Berterianus* and one resembling that species in habit of growth, and size, shape and structure of fruit. The new species is a plant of the cordilleras. Its relative belongs to the valleys and coastal hills and is quickly distinguished from the montane plant by a less robust habit, conspicuously hairy herbage, and smaller, less juicy leaflets. *Astragalus Looserii* is best known from the mountains east of Santiago. Philippi and Reiche seem to have confused it with the very different *A. curvicaulis*. I have been unable to separate the plants of the cordilleras above Santiago from some that come from the cordilleras further north in Coquimbo. The four sheets at Paris collected by Gay and determined by Clos as *P. elata* contain varying mixtures of three species. The predominating plant, however, is the northern form of *A. Looserii*.

7. *Astragalus Berterianus* (Moris) Reiche, *Anal. Univ. Chile* 97: 555 (1897), and *Fl. Chile* 2: 98 (1898).  
*Phaca canescens* Hooker & Arnott, *Bot. Misc.* 3: 185 (1832).—Type from Valparaiso, *Cuming 735*.  
*Astragalus canescens* (H. & A.) Gray, *Bot. U. S. Explor. Exped.* 1: 412 (1854); Reiche, *Anal. Univ. Chile* 97: 555 (1897), and *Fl. Chile* 2: 98 (1898). Not DeCandolle (1802).  
*Phaca Berteriana* Moris, *Mem. Accad. Torino* 37: 105, t. 26 (1834).—Type grown in the Botanic Garden at Turin from seeds collected by Bertero.  
*Astragalus oblongifolius* Clos in Gay, *Fl. Chile* 2: 109 (1846).—Type collected along the Rio Cachapoal, Oct. 1828, *Bertero 66*.  
*Astragalus sphaerocarpus* Clos in Gay, *Fl. Chile* 2: 119 (1846). Not Desfontaine (1840).—Type collected in the streets of Santiago, Sept. 1829, *Gay 498*.  
*Astragalus placens* var. *oblongifolius* (Clos) Reiche, *Anal. Univ. Chile* 97: 552 (1897), and *Fl. Chile* 2: 95 (1898).

- Phaca laxiflora* Philippi, Anal. Univ. Chile 84: 17 (1893).—Type collected near Los Andes.
- Astragalus laxiflorus* (Phil.) Reiche, Anal. Univ. Chile 97: 556 (1897), and Fl. Chile 2: 99 (1898). Not Fischer (1853).
- Phaca dolichostachya* Philippi, Anal. Univ. Chile 84: 21 (1893).—Type from sandy places near Concon, Oct. 1884, *F. Philippi*.
- Astragalus dolichostachys* (Phil.) Reiche, Anal. Univ. Chile 97: 556 (1897), and Fl. Chile 2: 99 (1898).
- Phaca dissitiflora* Philippi, Anal. Univ. Chile 84: 25 (1893).—Type collected at 1700 m. in the valley of the Rio Colorado in Jan. 1888.
- Astragalus laxiflorus* var. *dissitiflora* (Phil.) Reiche, Anal. Univ. Chile 97: 556 (1897), and Fl. Chile 2: 99 (1898). Not Bunge (1859).
- Astragalus aconcaguensis* Spegazzini, Anal. Mus. Nac. Buenos Aires ser. 2, 4: 264 (1902). A new name from *A. laxiflorus* Reiche, not Fischer.

CHILE. Coquimbo: Caimanes, Oct. 1935, *Espinosa* (G); Andocollo, Oct. 1926, *Claude-Joseph* 4532 (US). Aconcagua: Cord. de Norte Ligua, 1902, *Castillo* (G); Quintero, *Werdermann* 24 (G, US, BM, BD); Concon, dunes, Oct. 12, 1884, *Philippi* (G, isotype of *P. dolichostachya*); between Concon and Quintero, Oct. 1928, *Guenther & Buchtien* (Stock); Reñaca, sand hills, 1832, *Bridges* 46 (K); Valparaiso, 1831, *Cuming* 735 (K, type of *P. canescens*); Valparaiso, *Cuming* 734 (K) and 736 (BM), *King* (K) and *Bridges* (BM); San Felipe, 1926, *Claude-Joseph* 3846 and 3850 (US); Santa Rita, 1879, ex *Philippi* as *P. Berteriana* (Speg). Santiago: Colina, 1825, *Macrae* (K); Colina, Oct. 1887, ex *Philippi* as *P. Berteriana* (BM); Chacabuco, ex *Philippi* as *P. Berteriana* (BD); Lampa, *Reed* (K); Lampa, Nov. 1861, ex *Philippi* as *P. Berteriana* (Speg); Tiltill, dry sunny slope, 700 m. alt., *Looser* 728, 737 and 785 (G), *Montero* 149 (G); between Tiltill and Cuesta da La Dormida, 700–1200 m. alt., Oct. 1927, *Looser* 784 (G); streets in Santiago, Sept. 1829, *Gay* 498 (type of *A. sphaerocarpus*, Paris); Cajon del Maipo, *Philippi* as *P. canescens* (BD); near the Rio Maipo, May 1828, *Bertero* 66 (Paris); Rio Colorado, Jan. 1888, *Philippi* (G, isotype of *P. dissitiflora*); Renca, Oct. 1876, ex *Philippi* as *P. Pissisi* (Speg). Colchagua: near the Rio Cachapoal, Oct. 1828, *Bertero* 66 (Paris, type of *A. oblongifolius*; Del). Nuble: Cord. de Chillan, *Philippi* as *P. canescens* (BD). Talca: Curico, Jan. 1928, *Claude-Joseph* 5230 (US).

The type of *A. Berterianus* was grown in Italy from seeds sent by Bertero from Chile. Since Bertero seems to have made only two collections of this species, one near the Rio Maipo in May, 1828 and another near Rancagua along the Rio Cachapoal in Oct. 1828, one of these, probably the former, is the source of the seed he sent to Turin. The latter collection supplied the type of *A. oblongifolius* Clos.

This species varies in the amount of dark hairs on the inflorescence, calyx and fruit. Some plants have a minimum of dark hairs and are light in color, as in the type of *P. canescens*. The color of indument shows no geographical correlation.

8. *Astragalus paposanus* Johnston, Contr. Gray Herb. 85: 51 (1929).—Type from quebrada above Agua Perales, near Paposo, *Johnston* 5586.

RANGE: known only from the vicinity of Paposo and Taltal.

CHILE. Taltal: Quebrada Anchuña, Sept. 1936, *Montero* 2982 (G); Quebrada Guanillo above Agua Perales, near Paposo, Dec. 8, 1925, *Johnston* 5586 (type, G); between Paposo and Punta del Rincon, Nov. 30, 1925, *Johnston* 5564 (G); slopes above El Rincon, dryish ridge above fertile belt, Dec. 7, 1925, *Johnston* 5498 (G).

Very closely related to *A. coquimbensis* and perhaps simply an outlying northern form characterized by a velvety pallid indument.

9. *Astragalus coquimbensis* (H. & A.) Reiche, Anal. Univ. Chile 97: 566 (1897), and Fl. Chile 2: 109 (1898).

*Phaca coquimbensis* Hooker & Arnott, Bot. Misc. 3: 184 (1832). — Type given as from Coquimbo, *Cuming 864*.

*Phaca atacamensis* Philippi, Anal. Univ. Chile 84: 16 (1893). — Type collected at La Brea, Atacama Desert. 1884, *San Roman*.

*Phaca carrizalensis* Philippi, Anal. Univ. Chile 84: 21 (1893). — Type collected near Carrizal Bajo, Atacama, T. King.

*Astragalus vasticola* Johnston, Contr. Gray Herb. 85: 51 (1929). — Based upon *Phaca atacamensis* Phil., not *A. atacamensis* Fries (1905).

RANGE: Deserts along the coast from Coquimbo north towards Taltal.

CHILE. Coquimbo: Coquimbo, *Cuming 864* (type of *P. coquimbensis*, K); Coquimbo, *ex Philippi, no. 221*, as *P. coquimbensis* (BD). Atacama: Carrizal Bajo, *herb. Reed* as *P. carrizalensis* (isotype of *P. carrizalensis*, K); near Pique Mostasa, Totoral, 200 m. alt., *Werdermann 468* (G, K, BD); between Monte Amargo and Caldera, 50 m. alt., *Werdermann 1636* (BD); Playa Caldera, cerca Morro, Nov. 1936, *Espinosa* (G); near Caldera, *Gigoux* (G); between Caldera and Queb. de Leon, 10 m. alt., *Werdermann 1638* (G, BD); Chañaral, Sept. 1909, *Reiche* (G); Aguada Grande, *Johnston 5824* (G, K); indefinite locality, *Geisse 122* (NY); and *Morong 1283* (NY). Antofagasta: Aguada Cachina, *Johnston 5739* (G, K).

An annual species of the coastal desert of northern Chile. It has evident relations only in the closely related *A. paposanus*.

10. *Astragalus curvicaulis* (Clos) Reiche, Anal. Univ. Chile 97: 559 (1897), and Fl. Chile 2: 102 (1898).

*Phaca elata* Hooker & Arnott, Bot. Misc. 3: 185 (1832). — Type from the "Cordillera of Chile" (probably from the upper Aconcagua Valley), *Cuming 224*.

*Astragalus elatus* (H. & A.) Reiche, Anal. Univ. Chile 97: 557 (1897), and Fl. Chile 2: 100 (1898). Not Boiss. & Bal. (1859).

*Phaca curvicaulis* Clos in Gay, Fl. Chile 2: 102 (1846). — Type from "Central Chile" (probably cordilleras of Coquimbo), *Gay*.

RANGE: Higher cordilleras of Aconcagua and Coquimbo and the high coast-ranges east of Limache in the prov. Santiago.

CHILE. Santiago: Las Vizcachas, coast ranges about 8 km. east of La Dormida, 1400–1500 m. alt., open slope, *Morrison 16819* (G). Aconcagua: Ojos de Agua, *Cruckshank 92* (K); Juncal, 2200 m. alt., *Buchtien* (G, US, BM, BD); Juncal, 2300–2400 m. alt., 1925, *Pennell 12975* (G); Rio Blanco, 1950 m. alt., Nov. 1927, *Elliott 234* (K); Los Andes to Uspallata Pass, *Moseley* (K, BM); cordilleras, *Cuming 224* (type of *P. elata*, K); locality indefinite, *Bridges 40* (K, BM); locality indefinite, 1839, *John Style* (Del). Coquimbo: Caren, Queb. Luncuman, 40 km. n. e. of Illapel, ca. 1000 m. alt., in gravel, fl. lavender, *Worth & Morrison 16496* (G); prov. Coquimbo, *Gay 876* in part (Del); locality indefinite, *Gay* as *P. curvicaulis* (type of *P. curvicaulis*, Paris; G, K, BD, Del).

The type of *P. curvicaulis* at Paris is given as collected by Gay, but has no number, collection-date, nor locality. It seems very similar to part of *Gay 876* which consists of a mixture of *A. Looserii* and this species. No locality is given for *Gay 876* at Paris, but at Geneva it is labeled as from the province of Coquimbo. Since Gay does not appear to have collected in the upper Aconcagua valley, which seems to be the southern limit of the species, it seems probable that he must have obtained his material in the cordillera east of Ovalle or Coquimbo. The type of *P. elata* is simply given as from the Cordilleras of Chile. *Cuming*, its collector, is known to have collected in the upper Aconcagua valley where the species is best

known, and it is practically certain that his material must have come from that area. The var.  $\beta$  mentioned by Hooker & Arnott, l.c., based upon *Cuming* 734 represents *A. Berterianus*. The present species is a very distinct one, unique in its firm strict elongate lancoid pods. It has been confused with *A. Looserii* but is readily distinguished from that species by its much larger more inflated and rounded fruit, smaller flowers, scanty short pale, rather than dense conspicuous black indument on the ovary, fruit and calyx, and cinereous rather than green juvenile leaves.

11. *Astragalus pehuenches* Niederlein in Roca, Exped. Rio Negro 2: 206, t. 4, (1881). — Type collected between Pampa de Tilqui and Pampa de Trili, Neuquen, *Niederlein*.

*Phaca inflata* Gillies ex Hooker & Arnott, Bot. Misc. 3: 183 (1832). — Type from between Mendoza and Uspallata on the road to Canota, *Gillies*.

*Astragalus inflatus* Gillies ex Steudel, Nom. ed. 2, 1: 161 (1840). Not DeCandolle (1802).

*Phaca striata* Clos in Gay, Fl. Chile 2: 93 (1846). — Type from Andes de la Dehesa, prov. Santiago, Nov. 1829, *Gay* 926.

*Astragalus striatus* (Clos) Reiche, Anal. Univ. Chile 97: 570 (1897), and Fl. Chile 2: 113 (1898). Not Nuttall (1840).

*Phaca macrocarpa* Philippi, Linnaea 28: 619 (1857). — Type from the Cordillera de San Fernando, Feb. 1843, *Bustillos*.

*Astragalus macrocarpus* (Phil.) Reiche, Anal. Univ. Chile 97: 563 (1897), and Fl. Chile 2: 106 (1898). Not Pallas (1776), nor DeCandolle (1802).

*Tragacantha bisinflata* Kuntze, Rev. Gen. 2: 940 (1891). — Based upon *P. inflata* Gillies.

*Tragacantha grandis* Kuntze, Rev. Gen. 2: 941 (1891). — Based upon *P. macrocarpa* Phil.

*Astragalus grandis* (Kuntze) Spegazzini, Rev. Argent. Bot. 1: 214 (1926).

*Astragalus megalocarpus* Spegazzini, Anal. Mus. Nac. Buenos Aires ser. 2, 4: 265 (1902). — Based upon *A. macrocarpus* Reiche, not Pallas.

*Astragalus macrocarpus* var. *petiolatus* Hauman, Anal. Soc. Cien. Argentina 86: 280 (1918–19). — Type from Puente del Inca, *Sanzin* 349.

RANGE: Chilean cordilleras from southern Coquimbo to Talca; Argentine cordilleras from southernmost San Juan south to northern Neuquen and eastward on the desert lowlands into central La Pampa and northern Rio Negro.

CHILE. Coquimbo: Cuncumén, Rio Choapa, ex *Philippi* (BD). Santiago: Andes de la Dehesa, Nov. 1829, *Gay* 926 (type of *P. striata*, Paris); Las Condes, *herb. Reed* (G, K). Colchagua: Baños del Flaco, 1937, *Espinosa* (G); Val Tinguiririca, 1600 m. alt., 1897, *Wilczek* 87 (Boiss). Talca: Cuesta Vergara, ca. 2300 m. alt., Jan. 1933, *Grandjot* (Grandjot); above Los Queñes, 1240 m. alt., 1936, *Mexia* 7859 (G); Cord. de Curico, 1800 m. alt., Jan. 1897, *Reiche* (BD).

ARGENTINA. San Juan: Valle de la Rio Penitentes, Caleta Bicrak, March 1883, *Güßfeldt* (BD). Mendoza: Valle de Canota, *Gillies* (K); between Uspallata and Paramillo de Canota, gravelly soil in valley, *Gillies* (K); valleys between Mendoza and Uspallata by road of Canota, *Gillies* (type of *P. inflata*, K); La Loma del Agua de los Cielos, *Gillies* 269 (G, K); Cajon de las Aguas, upper Rio Salado, Jan. 27, 1893, *Kurtz* 7618 (NY); Los Molles, upper Rio Salado, Jan. 5, 1893, *Kurtz* 7487 (NY); near La Quebrada, Dec. 1933, *Ruiz Leal* 1836 (G); Paso de la Cruz de Piedra, 1500 m. alt., *Kuntze* (NY, US, BD); Malargue, *Monticelli* E 71 (G). La Pampa: Puelén, *Durando* (G); Gob. de la Pampa, 1932, *un cura* (*Burkart*). Neuquen: between the pampas of Tilqui and Trili, rare in gypsum-soil, ca. lat. 37°, long. 70°, June 26, 1879, *Niederlein* (type of *A. pehuenches*, BD). Rio Negro: Choele-choel, Dec. 1907, *herb. Spegazzini* (Speg); campo between Rio Colorado and Rio Negro, Jan. 1903, *herb. Spegazzini* (Speg). Indefinite: Patagonia, lat. 50°–53°, *Moreno & Tonini* 438 (NY).

A coarse spreading herbaceous plant with glabrous fruits and ovary. In its large spreading or pendulous papery pods it suggests *A. Darumbium*, but that plant has smaller flowers, a strigose ovary and fruit and a more erect habit of growth.

12. *Astragalus valerianensis* Johnston, Contr. Gray Herb. 85: 166 (1929).—Type from Rio Valeriana near La Cueva, 1926, *Johnston 6033*.

RANGE: Cordilleras of southeastern Atacama.

CHILE. Atacama: Rio Valeriano near La Cueva, cordillera east of Vallenar, 2800 m. alt., loamy talus slope, *Johnston 6033* (type, G).

A plant somewhat suggesting the montane forms of *A. Darumbium* but quickly distinguished by its glabrous ovary and fruit, strict stems, pedicels 4–6 mm. long, and detached more northerly occurrence. It is probably most closely related to *A. pehuenches*, but differs from that plant in its evidently strigose herbage, more slender and strict stems, and larger pods.

13. *Astragalus vagus* (Clos) Reiche, Anal. Univ. Chile 97: 563 (1897), and Fl. Chile 2: 106 (1898).

*Phaca vaga* Clos in Gay, Fl. Chile 2: 99 (1846).—Type from Pasto Blanco, cordilleras east of Coquimbo, *Gay 364*.

*Astragalus Echegarayi* Hieronymus, Bol. Acad. Nac. Cordoba 4: 22 (1881).—Type from Paramillo, west of San Juan, *Echegaray*.

*Astragalus striatus* var. *Echegarayi* (Hieron.) Hosseus, Bol. Acad. Nac. Cordoba 26: 156 (1922).

*Phaca San Romani* Philippi, Anal. Univ. Chile 84: 18 (1893).—Type from Queb. Seca, cordillera de Atacama, lat. 27° 55', long. 69° 10', *San Roman*.

*Astragalus San Romani* (Phil.) Reiche, Anal. Univ. Chile 97: 559 (1897), and Fl. Chile 2: 102 (1898).

RANGE: Higher cordilleras in the provinces of Atacama, Coquimbo and San Juan.

CHILE. Atacama: Cerro Cadillal, Cord. Rio Turbido, 3200 m. alt., *Werdermann 962* (G, K, BD); higher parts of Queb. de San Miguel, about alkaline flats and along dry stream-ways, 2800 m. alt., *Johnston 4922* (G, US, K); Rio Laguna Grande, 3800 m. alt., *Werdermann 244* (G, K, BD); Laguna Grande, in gravel, fl. pinkish, somewhat purplish at base, 3250 m. alt., *Johnston 5918* (G); Laguna Chica, in gravel, fl. white to flesh-colored, 3200 m. alt., *Johnston 5971* (G); Rio Sancarron below Rucas, gravelly bench, fl. pink to magenta, 3200 m. alt., *Johnston 6205* (G, K). Coquimbo: Pasto Blanco, Cord. de Elqui, 2837 m. alt., *Gay 364* (type of *P. vega*, Paris; G, K, BD, Del).

ARGENTINA. San Juan: Paramillo, Jan. 1876, *Echegaray* (type of *A. Echegarayi*, BD).

This appears to be the most common *Astragalus* with inflated pods found in the cordilleras of Atacama and Coquimbo. It may be related to *A. coquimbensis*, which occurs at low altitudes west of the cordilleras, but differs from that annual in its strong perennial root and somewhat smaller capitately congested pods. When I examined the type of *A. Echegarayi* I identified it with *A. vagus*, but subsequently as my studies of the genus progressed I have come to wonder if it might not really be a form of *A. monticola*. *Phaca San Romani*, however, is unquestionably a synonym of the present species.

14. *Astragalus Darumbium* (Bertero) Clos in Gay, Fl. Chile 2: 112 (1846).

*Sutherlandia Darumbium* Bertero ex Colla, Mem. Accad. Torino 37: 55 (1834).—Type from near Rancagua, *Bertero*.

*Phaca macrophysa* Philippi, *Linnaea* 28: 620 (1857). — Type from Las Arañas mine, Cord. de Santiago, Oct. 1853, *Philippi*.

*Astragalus macrophysus* (Phil.) Reiche, *Anal. Univ. Chile* 97: 554 (1897), and *Fl. Chile* 2: 106 (1898). Not Somm. & Levier (1893–94).

*Phaca robusta* Philippi, *Anal. Univ. Chile* 41: 690 (1872). — Type from the Cord. de Santiago.

*Astragalus macrophysus* var. *robustus* (Phil.) Reiche, *Anal. Univ. Chile* 97: 554 (1897), and *Fl. Chile* 2: 106 (1898).

*Tragacantha firma* Kuntze, *Rev. Gen.* 2: 941 (1891). — Based on *P. robusta* Phil.

*Astragalus atuelii* Chodat & Wilczek, *Bull. Herb. Boiss. ser. 2*, 2: 477 (1902). — Type from Arroyo Manga, Valle del Atuel, 1897, *Wilczek 86*.

RANGE: Cordilleras of Santiago and Colchagua and adjacent Mendoza.

CHILE. Santiago: Cerro Provenia, 2100–2500 m. alt., 1932–33, *Grandjot* (*Grandjot*); Valle de Ramon, 2200 m. alt., Feb. 1933, *Grandjot* (*Grandjot*); Valle de la Hierba Loca, 2300 m. alt., 1932, *Grandjot* (*Grandjot*); Manquehue, Oct. 11, 1908, *Rudolpho* (G); Las Arañas, Cord. de Santiago, Oct. 1853, *Philippi* (isotype of *P. macrophysa*, G); Cord. de Santiago, ex *Philippi* as *P. macrophysa* (BD). Colchagua: Baños de Cauquenes, Dec. 1901, *Elwes* (K); in sand along the Rio Cachapoal near San Joaquin, perhaps from seeds washed down from the cordilleras, 1829, *Bertero 679* (isotype of *S. Darumbium*, Paris, Del, BD, BM); Rancagua, Dec. 1828, *Bertero 679* (Del).

ARGENTINA. Mendoza: Arroyo Manga, Valle del Atuel, in sand and about rocks, 1900 m. alt., 1897, *Wilczek 86* (type of *A. atuelii*, Boiss).

The type of *A. Darumbium* is a very rank plant with coarse decumbent stems becoming 1 m. long and 7 mm. thick. It was discovered along a stream at the base of the cordilleras and thought to be a possible waif washed down from higher altitudes in the mountains (“fortasse semina ex cordilliera provenant”). Similar very coarse plants have not been re-discovered. A very closely related plant, however, has been found in the cordilleras and described as *P. macrophysa*, *P. robusta* and *A. atuelii*. This latter has shorter more slender stems, smaller leaves, perhaps shorter pedicels and larger black-hairy pods. The most reduced form is *P. macrophysa*. Apparently intermediate between this and the type of *A. Darumbium* is *P. robusta*. The indument on all these forms varies from sparsely to very densely strigose, some plants appearing glabrous at first sight while others are obviously silky with abundant appressed hairs.

When *A. atuelii* was originally described the type was given as from 900 m. altitude and as representing Wilczek’s collection no. 372. The label on the type at Geneva, however, gives the altitude as 1900 m. and the collection number as 86.

The species is related to *A. monticola* and, in fact, grows with it in the cordilleras east of Santiago. It is distinguished from this relative by its usually larger fruit, slightly more elongate calyx, and silky appressed indument. Some of the montane forms have a root that is much more slender than in other cordilleran species of this general relationship, and in gross habit frequently suggest forms of *A. coquimbensis* and *A. paposanus*. The two latter species, however, are not closely related to our plant and are readily distinguished by having pink rather than violet or purple corollas.

15. *Astragalus monticola* Philippi, *Linnaea* 33: 47 (1864); Reiche, *Anal. Univ. Chile* 97: 549 (1897), and *Fl. Chile* 2: 92 (1898).—Type collected near the silver mines of Las Arañas, Cord. de Santiago, *Philippi*.

*Astragalus* ? *Barceloi* Philippi, *Anal. Univ. Chile* 84: 27 (1893); Reiche, *Anal. Univ. Chile* 97: 566 (1897), and *Fl. Chile* 2: 109 (1898).—“Ex Andibus chillanensibus, ni fallor, provenit.”

RANGE: Cordilleras of Santiago and San Juan.

CHILE. Santiago: Las Arañas, Nov. 1861, *Philippi* (type of *A. monticola*, Santiago); Mina Disputada, Cord. de los Condes, 3500 m. alt., *Father Deny Le Manchee* 258 (G); Mina Disputada, 2500–2600 m. alt., April 1933, *Grandjot* (Grandjot); Valle de la Hierba Loca, 2000–2300 m. alt., Nov. 1932, *Grandjot* (Grandjot); Valle Largo de las Condes, 2600 m. alt., Jan. 1934, *Grandjot* (Grandjot); Cerro Provencia, 2100 m. alt., Nov. 1933, *Grandjot* (Grandjot); Potrero Grande, 2160 m. alt. Dec. 1933, *Behn* (G).

ARGENTINA. San Juan: between Tudeum and Queb. de Conconta, Jan. 1, 1930, *Perez Moreau* 30/105 (G).

A species evidently related to the montane form of *A. Darumbium* and differing from it chiefly in having dull spreading, rather than silky closely appressed hairs on the leaves, stems and fruit. Though *A. monticola* and *A. Darumbium* sometimes grow together (Dr. Grandjot collected them both at Valle de Hierba Loca and at Cerro Provencia) they maintain their characters and are readily separable. The type of *A. Barceloi*, as Philippi suspected, is almost certainly mislabeled. The label on the type at Santiago reads “*Astragalus Barceloi*, Cord. de Chillan?,” but the specimen agrees closely with the material I have cited from the cordilleras east of Santiago and I believe probably originated there.

16. *Astragalus vesiculosus* Clos in Gay, *Fl. Chile*, t. 17 (1844), and *Fl. Chile* 2: 120 (1846); Weddell, *Chlor. Andina* 2: 261 (1861); Reiche, *Anal. Univ. Chile* 97: 559 (1897), and *Fl. Chile* 2: 102 (1898).—Type from Cord. de los Patos, *Gay* 488.

*Phaca nubigena* Meyen ex Vogel, *Verhandl. K. Leop.-Carol. Akad. Naturf.* 19: suppl. pg. 16 (1843).—Type from 2400 m. alt. in the Cord. de San Fernando, *Meyen*.

*Astragalus nubigenus* (Meyen) Taubert in Engler & Prantl, *Nat. Pflanzenf.* iii. Abt. 3: 303 (1894); Reiche, *Anal. Univ. Chile* 97: 560 (1897), and *Fl. Chile* 2: 103 (1898). Not Don (1825).

*Phaca Bustilloi* Philippi, *Linnaea* 28: 680 (1857).—Type from the Cord. de San Fernando, *Bustillos*.

*Tragacantha andina* Kuntze, *Rev. Gen.* 2: 940 (1891).—Based upon *P. Bustilloi* Phil.

*Astragalus nubigenus* var. *Arnottianus* Meyen ex Reiche, *Anal. Univ. Chile* 97: 561 (1897), and *Fl. Chile* 2: 104 (1898).—Based upon “*Phaca Arnothiana* Hook.” sensu Meyen, *Reise* 1: 356 (1834); i.e., Rio Maipo, 11000 ft. alt., *Meyen*.

*Astragalus rupestris* Reiche, *Anal. Univ. Chile* 97: 562 (1897), and *Fl. Chile* 2: 105 (1898).—Based upon *Phaca Bustilloi* Phil.; not *Astragalus Bustilloi* Clos.

*Astragalus Meyenianus* Spegazzini, *Anal. Mus. Nac. Buenos Aires* 7: 262 (1902).—Based upon *Astragalus nubigenus* Taubert; not *A. nubigenus* Don.

*Astragalus Ameghinoi* Spegazzini, *Anal. Mus. Nac. Buenos Aires* 7: 262 (1902).—Type from between San Julian and Rio Descado, Santa Cruz, *Ameghino*.

*Astragalus Meyenianus* var. *paucifoliolata* Hicken, *Darwiniana* 1: 56 (1923).—Type from Cajon del Burro, Rio Atuel, *Gerth* 102 and 106a.

RANGE: From the provinces of San Juan and Coquimbo southward along the higher Andes to Mendoza and Talca, and with outlying stations in Chubut and Santa Cruz.

CHILE. Coquimbo: crest of the high cordilleras of Los Patos, 3340 m. alt., Gay 488 (Paris, type of *A. vesiculosus*); Cerro la Yerba Loca, east of La Vega Escondido, dept. Illapel, 2800–3450 m. alt., fl. blue and white, Dec. 1938, Morrison 16932 (G). Aconcagua: near Junta de Pinquenes, Rio Sobrante, dept. Petorca, rocky slopes, 3500–3700 m. alt., fl. blue-purple, Morrison 17284 (G). Santiago: Cord. de Santiago, 3500 m. alt., Feb. 1899, Reiche as *A. Bustillosii* (BD); Cord. de Santiago, 1899, ex Philippi as *A. rupestris* (BM); Cajon del Cepo, Cord. Santiago, 2900 m. alt., Feb. 22, 1894, Dessauer (Munich); above Laguna Negra, 3300 m. alt., 1902, Hastings 498 (US); Rio Maipo [upper Rio del Volcan!] 3300 m. alt., Feb. 1831, Meyen as *P. Arnottiana* (BD, type of *A. nubig.* var. *Arnottianus* Reiche); Paso de Maipo, Jan. 1883, Güssfeldt (BD); Paso de la Cruz Piedra, 2300 m. alt., Jan. 1892, Kuntze (NY, BD, US). Colchagua: Cord. Tinguiririca, east of Rengo, 2200 m. alt., 1930, Pirion 702 (G); El Teniente, Rio Coya, 2800 m. alt., 1925, Pennell 12317 (G); Cord. de San Fernando, Feb. 1843, herb. Philippi as *P. Bustillosii* (? type of *P. Bustillosii*, Santiago); Cord. de San Fernando, Meyen (BD, type of *P. nubigena*); Cord. del Rio Tinguiririca, 2400 m. alt., Feb. 1831, Meyen as *P. nubigena* (BD). Talca: near Volcan Peteroa, Bridges 1129 (K); Santa Elena, Cord. de Curico, Feb. 1902, Flaminio Ruiz (G).

ARGENTINA. San Juan: crest east of Carrisito (Rio Blanco), ca. 3200 m. alt., Nov. 17, 1915, Hosseus 1448 (BD). Mendoza: Punta de Vacas, March 1901, Spegazzini (Speg); "La Cumbre, Las Cuevas," Dec. 1908, Spegazzini (Speg); Paso del Portillo, 3500–4000 m. alt., Ruiz Leal 1985 and 2110 (G); Paso Hondo, Valle Rio Tunuyan, Ruiz Leal 2064 (G); Rio Tordillo, Piedra del Burrero, ca. 2900 m. alt., 1897, Wilczek 105 (Boiss, US); Cajon del Burro, ca. 2900 m. alt., Wilczek 104 (Boiss, US); Cerro de los Guanacos, 2600 m. alt., Jan. 1921, Carette 227 (G); Mala Dormida, 2700 m. alt., Jan. 1921, Carette 238 (LP). Chubut: Valle de Laguna Blanca, Koslowsky 177 (K). Santa Cruz: between San Julian and Rio Deseado, 1899, Ameghino (Speg, type of *A. Ameghinoi*).

This species is best known from the cordilleras about the headwaters of the Rio Maipo. Though apparently with a rather disrupted distribution it is a very distinct and readily recognizable species, characterized by its grayish loose indument, broad crowded obcordate leaflets, small frequently pale corollas and firm rounded inflated hairy pods.

Among the synonyms cited above, only *A. Ameghinoi* deserves special mention. The type of this species comes from southern Patagonia, far to the south of the principal range of *A. vesiculosus*. In appearance and all vegetative and habit characters it is similar to *A. vesiculosus*. The fruit, however, is small (ca. 1 cm. long), rigid, and very densely and conspicuously hairy. It is, however, not thoroughly ripened, and I suspect that some or all of these differences may be associated with immaturity. Concerning *A. Ameghinoi* it may be noted that of the two collections cited by Spegazzini the one from the Golfo de San Gorge is a very immature specimen of *A. Dusenii* showing flower-buds only.

17. *Astragalus Arnottianus* (Gillies) Reiche, Anal. Univ. Chile 97: 561 (1897), and Fl. Chile 2: 104 (1898).

*Phaca Arnottiana* Gillies ex Hooker & Arnott, Bot. Misc. 3: 184 (1832).—Type material from El Cerro de la Polcura and Las Leñas, Mendoza, Gillies.

*Phaca uspallatensis* Philippi, Anal. Univ. Chile 36: 168 (1870).—Type collected between Mendoza and Uspallata.

*Phaca Reedii* Philippi, Anal. Univ. Chile 36: 168 (1870).—Type from the eastern side of Paso del Portillo, Mendoza, Reed.

*Astragalus Reedii* (Phil.) Hauman, [Veg. Hautes Cord. 127] Anal. Soc. Cien. Argentina 86: 281 (1918).

*Phaca nana* Philippi, Anal. Univ. Chile 84: 19 (1893). — Type from Cordillera del Peuco, prov. Colchagua.

*Astragalus nanus* (Phil.) Reiche, Anal. Univ. Chile 97: 569 (1897), and Fl. Chile 2: 112 (1898). Not DC (1802).

*Astragalus Philippi* Spegazzini, Anal. Mus. Nac. Buenos Aires iv. 4: 265 (1902). — Based on *P. nana* Phil.

RANGE: Along the higher cordilleras from Coquimbo and La Rioja southward to Mendoza and Colchagua.

CHILE. Coquimbo: between Guanta and Baños del Toro, *Reed* (K); Estero de Guanta, 3500 m. alt., *Johnston* 6252 (G, US). Aconcagua: upper Rio Aconcagua, 3600 m. alt., *Gosse* (K); Caracoles, *Jaffuel* 3508 (G); Juncal, 2300 m. alt., 1913, *Buchtien* (G, US, BM, BD). Santiago: Cajon de Esmeralda, 1900, *J. Philippi* (G); Valle del Yeso, *Reed* (K); Laguna Negra, Feb. 1901, *Ayarzum* (BM). Colchagua: El Teniente, Rio Coya, 2800 m. alt., *Pennell* 12337 (G); Cord. del Peuco, 1886, *herb. Philippi* (type of *P. nana*, Santiago).

ARGENTINA. La Rioja: Queb. Descubrimiento Nuevo, *Hosseus* 1398 (BD). Mendoza: Cord. del Tigre, 2500 m. alt., *King* 323 (BM); Cumbre de Uspallata, 3600 m. alt., *Wilczek* 103 (Boiss); Puente del Inca, *King* 12 (K); Las Cuevas, *Hosseus* 2152, 2168 and 2230 (BD); Paramillo de las Cuevas, 3800 m. alt., *Bettfreund* 261 (BD); Punta de Vacas, *King* 690 (BM); Queb. Benjamin Matienzo, Las Cuevas, *Perez Moreau* 12632 (G); Las Leñas, *Gillies* (K); Las Leñas and El Cerro de la Polcura, *Gillies* (type of *P. Arnottiana*, K); Queb. de las Cauteras, Las Heras, 1200–1600 m. alt., *Semper* 4222 (G); Valle de las Relinchos, 3400–3600 m. alt., *Semper* 4921 and 4922 (G); Tres Quebradas, Tupungato, 2840 m. alt., *Ruiz Leal* 3613 (G); precord. near Rincon Colorado, Tunuyan, 2500–3000 m. alt., *Ruiz Leal* 1307 (G); near Cuesta de los Aflijidos, Cord. del Portillo, *Ruiz Leal* 1876 and 1876 A–B (G).

A well known and readily recognized species of the central cordilleras of Argentina and Chile. In its area it is the only species with mottled, glabrous, inflated pods. It appears to be common in the Andes of Mendoza below Uspallata Pass. From this area came the type of *A. Arnottianus*. Also from this region came the plants discussed and well illustrated (as *A. oreophilus*) by Hauman, [Veg. Hautes Cord. 126] Anal. Soc. Cien. Argentina 86: 280, t. 24, f. 4–5 (1918).

The species is evidently related to *A. palenae* which occurs along the cordilleras further to the south. From this relative *A. Arnottianus* is distinguished by having the leaflets more or less evidently strigose on the upper surface and the wings of the corolla always conspicuously longer than the keel. The fruit is always glabrous. At high altitudes the species becomes reduced in size and very compact in habit. One of these dwarfed extremes appears to be that described by Philippi as *Phaca Reedi*.

18. *Astragalus palenae* (Phil.) Reiche, Anal. Univ. Chile 97: 542 (May 1897), and Fl. Chile 2: 85 (1898); Spegazzini, Rev. Fac. Agron. y Vet. La Plata 3: 600 (Sept. 1897).

? *Phaca oreophila* Philippi, Linnaea 28: 681 (1857). — Type collected by Germain in the cordilleras east of Linares, prov. Maule.

? *Astragalus oreophilus* (Phil.) Reiche, Anal. Univ. Chile 97: 561 (1897), and Fl. Chile 2: 104 (1898).

*Phaca palenae* Philippi, Anal. Univ. Chile 84: 23 (1893). — Type from the Valley of the Rio Palena, ca. lat. 44° S., *F. Delfin*.

*Phaca Rahmeri* Philippi, Anal. Univ. Chile 84: 23 (1893). — Type from Laguna de Gualletué, prov. Gautin, 1887, *Rahmer*.

*Astragalus Rahmeri* (Phil.) Reiche, Anal. Univ. Chile 97: 542 (1897), and Fl. Chile 2: 85 (1898).

*Astragalus pallens* Reiche ex K. Schum. in Just, Bot. Jahresber. 26<sup>1</sup>: 352 (1900), lapsu calami.

*Astragalus palenae* var. *grandiflora* Spegazzini, Anal. Mus. Nac. Buenos Aires, ser. 2, 4: 267 (1902).—Type collected by Spegazzini near Lago Nahuel-huapi.

RANGE: Along the cordilleras from Neuquen and Cautin (and possibly Maule) southward to the drainage of the Rio Palena and Chubut.

CHILE. ?Maule: cord. Maule, *Germain* as *A. vesiculosus* (K, BM, Del). Cautin: "Araucania" [?Laguna de Gualletué, upper Bio Bio] ex *Philippi* as *P. Rahmeri* (K, BD).

ARGENTINA. Neuquen: San Martin de los Andes, 720 m. alt., *Comber 791* (K); Zapala district, *Opozo sub Comber 1160* (K); Pino Hachado, 2000 m. alt., 1920, *Parodi 2038* in pt. (Parodi). Rio Negro: Puerto Americano near Bariloche, 1928, *Rafael Cordini 194* (US); Bariloche, 1934, *Burkart 6277* (G); Sierra Gutierrez, Bariloche, 1400 m. alt., 1905, *Buchtien 21* (US); near Lago Nahuel-huapi, Dec. 1897, *Spegazzini* (Speg, type of var. *grandiflora*). Chubut: near Carren-leofu, 1901, *Illin* (Speg); near Carren-leofu, 1889, *Moyano* (Speg); Pampa Chica, Nov. 12, 1908, *Skottsberg 567* (Stock); Chubut, Dec. 1897, *collector?* (Speg); Patagonia, *Moreno & Tonini 439* as *Trag. Cruckshanksii* (NY).

18a. *Astragalus palenae* var. *Duseni* (Macloskie), comb. nov.

*Astragalus brevicaulis* Dusen, Sven. Exped. Magell. 3: no. 5, pg. 158 (1900).—Type from Cabo Domingo, eastern Fuegia, *Dusen*.

*Astragalus Duseni* Macloskie, Fl. Patagonia 2: 962 (1906).—Based upon *A. brevicaulis* Dusen (1900), not Nelson (1899).

RANGE: Eastern Fuegia northward to southwestern Chubut.

ARGENTINA. Santa Cruz: Killik Aike, Rio Gallegos, 1900, *Brown 21* and *54* (NY); Cape Fairweather, mouth of Rio Gallegos, *Capt. King* (K, BM); Rio Coyle, Estab. Las Vegas, 1916, *Dauber 130* (Parodi); Puerto Santa Cruz, Dec. 1904, *Dusen 5481* (Stock); Rio Santa Cruz, 1882, *Spegazzini* (Speg); Lago Argentino, *Furlong 81* (G, NY, K); Burmeister Peninsula, Lago Argentino, *Prichard* (BM); Lago San Martin, 1903, *collector?* (Speg); San Julian, 1833, *Henslow 80* (K); San Julian, 1904, *Dusen* (Stock); San Julian, 1931, *Blake 2, 172* and *180* (K); Golfo de San Jorge, Feb. 1896, *Ameghino* (Speg, as *A. Ameghinoi*). Chubut: Rio Aysen, Dec. 1900, *collector?* (Speg); Lago Blanco, Dec. 1903, *collector?* (Speg); Chubut, Jan. 1898, *collector?* (Speg).

Among the species with inflated fruit the present species is characterized by its austral distribution, its folded leaflets that are glabrous above, and its corolla-wings which are shorter than the keel or barely surpass it. Typical *A. palenae* comes from the valley of the Rio Palena (or the Rio Carrèn-leofu as it is called within Argentine). This form has the wings of the corolla evidently surpassed by the keel. The corolla is about 11 mm. long. Further north, about Lake Nahuel-huapi and the headwaters of the Rio Bio Bio, a coarser form is common. This has larger leaflets and coarser (13–16 mm. long) corollas and is represented by the type of the var. *grandiflora* Speg. I have accepted this variety as a luxuriant form of the species. Typical *A. palenae* is known from the same general region in which the variety has been found.

Beginning in southwestern Chubut and extending to Fuegia there are plants that agree well with typical *A. palenae* except that the wings and keel are subequal. These plants represent the variety *Duseni*. In the collection cited from Lago Blanco half of the plants in it have corollas of typical *A. palenae* and the other half those of the var. *Duseni*. They are

otherwise indistinguishable. The ovary and fruit of *A. palenae* and its var. *Duseni* are usually glabrous. As exceptions to this general rule, however, there is to be noted a collection from San Julian (*Blake 180*) in which some of the plants have glabrous and the others have densely strigose ovaries. A collection (Chubut, Jan. 1898) in the Spegazzini Herbarium has the ovaries and also mature fruit conspicuously strigose.

I have seen no authentic material of *Phaca oreophila* but I suspect that it may represent what is here treated as *A. palenae*. The descriptions of *A. oreophilus* given by Philippi and by Reiche seem to apply equally well to both *A. Arnottianus* and *A. palenae*. The type of *A. oreophilus* unfortunately lacks corollas. It came from the cordilleras above Linares in what is now the province of Maule. Should *A. oreophilus* prove actually conspecific with *A. palenae* then the former name, being older, must be taken up as the correct appellation for the concept here treated.

It is possible that the species may have another old name in *Phaca quindecimjuga* Phil. (1862), which was based on collections said to be from the cordilleras of Coquimbo though perhaps actually from the mountains of southern Chile. Further details regarding *P. quindecimjuga* will be found in the discussion of unplaced species.

19. *Astragalus argentinus* Manganaro, Anal. Soc. Cien. Argentina 87: 145, fig. 14 (1919).—Original collections from Sierra del Tandil, Sierra Peregrina and Sierra de Curamalal.

RANGE: Known only from the mountains in the southern half of the province of Buenos Aires.

ARGENTINA. Buenos Aires: Sierra de la Ventana, Nov. 1904, *Dusen 6279* (Stock); Pueblo Tornquist, Dec. 21, 1899, *collector not given* (Speg).

Though this very well marked local species was compared with *A. Bergii* by Manganaro, it certainly cannot be closely related to that plant. While showing evident differences in the proportions of its flowers, *A. argentinus* reveals its obvious relations with *A. Cruckshanksii* in its tough leathery fruit and salient pod-sutures.

20. *Astragalus Illinii*, nom. nov.

*Astragalus Moyanoi* var. *villosula* Spegazzini, Anal. Mus. Nac. Buenos Aires 7: 267 (1902).—Type from along the Rio Carren-leofu, 1900, *Illin*.

RANGE: Known only from Chubut.

ARGENTINA. Chubut: Carren-leofu, 1900, *N. Illin* (Speg, type); Chubut, 1903, *collector ?* (Speg).

A species apparently most closely related to *A. Cruckshanksii* but differing conspicuously in its indument and fruit. The leaves, fruit, and younger parts of the plant are canescent with a subtomentose indument of very slender loosely appressed hairs 1–2 mm. long. The angularly subovate or subglobose fruit is evidently higher (dorso-ventrally) than long or thick. It usually measures 10 × 6 × 6 mm. The valves though highly convex are compressed at their very margin. This consequently elevates the keel which encircles the fruit. The fruit is one-celled and has no false septum. When mature it is tough, rigid and filled with seeds.

21. *Astragalus Cruckshanksii* (H. & A.) Grisebach, *Abhand. K. Ges. Wiss. Goettingen* 24: 103 (1879), as "*A. Crukschankii*"; Reiche, *Anal. Univ. Chile* 97: 558 (1897), and *Fl. Chile* 2: 101 (1898).

*Phaca Cruckshanksii* Hooker & Arnott, *Bot. Misc.* 3: 184 (1832); Philippi, *Linnaea* 33: 41 (1864).—Type collected by Cruckshank between Tambillos and Puente de Inca, cordillera of Mendoza, not in the "cordilleras of Chile" as originally given!

*Phaca Landbecki* Philippi, *Linnaea* 33: 42 (1864).—"In Andibus prov. Colchaguae legit orn. Landbeck."

*Astragalus Landbecki* (Phil.) Reiche, *Anal. Univ. Chile* 97: 562 (1897), and *Fl. Chile* 2: 105 (1898).

RANGE: Cordilleras from Atacama and Mendoza south to Colchagua and Neuquen.

CHILE. Atacama: Queb. Alfalfa, dept. Vallenar, 3200 m. alt., *Johnston 5991* (G, K); Rio Valefiano at Juntas del Encierro, 3200 m. alt., *Johnston 6015* (G, US); Los Cuartitos, 3420, *Johnston 6228* (G). Coquimbo: Baños del Toro, 3500 m. alt., *Werdermann 202* (G, BM, BD); high cordilleras of Los Patos, 2537 m. alt., *Gay 487* (Paris); Las Hediondas, Baños del Toro, 1938, *Espinosa* (G). Aconcagua: El Peñon, *Poeppig 99/18* (BD, Paris); Juncal, 2100 m. alt., *Elliott 164* (K); Las Calaveras, 3100 m. alt., *Buchtien 1195* (G, US, BM, BD); cordilleras, *Cuming 319* (K, BM). Santiago: Cord. de la Dehesa, Nov. 1929, *Gay 533* (Paris); Valle Ramon, 2800 m. alt., Feb. 1933, *Grandjot* (Grandjot); Potrero Grande, 2200 m. alt., Dec. 1933, *Grandjot* (G); Valle Engorda, 2400 m. alt., March 1933, *Grandjot* (Grandjot); near San Gabriel, Maipo valley, 3000 m. alt., *Grandjot 3586* (G). Colchagua: Baños El Flaco, Cajon de Las Damas, Cord. San Fernando, 1800 m. alt., Dec. 1936, *Milner* (Behn); Cord. de Colchagua, 2000 m. alt., Jan. 1930, *Pirion 94* (G); Cord. de Colchagua, 3000–3600 m. alt., Dec. 1860, *Landbeck* (type of *P. Landbecki*, Santiago).

ARGENTINA. Mendoza: Cord. del Tigre, 2500 m. alt., *King 322* (K); between Tambillos and Puente del Inca, *Cruckshank 94* (type of *P. Cruckshanksii*, Kew) and *Perez Moreau 12628* (G); Puente del Inca, *Malme 2817* (US); Las Cuevas, *Perez Moreau 12633* (G); Cerro del Diamante and Cerro de la Polcura, *Gillies* (K); Cerro de los Aflijidos, *Ruiz Leal 1877* (G); Real de Contreras, Valle Tunuyan *Ruiz Leal 2120* (G); Valle Tunuyan, *Ruiz Leal 1925* (G); Los Guanacos, 2000 m. alt., *Carette 3000* (LP); Mala Dormida, 2700 m. alt., *Carette 240* (G); Cajon del Burro, Valle Atuel, 2900 m. alt., *Wilczek 115* (Boiss, US); Piedra del Burrero, 2900 m. alt., *Wilczek 118* (Boiss, US); Paso de la Cruz Piedra, 2500 m. alt., *Kuntze* as *T. Philippiana* (NY). Neuquen: Liu Cullin, 1350, *Comber 309* (K); Pino Hachado, *Parodi 2198* (Parodi); Vega Lolog, 810 m. alt., *Comber 824* (K).

As here defined the name *A. Cruckshanksii* is restricted to the well known and characteristic plant of middle altitudes in the central Andes of Chile and Argentina. It is closely related to *A. Amunategui* and, in the southern parts of its area, perhaps intergrades with that more southerly and easterly ranging species. It differs from its relative in its more distinctly montane habitats, its prevailing prostrate stems, and its elliptic or oblanceolate obtuse or emarginate leaflets. The species was first collected and is best known along the road to Uspallata Pass in Mendoza. Plants from the area have been illustrated and discussed by Hauman, [*Veg. Hautes Cord.* 125] *Anal. Soc. Cien. Argentina* 86: 289. t. 21, f. 5 (1918). Chilean specimens and those from Mendoza are rather uniform in appearance and usually have evidently strigose leaflets and fruit. The specimens cited from Neuquen, however, have the ovary and fruit glabrous and two of the collections (Liu Cullin and Pino Hachado) have practically glabrous leaflets. These southern forms have the leaflets of *A. Cruck-*

*shanksii* and seem more closely related to that species than to *A. Amunategui*. I suspect that they may prove to represent a variation worthy of some taxonomic recognition. It will be noted that they come from an altitude distinctly lower than that affected by good *A. Cruckshanksii*.

The fruit of typical *A. Cruckshanksii* is very strongly compressed laterally, the elliptic leathery valves being almost flat and parallel. It is noteworthy, therefore, that in one of the collections from Neuquen (*Parodi 2198*), the valves are not flat but convex and the pod evidently inflated, being lenticular in cross-section and compressed only in a narrow rim about the margin of the valves. The fruit, in fact, is very similar to that found in some specimens (*Carette 242 and 243*) of *A. Amunategui*.

22. *Astragalus Amunategui* Philippi, Anal. Univ. Chile 84: 31 (1893).— Type from Las Choicas.

*Astragalus Amunateguianus* Philippi ex Reiche, Anal. Univ. Chile 97: 560 (1897), and Fl. Chile 2: 103 (1898).— A variant spelling.

*Tragacantha Cruckshanksii* var. *glabrescens* Kuntze, Rev. Gen. 3: 73 (1898).— Type from Chilean side of the Paso de la Cruz Piedra, 2500 m. alt., *Kuntze*.

*Astragalus Moyanoi* Spegazzini, Rev. Fac. Agron. y Vet. La Plata 3: 601 (1897).— Type from Teka-choique, western Chubut, ca. lat. 43° 30', *Moyano*.

RANGE: Southern Mendoza and adjoining Santiago south into Patagonia.

CHILE. Santiago: Paso de la Cruz Piedra, 2500 m. alt., *Kuntze* (type of var. *glabrescens*, NY; isotypes US, BD). Colchagua: "Cord. de San Fernando," ex *Philippi* as *A. Amunateguianus* (US, K, BD).

ARGENTINA. Mendoza: Las Choicas, Jan. 1872, ex *Philippi* as *A. Amunateguianus* (Speg); Cuesta de los Aflijidos, *Ruiz Leal 1877* (G); Cerro de Guanacos, 2600 m. alt., *Carette 242 and 243* (LP); Cerro Nevado, dept. S. Rafael, *Carette 2552* (G). Neuquen: Mangrullo, 900 m. alt., *Ammann 76* (FM); Laguna Llancanelo, Nov. 1902, *herb. Spegazzini 2145* (Speg). Chubut: Rio Teka-choique, 1889, *Moyano* (type of *A. Moyanoi*, Speg); Comodoro Rivadavia, *Renard 13804* (G), *Ferruglio 30/1859* (G), and *Parodi 289* (Parodi); Puerto Madryn, *Dusen 5374* (Stock).

The plants here assembled under *A. Amunategui* come from an area lying between the ranges of *A. patagonicus* and *A. Cruckshanksii* and perhaps intergrade with both species. Their closest relationship seems to be with *A. patagonicus*. Indeed they may prove to be simply a luxuriant northern form of that southern species.

Typical *A. Amunategui* is a plant having the gross habit of *A. Cruckshanksii* but differing in its lanceolate leaflets and somewhat inflated strigose pods. The flowers and fruit are bunched in a subumbellate cluster on peduncles that are distinctly recurved at maturity. Specimens very similar to the type have been collected at Cerro Guanacos and Cerro Nevado, Mendoza, by *Carette*. The other collections referred to the species differ from those distributed by *Philippi* and *Carette* in being more erect plants with elongate loosely flowered racemes on erect peduncles. Included among them are the types of *A. Moyanoi* and *T. Cruckshanksii* var. *glabrescens*. These types are rather similar in general appearance, but differ in some details. The type of *A. Moyanoi* has the ovary and the leaflets glabrous whereas these are strigose and the leaflets less definitely acute in the var. *glabrescens*. The collections from Comodoro Rivadavia and Puerto Madryn much resemble one another and are very slender plants

with very few erect stems and very slender possibly annual roots. The racemes are loosely flowered and elongate and borne on erect peduncles. This particular form is very similar to some of the luxuriant forms of *A. patagonicus*.

When Philippi published *A. Amunategui* he stated that it was named in memory of Michal L. Amunatégus and gave its source as "Habitat in Andium loco Las Choicas dicto." I have seen a number of collections, scattered in various herbaria, distributed by Philippi as "*A. Amunategui-anus* Phil." These are mostly labeled as from the "Cordillera de San Fernando," but one is given as from "Las Choicas, Jan. 1872." All these specimens are extremely similar in details of size, maturity, discoloration etc., and I believe them to be parts of one collection. They agree closely with the original description and almost certainly are duplicates of the type. Their source is probably a short distance east of the Chile-Argentina boundary in Mendoza. There is a well known route from San Fernando, Colchagua, up the Rio Tinguiririca to the Paso de las Damas on the continental divide. Descending eastward from the pass the road crosses Arroyo de Las Choicas and passes close to the Mina de Las Choicas. The type of the *Astragalus* was probably obtained in this vicinity. In Jan. 1872 Paul Ortega traveled this route to Valle Hermosa (about 25 km. south of Choicas) and collected the types of *Gayophytum robustum* Phil., *Verbena ulicina* Phil., *Boopsis breviscapa* Phil., *Carex vallis-pulchrae* Phil., etc., and very likely the original material of our plant also.

As now known the species is practically confined to Argentina. The only Chilean material seen is the collection by Kuntze, the type of the var. *glabrescens*, labeled "Chile, Paso Cruz, 2500 m., Jan. 1892." If the data on the label are trustworthy the plant came from 1000 m. below the summit of Paso de la Cruz Piedra in the headwaters of the Rio Maipo, in the province of Santiago. Interestingly, among all the specimens referred to *A. Amunategui*, this Chilean one has characters most closely approaching those found in *A. Cruckshanksii*.

23. *Astragalus patagonicus* (Phil.) Spegazzini, Rev. Fac. Agron. y Vet. La Plata 3: 505 (1897).

*Phaca patagonica* Philippi, Anal. Univ. Chile 84: 20 (1893). — "In Patagonia haud procul a colonia chilensi Decembri 1878 legit orn. Henricus Ibar. . ."

RANGE: Southern Patagonia.

CHILE. Magallanes: Patagonia, ex Philippi as *P. patagonica* (isotype, K, Speg).

ARGENTINA. Santa Cruz: Killik Aike, Rio Gallegos, *Brown* 27 (NY); Estab. Las Vegas, Rio Coyle, *Dauber* 129 (G); upper Rio Santa Cruz, Lago Argentino, *Hauthal* 8786 (Speg); near Lago Argentino, *Furlong* 82 (G, NY); Rio Santa Cruz, 1882, *Spegazzini* (Speg); Puerto San Julian, *Dusen* 6332 (K, Stock) and *Blake* 2A (K, BM); Caleta Olivia, *Donat* 141 (G in pt.; K, NY); Cañadon de las Vacas, 1891, *Beaufils* (G); Patagonia, lat. 50°–53°, *Moreno & Tonini* 188 and 206 (NY). Chubut: Valle de la Laguna Blanca, *Koslowsky* 178 and 183 (K); Pampa Chica, *Skottsberg* 539 (Stock); Lago Musters, 1899, *Illin* (Speg); Lago Colhue Huapi, 540 m. alt., *Riggs* 44 (G, FM); Corcovado, 1901, *Illin* (Speg); along Rio Carren-leofu, 1900, *Illin* (Speg). Neuquen: Cord. del Viento, subito de Atrengo, *Rengonese* 295 (G).

This species appears to be most common in Santa Cruz and southern Chubut. The plants are dwarfed with the leaf-bearing seasonal stems only a few centimeters long and with the internodes very much shortened or scarcely developed. A multicapital caudex is formed from which arise tufts of leaves and the scapose peduncles. The flowers are usually few and borne in umbellate clusters. The flattened pod may be strigose, but frequently is more or less glabrous. The leaflets are narrow, 1–3 mm. broad, and linear. Most of the collections cited are readily placed and obviously referable to *A. patagonicus*. A few specimens from Santa Cruz (*Furlong 82*; *Dusen 6332*) and Chubut (*Lago Musters* and *Carren-leofu, Illin*) are more vigorous plants with more elongate stems than the other specimens cited and make embarrassing approaches to the various forms of *A. Amunategui*.

24. *Astragalus Burkartii*, sp. nov.

Herba caespitosa; ramulis caudicis prostratis congeste breviterque ramosis 3–5 mm. crassis, stipulis laxe ochraceis 3–5 mm. longis glabris vel breviter ciliatis marcescentibus chartaceis pallidis dense vestitis; foliis apice caudicis stipulosis congestis; rhachibus 10–30 (–40) mm. longis; foliolis ellipticis (2–) 3–6-jugatis 2–5 mm. longis 1–3 mm. latis viridibus crassiusculis costatis sed enervatis supra glabris subtus sparsissime adpresseque villosis apice rotundis vel retusis; floribus 2–4 in racemos brevissimos 1–5 mm. longe pedunculatos dispositis; calycibus sparse adpresse villosis 8–10 mm. longis tubo 2–3 mm. crasso 1–2 mm. longe pedicellato dentibus gracilibus 2–5 mm. longis tubo brevioribus; corolla conspicua violacea vexillo 15 mm. longo, lamina late elliptica 8–10 mm. longa ca. 7 mm. lata, alis 3–4 mm. latis vexillo 2 mm. brevioribus carina 2–3 mm. superantibus; ovario glabro; leguminibus evidentibus ascendentibus biconvexis glabris unilocularibus basim versus crassioribus lateraliter compressis margine acutis prominentibus; valvulis 10–15 mm. longis 5–7 mm. latis medium versus vel paulo infra medium latioribus apice acutis recte apiculatis basi obtusis vel rotundis intus sparse pubescentibus; seminibus 10–15 nigrescentibus maculatis compressis ca. 2.5 mm. diametro.

ARGENTINA. Tucuman: Peñas Azules, Sierra Calchaquies, dept. Tafi, among dry rocks, fl. rather large, blue, 3400 m. alt., Jan. 1933, *Burkart 5403* (G). Catamarca: Cerro de la Tambilla, low and spreading, fl. pinkish blue, March 25, 1917, *Joergensen 1337* (Gray Herb., type); Sierra del Anconquiya, dept. Santa Maria, rocky places, fl. bright violet, 4600 m. alt., March 1, 1925, *Venturi 6693* (US). Salta: Cerro de Cachi, dept. San Carlos, rocky places, fl. bright violet, 4500 m. alt., March 12, 1927, *Venturi 6692* (US); between Cuesta del Arca and Trancas, Jan. 1897, *Spegazzini 2100* and *2102* (Speg); Pampa Grande, Jan. 1897, *Spegazzini 2103* (Speg).

The nearest relative of *A. Burkartii* is probably *A. Venturii*, a poorly understood and perplexing species also occurring at high altitudes in northwestern Argentina. From that species it is readily separated by having flowers almost twice as large, usually more numerous leaflets, a sparser pale rather than yellowish indument, a more compacted caudex with less elongate stems, and looser pale rather than yellowish sheathing stipules. The fruit of *A. Burkartii* appears to be much larger and its sutures are both salient. They are laterally compressed and ovate-elliptic in outline. No traces of a false septum are present.

25. *Astragalus crypticus*, sp. nov.

Planta humilis caespitosa; caudice multicepicali denso e radice valida profunda oriente, ramulis stipulis ochraceis imbricatis obtectis apice fasciculos foliorum dense argenteo-strigosorum proferentibus; stipulis marcescentibus stramineis vaginatis ca. 5 mm. longis dorse sparse villosis acutis vel apice emarginatis; rhachi folii 1–3.5 mm. longo basi inter stipulis occulto; foliolis lanceolatis vel ellipticis 3–4-jugatis 1–2.5 mm. latis 3–6 mm. longis apice acutis; floribus axillaribus solitariis subsessilibus; calycibus inter stipulis occultis 5–6 mm. longis, tubo strigoso 3–4 mm. longo, lobis angustis 2–3 mm. longis; corolla flavescente, vexillo ca. 6–7 mm. longo cum lamina 3.5–4 mm. lata, alis 5–6 mm. longis angustis quam carina 1.5 mm. longioribus; leguminibus inter stipulis occultis 3–4 mm. longis 1–1.7 mm. crassis 2–3 mm. altis dense appressi-villosis, margine vix intrusis, suturis prominentibus donatis, valvulis cartilagineis ellipticis vel oblique ovatis; seminibus saepe 2.

ARGENTINA. Tucuman: Cumbres Calchaquies, dept. Tafi, en la puna tucumana, 4400 m. alt., Jan. 30, 1933, *Burkart 5407* (type, Gray Herb.); La Puerta, Sierra Calchaquies, 4000 m. alt., Jan. 30, 1933, *Burkart 5405* (G); Sierra del Cajon, dept. Tafi, mountain slopes among rocks, fl. yellowish, 3500 m. alt., March 12, 1927, *Venturi 9435* (US).

A very distinct species with its closest relations in *A. cryptobotrys* of northwestern Argentina and adjacent Chile. The two species agree in fruit-structure. Their pods are more or less lenticular with both sutures salient. The valves are cartilaginous and abundantly covered with similar appressed silky hairs. There is no false septum developed. The two species differ, however, in size of fruit, habit of growth, and shape of leaflets. In gross habit our present plant much simulates that of *A. peruvianus* and its allies.

26. *Astragalus cryptobotrys*, nom. nov.

*Phaca clandestina* Philippi, Fl. Atac. 14 (1860).—Type from Valle Sandon, 2700 m. alt., *Philippi*.

*Astragalus clandestinus* (Phil.) Hieronymus, Bol. Acad. Nat. Cien. Cordoba 4: [Sert. Sanjuan.] 22 (1881); Reiche, Anal. Univ. Chile 97: 537 (1897), and Fl. Chile 2: 80 (1898); not Roth ex Sprengel (1826).

*Phaca cryptantha* Philippi, Fl. Itin. Tarapaca. 14 (1891).—Type from between Aguas Calientes and Socaire (prov. Antofagasta, east of Salar de Atacama), 3000 m. alt., *Philippi*.—Not *Astragalus cryptanthus* Wedd. (1861).

?*Astragalus clandestinus* var. *Flossdorfii* Hicken, Darwiniana 1: 28 (1922).—Type from Queb. de Encrucijada, Sierra Famatina, La Rioja, 4000 m. alt., March 1913, *Flossdorf*.

RANGE: In Chile known only from the puna in eastern Antofagasta. In Argentina ranging at high altitudes from Salta (and Los Andes) south to Tucuman and San Juan.

CHILE. Antofagasta: Atacama Desert (betw. Ag. Calientes and Socaire?), Jan. 1885, ex *Philippi* as *P. cryptantha* (BD); Aguada Veras, 4000 m. alt., *Werdermann 1034* (G, K, US, BD); Cord. Domeyko, 1925, *Berninger 487* (BD); Atacama Desert (Valle Sandon?) *Philippi* as *P. clandestina* (K, DB, Boiss); Guanaqueros to Agua Delgada, Feb. 5, 1901, *Reiche* as *A. bolivianus* (G, BM).

ARGENTINA. Salta: Cerro de Cachi, 4000–4500 m. alt., 1927, *Venturi 6703* (US). Catamarca: Cerro Yutuyaco, north of Andalgalá, 3500 m. alt., *Joergensen 1627* in pt. (US); Sierra Anconquiya, 4600 m. alt., 1924, *Venturi 6624* (US); Junta de los Reales Blancos, 1930, *Castillanos 37/498* (G). Tucuman: Las Lagunas, dept. Tafi, 4400 m. alt., 1933, *Parodi 10829* (G); Cumbres Calchaquies, dept. Tafi, 4000–4400

m. alt., 1933, *Burkart* 5399, 5400 and 5401 (G); Est. Santa Rosa, dept. Chicligasta, 4600 m. alt., 1925, *Venturi* 4008 (US); Est. Las Pavas, dept. Chicligasta, 3500 m. alt., 1926, *Venturi* 4711 (US); El Pelado, 1912, *Rodriguez* 450 (G). La Rioja (Sierra Famatina): Alto Blanco, 1928, *Castillanos* 28/188 (G); Mina Jareta, 1879, *Hieronimus & Niederlein* 806 (K, BD); between Mina Jareta and Alto de Espiritu Santo, 1879, *Hieronimus & Niederlein* 795 (BD); Cueva de Perez, 1879, *Hieronimus & Niederlein* 358 (BD); Tocino Pass, 4320 m. alt., 1915, *Hösseus* 1911 (BD); below Tocino Pass, 3900–4320 m. alt., 1915, *Hösseus* 1903 (BD). San Juan: Paramillo, southwest of San Juan, Jan. 1876, *Echegaray* (BD); Cord. Colangüil, Queb. del Salto, 1930, *Perez-Moreau* 30/104 (G).

A plant much resembling *A. geminiflorus* of Ecuador in gross habit. That northern plant, however, has an incompletely 2-celled fruit with the lower suture inflexed, smaller more crowded distinctly silvery silky leaflets, short petioles, and a somewhat more trailing habit of growth. I do not believe that there is any close relationship between *A. geminiflorus* and *A. cryptobotrys*. The latter, in any case, has its closest relations in *A. crypticus* and *A. Asplundii*. Reiche has cited *Phaca diminutiva* Phil., which was collected with the type of *P. cryptantha* Phil., as a synonym of the present species. The plants described as *A. diminutiva*, however, seem so very much smaller than the most reduced forms of the present species known to me that I hesitate to accept it as a synonym. In any case the name cannot be transferred to *Astragalus* since the resulting binomial is preoccupied by another valid species.

27. *Astragalus Asplundii*, sp. nov.

Herba perennis incana; caulibus numerosis e caudice humili laxo ramoso orientibus 5–10 cm. longis simplicibus tomentosus, internodiis 3–20 mm. longis; rhachi folii 4–8 mm. longo; foliolis 5–8-jugis lanceolatis vel lanceolato-ovatis 3–10 mm. longis 2–4 mm. latis basim versus latioribus apicem versus gradatim attenuatis concoloribus planis utrinque villosis-tomentosis; stipulis laxo ochraceis grandis chartaceis 4–6 mm. longis; pedunculis axillaribus 5–15 mm. longis quam foliis conspicue brevioribus laxo ascendentibus ad apicem flores 3–7 capitato-congestos productis; calycibus subsessilibus ca. 5 mm. longis, lobis subulatis ca. 2 mm. longis; corolla ca. 14 mm. longa; leguminibus sublenticularibus dense villosis-strigosis unilocularibus 6–7 mm. longis 5–6 mm. altis 3–4 mm. crassis sub medium crassioribus et altioribus basi oblique rotundis apice obtusis margine angulatis vix inflexis.

BOLIVIA: Uyuni, Potosi, 3700 m. alt., March 24, 1921, *Asplund* 6132 (type, U. S. Nat. Herb.) and 3093 (Upsala); Uyuni, 3700 m. alt., March 25, 1921, *Asplund* 6131 (US) and 3161 (Upsala); Uyuni, 3660 m. alt., Feb. 23, 1903, *Hicken* 12 (Stock).

A very distinct species with evident relations in *A. cryptobotrys*. From the latter it differs in its larger more elongate acute leaflets and its clustered flowers borne on obvious axillary peduncles. The species is known only from one locality in southern Bolivia, lying several hundred kilometers to the north of the range of its relative.

28. *Astragalus bellus* (Kuntze) Fries, Nova Acta R. Soc. Sci. Upsala IV, 1<sup>1</sup>: 135 (1905).

*Phaca pulchella* Clos in Gay, Fl. Chile 2: 92 (1846); Weddell, Chlor. Andina 2: 263 (1861). — Type from Cordillera de los Patos, Gay 490.

*Astragalus pulchellus* (Clos) Reiche, Anal. Univ. Chile 97: 539 (1897), and Fl. Chile 2: 82 (1898). Not Salisb. (1796), nor Boiss. (1843).

*Tragacantha bella* Kuntze, Rev. Gen. 2: 940 (1891). Based upon *P. pulchella* Clos.

RANGE: Known only near the Chile-Argentine boundary, between the provinces of Coquimbo and San Juan.

CHILE-ARGENTINE BOUNDARY: Cordillera de los Patos, rare about the base of scattered rocks, 3100 m. alt., *Gay 490* (type, Paris); Chile, *Gay* (G, K, BD).

A small depressed plant with silky strigose stems and leaves. The strigose fruit is several-seeded, compressed about the margins, and nearly as broad as long. The peduncles are 1–3 mm. long and bear loose clusters of several flowers. The pedicels are about 1 mm. long. The species seems to be most closely related to *A. cryptobotrys* but has much more slender stems, smaller stipules, and less compressed legumes which are compressed about the margins.

29. *Astragalus tehuelches* Spegazzini, Anal. Mus. Nac. Buenos Aires 7: 268 (1902). — Type from Rio Chico, Chubut, *Ameghino*.

RANGE: Known only from southern Patagonia (Chubut).

ARGENTINA. Chubut: Rio Chico, 1900, *Ameghino* (type, Speg.); Chubut, Dec. 1900, *collector not given* (Speg.).

A very distinct species and one very readily recognizable by its coarse, rather fleshy, conspicuously emarginate leaflets and its elongate fruit 2.5–3 cm. long. The pod is narrowed at both ends and is somewhat falcate, the lower margin being concave and the upper one convex in lateral outline. The lower suture is strongly inflexed. There is a very narrow incomplete hyaline false septum. The corollas of the species have not been seen. The coarse calyx, however, suggests that the corollas are probably 10–15 mm. long. The species may have its closest relative in the very different *A. Ruiz-Lealii* of Mendoza.

30. *Astragalus chubutensis* Spegazzini, Anal. Mus. Nac. Buenos Aires 7: 266 (1907). — Based upon collections made by Illin on the Rio Chubut (near Lago Musters) and Rio Carren-leofu.

RANGE: Known only from Chubut and northern Santa Cruz, Patagonia.

ARGENTINA. Chubut: Rio Chubut near Lago Musters, "campo alto cerca del primer manantial," 1899, *Illin* (type, Speg.); Carren-leofu, 1900, *Illin* (Speg.). Santa Cruz: Caleta Oliva, 325 m. alt., Oct. 23, 1929, *Donat 178* (G, NY); Minerales, 300 m. alt., Oct. 23, 1929, *Donat 178* (K, FM, Stock); Lago Argentino, upper Rio Santa Cruz, Jan. 1902, *Hauthal* (Speg.).

A low subcaespitose plant with the numerous leaf-bearing shoots 1–2 cm. long. The leaves, stems, peduncles and calyces are densely appressed villous. This indument is white except on the calyces and stipular sheathes where black hairs may be numerous. The peduncles are 3–5 cm. long and evidently surpass the numerous more or less basal leaves. They are terminated by a capitate cluster of 3–8 blue flowers which become reflexed after anthesis. No mature fruit has been seen. Hauthal's collection, however, has immature fruits which suggest that when mature they would be about 1 cm. long, straight, and only incompletely exerted from the calyx.

31. *Astragalus distinens* Macloskie, Fl. Patagonia 2: 505 (1905). — A renaming of *A. distans* Gray, not Fischer.

*Astragalus distans* Gray, Bot. U. S. Explor. Exped. 1: 412 (1854). Not Fischer (1853). — Type collected by Pickering on the dunes at the mouth of the Rio Negro, northern Patagonia.

RANGE: From the Rio de la Plata westward and northwestward to San Luis and Jujuy, and southward, probably in the interior, to the lower Rio Negro.

ARGENTINA. Rio Negro: dunes near mouth of Rio Negro, *U. S. Explor. Exped.* (type, US, G). Buenos Aires: Barrancas del Cazador near Escobar, Nov. 23, 1924, *Doello-Jurado 24/1891* (G); Campana, limy barrancas along the Rio Parana, fl. bluish, *Parodi 4736* (Parodi) and *8609* (G); *Burkart 3080* and *5661* (G); *Hauman 13807* (G); *Castellanos 26/1912* (G). Santa Fe: Arroyo Frias, south of Rosario, fl. blue, Oct. 1929, *Cabrera 931* (Stock, G). Corrientes: without locality, 1821, *Bonpland* (Paris). Cordoba: Achiras, fl. bluish white, 800 m. alt., 1930, *King 735* (BM); Capilla por Los Cocos, Nov. 1915, *Hauman 13789* (G). San Luis: Cerro del Portezuelo, Nov. 1820, *Gillies* (K); San Luis, Jan. 1910, *Spegazzini* (Speg); La Guardia, March 23, 1882, *Galander* (BD). La Rioja: near Los Corrales, Sierra Famatina, 1879, *Hieronymus & Niederlein* (BD). Catamarca: Sierra del Anconquija, dept. Santa Maria, fl. yellowish, in rocky places, 4200 m. alt., Jan. 1926, *Venturi 6628* (US); [?] Los Hoyitos, Feb. 7, 1930, *Castellanos 30/491* (G). Tucuman: betw. Amaicha and El Molle, dept. Tafi, dry place, fl. dark blue, Feb. 3, 1933, *Burkart 5393* (G); between Amaicha and El Molle, 2400 m. alt., fl. pale blue, Feb., 1933, *Burkart 5391* (G); Amaicha del Valle, dept. Tafi, 2300 m. alt., dry rocky valley, fl. violaceous white, Jan. 31, 1933, *Burkart 5392* (G). Jujuy: Tilcara, "en los pajonales del cerro," fl. white, 3000 m. alt., Feb. 19, 1927, *Venturi 7422* (US); Cerro La Solidaridad, dept. Humahuaca, "en los pastigales," fl. bright blue, 3000 m. alt., Jan. 23, 1929, *Venturi 8894* (G, US).

URUGUAY. Carasco, Montevideo, Dec. 1869, *Fruchard* (Paris); Montevideo, sandy place, *Gibert 391* (K); Banados de Santiago Vazquez, 1937, *Rosengurtt 554* (G); Arenal Grande, April 1876, *Arechavaleta* (BD); on face of very dry clay banks at Cape Fray Bentos, Rio Uruguay, *Tweedie* (K); Fray Bentos, 1933, *Herter 1833* (G).

The plant here treated is a very distinct one which is quickly recognizable by its unique fruit. It is most closely related to the more southerly ranging, coastal *A. Bergii* with which it agrees very closely in all structures save its fruit. The type of *A. distinens* is given by Gray, l.c., as from the "Rio Negro, North Patagonia; on sand-hills" where it is said to have been collected with *A. Bergii* (= *A. distans* var.  $\beta$  Gray, l.c.). Pickering, *Geogr. Distr. Animals and Plants* 77 (1870), who was one of the collectors, indicates that *Astragalus* was collected on the "tract of sand-hillocks" at the mouth of the Rio Negro and presumably those to the southward of the anchorage at the river mouth. Except for the type, I have seen no material of *A. distinens* labeled as coming from south of northernmost Buenos Aires and northern San Luis. Hauman, *Anal. Mus. Nac. Buenos Aires* 24: 396 (1913), and Manganaro, *Anal. Soc. Cien. Argentina* 87: 149 (1919), however, report "*A. Bergii*" in western parts of the province of Buenos Aires (Nuevo Plata, and Rivera) towards the La Pampa boundary. There is a possibility that these records may refer to material of *A. distinens* and so indicate an extension of that species from San Luis and Cordoba southward in the interior towards the lower Rio Negro.

It is difficult to believe that the types of two such closely related species as *A. distinens* and *A. Bergii* could have both come from the mouth of the

Rio Negro. The species concerned are so closely allied that hybridization could be expected if they grew in the same area. The type of *A. distinens* is thoroughly typical of the species as here accepted and is said to have been collected with plants that are equally typical of *A. Bergii*. It was collected by members of the U.S. Exploring Expeditions, under Capt. Wilkes, while the ships anchored at the mouth of the Rio Negro during the final week of Jan. 1839. No other landing was made by the expedition between Rio de Janeiro and the Straits of Magellan. The material of *A. Bergii*, collected by the expedition, probably did come from near the anchorage, since that species has been found there subsequently by various botanists. The material of *A. distinens*, however, was probably collected further north, possibly during some overland excursion made while the ships were at anchor. The material collected of the two species is very mature and has ripened pods. That of *A. distinens* is slightly less matured and not so dried and weathered as that of *A. Bergii*.

32. *Astragalus Bergii* Hieronymus, [Sert. Patagon. 17] Bol. Acad. Nac. Cordoba 3: 343 (1880). — Type from near mouth of the Rio Negro, *Berg 79*.

*Astragalus distans* var.  $\beta$  Gray, Bot. U. S. Explor. Exped. 1: 412 (1854). — Type from near mouth of the Rio Negro.

RANGE: Known only from the southern parts of the province of Buenos Aires where it seems to be confined to sands near the coast.

ARGENTINA. Buenos Aires: mouth of the Rio Negro, Oct. 2, 1874, *Berg 79* (type of *A. Bergii*, BD); near mouth of the Rio Negro, *U. S. Explor. Exped.* (type, US, G); El Carbon, Carmen de Patagones, Feb. 1898, *Spegazzini* (Speg); Bahia Blanca por San Blas, 1903, *Ameghino 13806* (G); Baterias, Bahia Blanca, Dec. 1901, *Spegazzini* (Speg); Monte Hermoso, 1916, *Carette* (G); Sierra de la Ventana, Nov. 1904, *Dusen 6272* (Stock); Sierra de Curamalal, Arroyo Cochenleufú, fl. blue, Nov. 1939, *Cabrera 5490* (G).

The plant treated here has been confused with that which I have called *A. distinens*. The notes by Spegazzini, *Anal. Soc. Cien. Argent.* 47: 233 (1899), and by Hauman, *Anal. Mus. Nac. Buenos Aires* 24: 396 (1913), apply to both species. Manganaro, *Anal. Soc. Cien. Argent.* 87: 149, fig. 15 (1919), however, while giving a general range that includes *A. distinens*, seems to have figured and described plants referable to *A. Bergii* as here accepted. She states, however, that she examined specimens from Rio Negro, Bahia Blanca, Sierra Ventata and Nueva Plata. I have seen no material from as far north as Nueva Plata (Partido Pehuajo, prov. Buenos Aires). Monticelli, *Lilloa* 3: 345, fig. 22 (1938), reporting *A. Bergii* from La Pampa, illustrates a plant which seems to represent that species. A specimen from him, collected at Telén, La Pampa, showing flowers but no fruit, bears the annotation "fragmento del ilustrado en mi trabajo." The acceptance of this record would extend the known range of *A. Bergii* from southwestern Buenos Aires northwestward into La Pampa.

The type of *A. Bergii*, which I examined at Berlin, is labeled as collected from the shade of shrubs of the Patagonian campo near the Rio Negro on Oct. 2, 1874. According to Berg, *Peterm. Geogr. Mittheilungen* 21: 367 (1875), he was on the brig "Rosales" which sailed down the Rio Negro from Carmen de Patagones on Sept. 29, 1874. After a halt of three days

at the mouth of the Rio Negro the vessel arrived at the Rio Santa Cruz on Oct. 8th. On Oct. 2nd, the date on which the type was collected, Berg accordingly must have been at the mouth of the Rio Negro.

I am unable to distinguish flowering, non-fruiting plants of the two species I am calling *A. distinens* and *A. Bergii*. Since Berg's type is at anthesis, and entirely lacks fruit, I have arbitrarily associated the name "*A. Bergii*" with what appears to be the common species about the mouth of the Rio Negro. This application of the name, however, must remain a practical expedient, designed to avoid the coining of a new botanical name, until more collecting is done about the lower Rio Negro or until someone discovers floral or vegetative characters whereby the type of *A. Bergii* can be positively assigned to one or the other of the two species concerned here, for, as noted in my discussion of *A. distinens*, the type of this latter species also came from the mouth of the Rio Negro and possibly may represent the species collected by Berg.

33. *Astragalus Spegazzinii*, nom. nov.

*Astragalus Rengifo* var. *lejocarpa* Spegazzini, Anal. Mus. Nac. Buenos Aires 7: 268 (1902).—Type from near the confluence of the Rio Limay and Rio Neuquen, *Spegazzini*.

RANGE: Known only from the upper parts of the watershed of the Rio Negro.

ARGENTINA. Rio Negro: near the confluence of the Rio Limay and Rio Neuquen in dry sandy places, Dec. 1897, *Spegazzini* (type, Speg); near General Roca, valley of the Rio Negro, in clay soil, 1915, *Fischer 145* (G, NY, US, K).

In the flowering condition this plant very much suggests some of the intermediates connecting *A. Amunategui* and *A. patagonicus*. Fischer's plant has been reported as *A. Cruckshanksii* by Hicken, *Physis* 2: 15 (1915). Spegazzini reported his collection first, *Anal. Soc. Cien. Argent.* 47: 237 (1899), as *A. Arnottianus* and later, as his proposed new variety, *A. Rengifo* var. *lejocarpa*. The relations of the species are certainly not with *A. Cruckshanksii* and its allies, nor with *A. Arnottianus*. The fruit is linear, has an inflexed lower suture, and becomes deflexed in age. *Astragalus carinatus* is probably its closest relative. Fischer's plants, collected at anthesis, lack even partially matured fruit. Spegazzini's collection has young fruit. The largest of these are falcate and linear, becoming 2 cm. long, ca. 1.7 mm. high and strongly flattened laterally. The upper edge is concave and the lower is convex in lateral outline.

34. *Astragalus carinatus* (H. & A.) Reiche, *Anal. Univ. Chile* 97: 557 (May, 1897), and *Fl. Chile* 2: 100 (1898); Kurtz, *Bol. Acad. Nac. Cordoba* 15: 511 (July 1897).

*Phaca carinata* Hooker & Arnott, *Bot. Misc.* 3: 185 (1832).—Type from below Hornillos, Mendoza, *Cruckshank 89*.

*Phaca carinata* var.  $\beta$  Hooker & Arnott, *Bot. Misc.* 3: 185 (1832).

*Phaca andicola* Gillies ex Hooker & Arnott, *Bot. Misc.* 3: 185 (1832), in synonymy.

RANGE: Base of the cordilleras of Mendoza; Cordoba; and perhaps Catamarca.

ARGENTINA. Mendoza: below the Hornillos, *Cruckshank 89* (type, Kew); Portez. del Pantanillo and Portez. de la Casa de Piedra, *Gillies* (type of var.  $\beta$ , K); abundant along the descent from Portez. de la Casa de Piedra, *Gillies* (K); Rodeo de los Chacayos, Nov. 3, 1834, *Gillies* (K); near baths of Villa Vicencio, Nov. 15, 1822,

*Gillies* (K); hills above baths of Villa Vicencio, Nov. 15, *Gillies* (G); Potrerillos. Est. "El Salto," fl. blue, 1900 m. alt., Nov. 1933, *Ragonese* 97 (G); Mendoza, Jan. 1910, *Spegazzini* (Speg.); El Alambre Atravezado, Estan. La Vila, Tupungato, *Ruiz Leal* 2799 (G); Puesto del Manzano, Tunuyan, 1700-2700 m. alt., *Ruiz Leal* 1745 and 2318 (G); Cerro Nevado, dept. San Rafael, *Carette* 2555 (G). Cordoba: Capital, *herb. Burkart* 2140 (Burkart).

In gross habit this plant frequently suggests forms of the very different *A. Arnottianus*, but may be readily separated by its fruit and by its leaflets which are glabrous on the upper surface. It is a plant of the base of the cordilleras, and not of their higher parts. The fruit is glabrous, deltoid in cross-section, and has its lower surfaces broadly inflexed and flattened. The corolla varies in size from 9-12 mm. in length. The type represents the large-flowered form.

Perhaps referable to *A. carinatus* are some collections from Catamarca (Yacutula, *Schickendantz* 61; Granadillas, *Schickendantz* 98 and 104; Catamarca, *Lorentz* 41) which have a form of corolla slightly different from that in typical plants of Mendoza and Cordoba. Also questionably referred to the present species is a collection made by Perez Moreau (no. 30/97) near Las Vicunitas, Queb. de Conconta, in the cordilleras of San Juan. This latter is a caespitose plant with minute leaflets, about 1 mm. long, and reduced scapes only 5-15 mm. high. It may be a compacted depauperate montane form, comparable to depauperate compacted phases of *A. Arnottianus* that have been collected near El Portillo, Mendoza.

35. *Astragalus Parodii*, sp. nov.

Herba perennis e radice crassa valida profunda oriens; caulibus 3-20 (saepe 5-15) cm. longis foliosis angulatis numerosis gracillimis ca. 1 mm. crassis decumbentibus longe sparseque ramosis sparse brevissimeque strigosis e caudice ramoso 5-10 cm. diametro subterraneo erumpentibus internodiis 3-6 cm. longis; stipulis vix conspicuis 1.5-3 mm. longis infra medium connatis inconspicue strigosis chartaceis, lobis herbaceis saepe reflexis; rhachibus foliorum 1-2.5 cm. longis; foliolis 3-6 jugis medio-plicatis oblongo-obovatis vei anguste oblongis 3-10 mm. longis 1-2.5 mm. latis costatis sed enervatis subtus sparse inconspicueque strigosis, supra saepe glabris, apice retusis, infra medium basim versus contractis; racemis 4-7 floris 1-2 cm. longis laxifloris; pedunculis 1-4 cm. longis foliis 1-2-plo longioribus; calycibus 3-4 mm. longis sparse et pallide nigreque strigosis, lobis linearibus quam tubo paulo brevioribus; corolla caerulea; vexillo 8-10 mm. longo, lamina obovata 5-6 mm. lata 5-7 mm. longa apice emarginata; alis 7-8 mm. longis quam carina 1-2 mm. longioribus; leguminibus subovoideis vel oblongis lateraliter compressis angulatis unilocularibus 5-9 mm. longis 2-3 mm. crassis 2-3.5 mm. altis induratis tarde dehiscentibus pendulis, apice acutis et apiculatis, basi rotundis, infra medium vel basim versus crassioribus et latioribus, dorso acutis et summam ad marginem incrassatis et paulo compressis, subtus planis vel leviter subintrusis; suturis prominentibus; seminibus congestis ca. 10.

RANGE: Known only from the Sierra de Achala, Cordoba. All collections seem to be from the Dept. Punillo near Los Gigantes.

ARGENTINA. Cordoba: base of Los Gigantes, Dec. 2, 1878, *Hieronymus* (BD); Quebrada at base of Los Gigantes, Jan. 22, 1880, *Galander* (BD); near

Esquina, in quebrada at base of Los Gigantes, Dec. 3, 1878, *Hieronymus* (BD) and Jan. 1881, *Hieronymus* (BD); valley of the Rio Catre below the potreros, Feb. 4, 1877, *Hieronymus* 761 (BD, Paris); Cuesta del Gaucho, Jan. 9, 1876, *Hieronymus* (BD); Copina, moist alpine meadows, fl. blue, 1500 m. alt., Dec. 29, 1935, *Burkart* 7360 (type, Gray Herb.); between Cuesta de Copina and Las Encenadas, Jan. 8, 1876, *Hieronymus* (BD); near Pampa de Achala, sandy soil, 2000 m. alt., Dec. 1926, *Parodi* 7490 (BD); Pampa de Achala, moist meadows, 2200 m. alt., Dec. 29, 1935, *Burkart* 7355 (G); Pampa de Achala, 10 km. below Hotel El Condor, rocky plateau, fl. bluish white, 1000 m. alt., Dec. 16, 1938, *Goodspeed* 17228 (G).

A very distinct species having its closest affinities probably with *A. carinatus*. It differs from the latter in its smaller, indurate, very much less angulate pods and fewer, somewhat smaller, more congested flowers. Its tough pods also suggest *A. Bergii* and *A. distinens* but these species have much more numerous smaller pale flowers in elongate racemes and curved pods with at least one suture recessive. In lateral outline the pods of *A. Parodii* are strongly convex above and nearly straight below. In cross-section they are roughly triangular. Their upper edge is prominent being compressed laterally and slightly thickened along the suture. The pods are flattened or weakly and broadly intruded dorsally. The legumes of this species dehisce only very tardily if at all.

36. *Astragalus Joergensenii*, sp. nov.

Herba perennis gracilis laete viridis erecta vel decumbens; caulibus 1.5–7 dm. longis sulcatis sparse strigosis longe ascenderis ramosis foliosis; foliis 8–11-jugatis ellipticis vel lanceo-oblongis 3–11 mm. longis 2–4 mm. latis apice obtusis vel retusis subtus strigosis supra glabris margine plus minusve involutis; pedunculis 4–7 cm. longis foliis aequilongis vel paulo longioribus apicem versus flores congestos gerentibus; floribus violaceis maturitate deflexis; calycibus cupulatis 1–1.5 mm. profundis nigro-strigosis ca. 1 mm. longe pedicellatis, lobis angustis tubo subaequilongis; vexillo 5–7 mm. longo; alis carina evidenter longioribus; ovario strigoso; leguminibus unilocularibus refractis 1.5–2 cm. longis 2–4 mm. altis sparse strigosis falcatis chartaceis valde angulatis supra carinatis subtus conspicue lateque inflexis 1–3 mm. crassis; seminibus numerosis.

RANGE: Northwestern Argentina at middle altitudes.

ARGENTINA. Catamarca: Poman, Dec. 1909, *Spegazzini* (Speg); El Cannedo, common, Feb. 10, 1917 and Jan. 20, 1916, *Joergensen* 1123 (US) and 1126 (type, Gray Herb.). Tucuman: sierras near Tafi del Valle, fl. blue-violet, 2400 m. alt., Feb. 3, 1933, *Burkart* 5404 (G); Estan. Santa Rosa, Pueblo Viejo, dept. Chichigasta, among grass on ridge, fl. violet, 4000 m. alt., Dec. 22, 1925, *Venturi* 7513 (US). Salta: Cerro de Cachi, dept. San Carlos, among grass, fl. bluish, 3500 m. alt., March 11, 1917, *Venturi* 6697 (US); Cerro de Cachi, fl. violet, 3500 m. alt., March 10, 1917, *Venturi* 6696 (US); Pampa Grande, Jan. 1897, *Spegazzini* (Speg); Amblaiio to Cachi, Jan. 1897, *Spegazzini* (Speg). Jujuy: Tilcara, en los pajonales del cerro, fl. violet, 3000 m. alt., Feb. 18, 1927, *Venturi* 7419 (US); Maimora, dept. Tilcara, fl. pinkish yellow, in gravel, 2500 m. alt., Feb. 15, 1927, *Venturi* 10411 (US); Volcan, dept. Tumbaya, grassy place, fl. bluish, 2300 m. alt., Jan. 20, 1926, *Venturi* 9180 (US).

In the mountainous regions of northern Argentina this plant has been confused with the form of *A. distinens* found in the same area. It is not closely related to that species, however, differing conspicuously in the

structure of the fruit and usually in the color as well as form of the corolla. The pods, though averaging somewhat smaller, are similar in structure, texture and shape to those of *A. carinatus*. It is probably in the evidently different and more southerly ranging *A. carinatus* and *A. pauranthus* that our present species finds its closest relatives.

37. *Astragalus pauranthus*, sp. nov.

Planta humilis ascendens e radice gracili profundi perenni erumpens; caulibus pluribus gracillimis 1–2 dm. longis strigosis sparse ascendenter ramosis foliosis; rhachibus folii 2–5 cm. longis; foliolis distantibus 5–7-jugatis 3–7 mm. longis 1–3 mm. latis linearibus vel oblongis supra glabris subtus strigosis apice saepe retusis; pedunculis 5–10 cm. longis foliis subduplo longioribus supra medium laxifloris; floribus 3–8 distantibus pallidis; vexillo 5–7 mm. longo; alis carina conspicue longioribus; calycibus 2 mm. longis campanulatis nigro-strigosis, lobis gracilibus tubo paulo brevioribus; ovario glabro; leguminibus refractis glabris 12–15 mm. longis 3–4 mm. altis basim versus rotundis apice obtusis supra carinatis saepe rectis vel (a latere viso) plus minusve concavis subtus late inflexis 2–3 mm. crassis.

RANGE: Patagonia.

ARGENTINA. Rio Negro: General Roca, on dunes at foot of the barrancas on the north side of the valley of the Rio Negro, Oct.—Nov. 1914, *Fischer 99* (type, Gray Herb.; US, NY, FM, K, BD). Chubut: Carren-leofu, 1900, *Illin* (Speg); Chubut, 1899, *Illin* (Speg); Chubut, 1900, *Basaldua* (Speg).

The collections made by Illin and Basaldua were those cited as *A. Bergii* by Spegazzini, *Anal. Mus. Nac. Buenos Aires* 7: 265 (1902). That species, which is known only to the east and north of the range of *A. pauranthus*, is a very different plant. Our species may be separated from it by the few differently shaped flowers, the more slender more lowly habit of growth, and the chartaceous fruits with broadly and strongly inflexed lower suture. The affinities of *A. pauranthus* are with *A. Bergii*, *A. Joergensenii*, and possibly *A. Ruiz-Lealii*.

38. *Astragalus Ruiz-Lealii* sp. nov.

Planta gracillima annua strigosa cinerea; caulibus basi sparse ramosis erectis 5–15 cm. altis ca. 1 mm. crassis; foliis caulinis, rhachibus folii 2–5 cm. longis sursum 4–12 mm. supra basim efoliolatis; foliolis distantibus 5–7-jugatis 2–9 mm. longis 1–2 mm. latis linearibus vel oblongis, apice emarginatis vel obtusis, supra strigosis vel costam versus plus minusve glabris, margine involutis; pedunculis rhachibus folii subaequilongis apicem versus laxe bifloris; floribus flavaceis 0.5–1 mm. longe pedicellatis; calycibus ca. 3.5 mm. longis cum pilis pallidis et non rariter nigris strigosis, tubo ca. 2 mm. longo ca. 1.3 mm. crasso, lobis ca. 1.5 mm. longis gracilibus; vexillo 6–7.5 mm. longo apice emarginato, alis ca. 5 mm. longis quam carina ca. 1 mm. longioribus; ovario strigoso; leguminibus vix induratis plus minusve reflexis pallide strigosis 2–2.5 cm. longis utroque attenuatis gracilibus 6–10-plo longioribus quam latis falcatis, margine superiore (a latere viso) convexis secus sutura prominente paulo compressis, margine inferiore (a latere viso) concavis valde inflexis; seminibus numerosis.

RANGE: Known only from Mendoza.

ARGENTINA. Mendoza: Mendoza, Jan. 1910, *Spegazzini* (Speg); dry rocky places near Mina La Atala, dept. Las Heras, Nov. 1, 1936, *Ruiz Leal* 4200 (G); bed of Rio Papagayos near Queb. de la Mina La Atala, Oct. 24, 1937, *Ruiz Leal* 3343 (type, Gray Herb.); near Queb. de la Mina La Atala, Sept. 20, 1937, *Ruiz Leal* 4676 (G); Km. no. 59, Paso de la Cumbre, dept. Lavalle, Sept. 20, 1938, *Ruiz Leal* 5297 (G).

A very distinct species characterized by its very slender stems, its annual root, few flowers, and elongate extrorsely falcate pods. In having extrorsely falcate pods which become deflexed, the species can be compared only with the very different *A. tehuelches* of southern Patagonia. The seminiferous (superior) suture of the fruit is strongly convex in lateral outline and not concave nor straight as is prevalent in this genus. The valves are laterally compressed just below the superior suture and then somewhat swollen. The lower suture is abruptly and distinctly inflexed. There is a very narrow hyaline incomplete false septum inside the pod. The species is probably most closely related to *A. tehuelches* and *A. pauranthus*, but has smaller and fewer flowers, more slender stems, and a distinctly annual root. The collection by Spegazzini, cited above, was mixed with material of *A. carinatus* and is part of collection no. 2146 in his herbarium at La Plata.

TO BE CONTINUED

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