

# THE ANDEAN SPECIES OF THE GENUS STIPA ALLIED TO STIPA OBTUSA

by

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(with 1 figure)

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The Puna de Atacama, whose hills and slopes are at over 3500 meters above sea-level, is the habitat of several species of *Stipa*, which constitute a natural, well-defined group. They are xerophilous, caespitose grasses with setose leaves and small fruits, showing a distinct affinity with the genera *Oryzopsis* of the U.S.A. and *Orthachne* of the sub-Antarctic Andes.

Their taxonomic position is not entirely clear, for, as will be discussed underneath, some species have been included successively in *Stipa*, *Oryzopsis*, *Piptochaetium*, etc. The object of this article is to define a group, which I will designate as the group *Obtusae* (basing it on *Stipa obtusa* [Nees et Meyen] Hitchcock which among these species has priority) and which will contain those species which I consider allied, although other authors have often considered them distant.

These species are known to the inhabitants of the Puna as "vizcacheras" and have the important practical interest that some of them are toxic for livestock, especially horses. They are frequently labeled "poisonous" in herbaria but the toxicity has only been proven for *Stipa saltensis* and *Stipa Bomani*. It seems probable that the variation in toxicity is due not only to the effects of the site as Boman supposes (1) but also to different species.

## GROUP OBTUSAE.

Perennial grasses, densely caespitose, bronzed or golden coloured, with intravaginal innovations and prophyllum from 2 to 5 cm long, 2-awned in its apex. Sheaths glabrous, dilated in the ligular zone so that the acicular blade appears to emerge from the dorsum; ligule membranaceous, oblong, from 3 to 10 mm long; blades convolute-setose, less than 0.4 mm in diameter. Panicles linear, erect, contracted and usually few-flowered. Spikelets violet, lead coloured or reddish-brown, supported on stiff pedicels. Glumes scarious, depressed, 3-veined with diffuse veins, glabrous, either of equal length or with the lower one smaller than the upper, as long or longer than the lemma, with the apex obtuse or slightly

acute. Lemma fusiform, up to 4 mm long, pubescent or glabrous, without corona, narrowed towards the extremity; awn deciduous or persistent, straight or slightly curved but not geniculate; callus less than 0.5 mm; margins of the lemma open, disclosing the dorsum of the palea, the latter being lanceolate, flat or navicular, 2-veined, and as long as the lemma. Stamens 3 with glabrous anthers. Caryopsis fusiform.

This group contains 6 species from the high Andes of southern Peru, Bolivia, northwestern Argentina and northern Chile. They inhabit desert regions, inaccessible and poorly explored, at elevations of over 3500 meters. On this account they are very sparsely represented in herbaria.

### RELATIONSHIPS.

As has already been said, this group is related to *Oryzopsis* Michx. (2) and *Orthachne* Nees (3) and also to another group of *Stipa* whose typical species is *S. brachychaeta* Godr. (*Stipa hirtiflora* Hackel, *S. Duseni* Hitchcock, etc.). In all species of the groups just mentioned the anthoecia are somewhat fusiform and the palea is well-developed, 2-veined, flat or navicular, and reaching the apex of the lemma whose edges generally do not touch, allowing the dorsum of the palea to be seen between them. In *Orthachne*, some *Oryzopsis* and the new group *Obtusae* the awn is curved but not geniculate, persistent or deciduous, while in *Stipa* aff. *brachychaeta* and in some *Oryzopsis* it is geniculate. The anthers have no apical hairs in *Orthachne* and *Stipa* group *Obtusae* and are pilose-tipped in *Oryzopsis* and *Stipa* aff. *brachychaeta*.

An important character of the group *Obtusae* is the form of the leaves, with the vaginal margins widened, the long ligule and setose blades. *Orthachne breviseta* Hitchc., which is the species most closely related to this group, also has setose blades. *Orthachne rariflora* (Hook.f.) Hughes (4), on the other hand, differs in having its blades flat or subconvolute with a short transverse ligule.

*Stipa venusta* and *S. Bomani* have their spikelets very similar to *O. rariflora*. This fact confirms the advisability of either abandoning the genus *Orthachne* or else including in it these species here mentioned. Further studies will indicate which is the better course.

The species related to *S. brachychaeta* differ in having their blades convoluted but not setose, with short, transversal ligule, bearing lateral hairs. The tuft is more vigorous and the lemma larger.

### Key to the Species.

- A. Awn 2 or more times as long as its lemma, exceeding 1 cm in length and generally persistent. Glumes unequal, the lower one smaller than the upper, obtuse or acute.
  1. A capillary, 4 to 6 cm long, delicately curved. Lemma about 3 mm.
    - a. Lemma glabrous . . . . . 1. *S. venusta*
    - b. Lemma pilose . . . . . 2. *S. Bomani*
  2. Awn stiff, less than 2 cm. Lemma with glabrous dorsum; the callus and the apex somewhat pilose.
    - a. Lemma fusiform from 2.5 to 2.8 mm long with awn 1 cm long. Glumes obtuse, almost equal, from 2.5 to 3 mm long . . . . . 3. *S. obtusa*

- b. Lemma linear-fusiform, from 3.5 to 4 mm long, with awn 1.2 to 1.7 cm long. Glumes subacute, the lower one 4 mm, the upper one 4.5 to 5 mm long . . . . . 4. *S. rigidiseta*
- B. Awn equal to or smaller than its lemma, usually less than 5 mm long; glumes almost equal. Lemma pilose 3 to 4 mm long.
1. Awn mucronate, persistent, 0.5 to 1.5 mm long. Lemma 3 to 3.5 mm long . . . . . 5. *S. saltensis*
2. Awn capillary, very deciduous, somewhat smaller than its lemma. Lemma 4 mm long. . . . . 6. *S. Henrardiana*

1. *Stipa venusta* Phil. — R. A. Philippi, An. Mus. Nac. Chile, Bot. 8: 81, 1891. "De Socaire allata." The *type*, collected by F. Philippi, was examined in the Mus. Nac. Santiago, Chile.

N o m . v e r n . : Vizcachera.

Plant perennial with flowering culms 25 to 30 cm high; panicles emerging perfectly from the foliar tips; prophyllum long with 2-awned apex. Sheaths glabrous and shining, wider than the blades; ligules membranaceous, oblong, 3 to 4 mm long; blades convolute, setose, golden, glabrous, 10 to 15 cm long and 0.3—0.4 mm in diameter. Panicles linear, interrupted, 12 to 18 cm long, formed by short branches borne in distant nodes. Spikelets erect, intensely violet. Glumes scarious, stiff, 3-nerved, glabrous and smooth with the apex more or less acute, the lower one 3.5 mm, the upper one 4 mm long. Anthoecium fusiform, glabrous, tapering towards the ends, sparsely ciliate at the insertion of the awn, 3 mm long and 0.5 mm in diameter; callus less than 0.5 mm with a few little short hairs; awns capillary, curved, glabrate, 5 to 6 cm long. Palea lanceolate, navicular, glabrous, as long as the lemma. Stamens with glabrate anthers, 1—1.2 mm long.

D i s t r i b u t i o n : Atacama Desert in the North of Chile.

C h i l e : Tarapacá, Socaire, leg. *F. Philippi*, II-1885 (*Typus*).

O b s . — This species and *S. Bomani* are closely allied and are characterised by unequal glumes with apex not very acute and by very long awn, not geniculate and slender as a hair.

2. *Stipa Bomani* Hauman — L. Hauman, An. Mus. Nac. Hist. Nat. B. Aires, 29: 397, fig. 1, 1917. "Territoire des Andes: Susques, à environ 3700 m d'altitude, dans un vallon profond (cañon), leg. E. Boman, juillet 1903." *Typus* in Herb. Mus. Nac. Hist. Nat. B. Aires.

N o m . v e r n . : Vizcachera.

This species is closely allied to *S. venusta* from which it differs by the lemma being pubescent. The general aspect of the plant is similar in both species. Stamens 3 with glabrous anthers 1 mm long.

D i s t r i b u t i o n : This species inhabits the hills and high valleys at more than 3500 m above sea level in the southwestern portion of the Argentine province of Jujuy, department of Susques.

A r g e n t i n e : Jujuy, Department Susques, Quebrada de Tocomar, 4200 m s. m. leg. *A. L. Cabrera* no. 8295, I-1944. — Susques, quebrada al pié del Tuzgle, 4400 m s. m. leg. *A. L. Cabrera* no. 8403, II-1944. — Susques, leg. *A. Castellanos*, III-1927 (Herb. Mus. Nac. B. Aires, no. 27/769).

O b s . — This plant, known by the vernacular name of "vizcachera" is feared by the mountain guides (arrieros) of the Puna of Jujuy owing to its toxicity for horses (cf. Boman, loc. cit. sub. nom. *S. hystricina*).

3. *Stipa obtusa* (Nees et Mey.) Hitchc. — A. S. Hitchcock, Contr. U. S. Nat. Herb. 24: 284, 1925.

*Piptatherum obtusum* Nees et Meyen, Nov. Act. Caes. Leop. Carol. 19, Suppl. 1: 18, 1841 (separata); 150, 1843. The type, collected by Meyen at Arequipa, was examined in the Berlin-Dahlem Herbarium.

*Urachne obtusa* Trin. et Rupr., Spec. Gram. Stipac. Act. Acad. Imp. Sc. Petrop. ser. 6, 5: 22, 1842.

*Helopus obtusus* Steudel, Nom. Bot. ed. 2, 1: 747, 1840.

*Stipa boliviensis* Hackel in Fedde, Repert. Nov. spec. 11: 21, 1912. "Bolivia, in planitie alta prope La Paz (alt. 4100 m), mart. 1910, leg. Dr O. Buchtien no. 2489." An isotype was examined in the U. S. Nat. Herbarium, Washington.

*Oryzopsis Neesii* Pilger in Engler, Bot. Jahrb. 56 (2), Beibl. 123: 26, 1920. Based on *Piptatherum obtusum* Nees et Mey., non *Oryzopsis obtusa* Stapf.

*Stipa jujuyensis* Spegazzini, Rev. Arg. Bot. 1 (1): 39, 1925. "En las quebradas de las altas mesetas de la Puna de Jujuy, en 1906, leg. Dr M. Tezano Pinto." The type was examined in the Herbarium Spegazzini in the National Museum of La Plata.

Plant perennial, caespitose, dense; leaves with ligules 3 to 7 mm long and blades setose, retroscabrous, stiff, up to 25 cm long. Panicle narrow, somewhat interrupted, 8 to 15 cm long, the branches appressed, short and stiff with pedicels intensely violet. Glumes papery, obtuse, glabrous, dark-purplish, 2.5—3 mm long. Anthoecium fusiform, glabrous for the most part, pilose toward summit, 2.5—2.8 mm long, hardly covered by the glumes; callus obtuse, and pubescent; awn straight or slightly wavy, 8—10 mm long. Palea lanceolate-oblong, slightly convex, 2-nerved, papery, glabrous, as long as the lemma. Stamens 3 with anthers glabrous 1 mm long.

Distribution: This species inhabits the grassy slopes from southern Perú (Cuzco and Arequipa) and Bolivia to the Jujuy Plateau in the North of Argentine.

Perú: Cuzco, Prov. Calca, Chahuactiri, 3900 m s.m., leg. C. Vargas no. 6003, IV-1946. — Arequipa, leg. Meyen, Sept. 1831 (*Typus*). — Perú austral, Weddell no. 4488, II/IV-1847 (Paris).

Bolivia: La Paz, leg. O. Buchtien 2489, III-1910. — Palca, Hacienda Huanca-pampa, leg. O. Buchtien no. 2539, IV-1910. — Cochabamba, Tunari, leg. Steinbach no. 9786.

Argentina: Jujuy, Puna de Atacama, leg. M. de Tezano Pinto en 1906 (Herb. Spegazzini no. 2416).

Obs. — Species closely allied to *S. rigidisetata* from which it differs by the smaller and obtuse glumes and the shorter anthoecium.

4. *Stipa rigidisetata* (Pilger) Hitchc. — A. S. Hitchcock, U. S. Nat. Herb. 24 (7): 285, 1925.

*Oryzopsis rigidisetata* Pilger in Engler, Bot. Jahrb. 56 (2), Beibl. 123: 26, 1920. "Perú: Depart. Puno, Azangaro; felsige Matten bei 4000 m u. M. (Weberbauer no. 475. — Februar 1902)." The type was examined in the Berlin-Dahlem Herbarium.

*Stipa peruviana* Hitchcock, Contr. U. S. Nat. Herb. 24 (7): 285, 1925. "Perú, Lechler no. 1735 (U. S. Nat. Herb. no. 1163387)." An isotype was

examined in the Paris Herbarium. The specimen, W. Lechler, plant. peruv. no. 1735, from Azangaro in asper. lapid. Jan. 1854, is marked *Stipa Lechleriana* Steud.

*Stipa Lechleriana* Steudel, Lechler, Berb. Amer. Austr. 56, 1857. Nom. nud. (Lechler no. 1735).

Plant perennial, caespitose, up to 50 cm high. Sheaths glabrous; ligule membranaceous from 5 to 10 mm long; blades setose, stiff, subpungent, retroscabrous, 10 to 20 cm long. Panicle contracted, linear, interrupted, 10 to 15 cm long. Spikelets lanceolate, erect, straw-violet coloured, 4.5 mm long with a stiff and pubescent pedicel. Glumes lanceolate, scarious, rigid, acute and glabrous; the lower one up to 4 mm, the upper one 4.5 to 5 mm long. Anthoecium fusiform, 3.5 to 4 mm with glabrous dorsum, straw coloured with short cilia at the end where the awn emerges, without differentiated corona; callus acute and pubescent; margins of the lemma ciliate not overlapping and exposing the dorsum of the palea; awn curved or almost straight, 12 to 17 mm long, finely ciliate at the base. Palea lanceolate, navicular, glabrous, as long as the lemma. Stamens 3 with anthers 1 mm long not pilose tipped.

**Distribution:** Departamento de Puno in the South of Peru.

Perú: Departamento de Puno, Azangaro, *Lechler no. 1735*, Jan. 1854 (Paris). — Azangaro, 4000 m. s. m.; *Weberbauer no. 475*, II-1902 (Berlin-Dahlem).

**Obs.** — The synonymy of *Oryzopsis rigidisetata* Pilger and *S. peruviana* Hieron. is quite clear, the two type specimens come from the same locality, Azangaro, and are exactly alike.

5. *Stipa saltensis* O. Kuntze — O. Kuntze, Rev. Gen. Plant. 3 (2): 372, 1898. "Argentina: Alrededores del Nevado del Castillo, Prov. Salta (73 Lorentz et Hieronymus)". An isotype was examined in the Herbarium of the Univ. Córdoba. — C. Spegazzini, *Stipae platenses*, An. Mus. Nac. Montevideo, 4: 36, 1901.

*Piptochaetium mucronatum* Grisebach, Symb. Flor. Arg. 296, 1879. "Salta: Nevado del Castillo, alt. 10—15,000'."

*Oryzopsis mucronata* (Griseb.) Parodi, Rev. Mus. La Plata (Nueva ser.) Secc. Bot. 6: 306, fig. 3, D, E. 1944.

**Nom. vern.:** Vizcachera, vizcachilla, hierba guanaquera.

Plant perennial, erect, densely caespitose, 15—30 cm high, with the leaves as long as or longer than the panicles. Prophyllum 2-keeled, 2-awned, 3—4 cm long, pubescent in the keels. Sheaths glabrous, striate; ligule oblong, short in the lower leaves and up to 5 mm in the upper ones; blades setose, retroscabrous, often covered by a resinous secretion, up to 20 cm long. Panicle erect, lax, 6—10 cm long by 0.5—1 cm wide; axis and branches pubescent. Spikelets purplish, erect, 5—5.5 mm long. Glumes scarious, papery, glabrous, smooth, lanceolate, 3-nerved, depressed, isomorphic, including the whole fruit. Anthoecium fusiform, grayish brown, pilose, 3 to 3.5 mm long, with the margins of the lemma membranaceous, not overlapping; callus short and glabrous; the end with two very small teeth, between which the very short awn appears; awn mucro-shaped triangular at base, persistent, 0.5 to 1.2 mm long. Palea lanceolate, 2-nerved, flat or subnavicular, glabrous, obtuse, as long as its lemma. Stamens 3 with anthers glabrous 1 mm long. Caryopsis fusiform.

**Distribution:** High mountains and rocky hills of the north of Chile, near the border of Catamarca, and in the Northwest of Argentine.

**Argentine:** Salta, Nevado del Castillo, leg. *Hieronymus et Lorentz*, no. 743, 19—23, III-1873 (Isotype of *S. saltensis* and *P. mucronatum*, in Herb. Univ. Córdoba). Tucuman, El Pelado, Cumbres Calchaquies, leg. *Rodriguez* no. 441, III-1912. — Tafi, Cumbres de San José, 3500 m s.m. leg. *Diaz* no. 9566, III-1933.

**Chile:** Atacama, in itinere a Catamarca in Chile, leg. *Timoteo Martinez* in 1893 (Mus. Santiago).

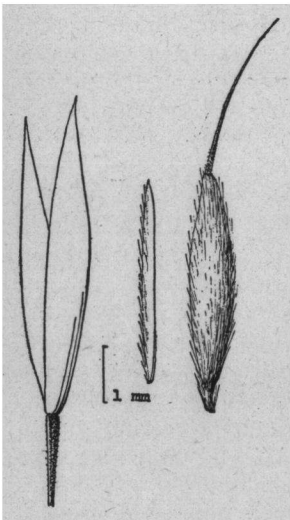
**Obs. I.** — The length of the lemma and the awn is somewhat variable; in the type (Lorentz et Hieron. 743) and in the Diaz n° 9566 specimen, it is fusiform-elongated, 3.5 mm long, with awn 1—1.2 mm, while in the Rodriguez n° 441 specimen, the fruit is 3 mm long and the awn hardly reaches 0.5 mm.

**Obs. II.** — This species is close allied to *Orthachne breviseta*; the anthoecium is alike in both species, the lemma with margins narrowly membranaceous ending in two little teeth between which the awn with a triangular base emerges; in *S. saltensis* the awn is short and visibly articulated with the lemma, while in *Orthachne breviseta* it is 3 to 4 mm long and recurved without an articulation zone. *S. saltensis* has the glumes larger than its fruit, while *O. breviseta* has them slightly smaller than the fruit.

#### 6. *Stipa Henrardiana*, nov. spec.

Perennis dense caespitosa. Culmi erecti 15—20 cm alti, teretes, laevi. Folia 4—5 in basi culmi aggregata. Vaginae teretes, arctae, laeves; ligula membranacea, elongata, usque ad 7 mm longa; lamina setaceo-convoluta sensim subulato-acuminata, erecta, rigida, 5—10 cm longa 0.3—0.5 mm diam. Panicula linearis, erecta, 3—5 cm longa, subcontracta, ramis binis suberectis, scabro-puberulis, basi nudis, inferioribus 2—3-spiculatis, reliquis 1—2-spiculatis. Spiculae lanceolatae, 1-florae, 5.5 mm longae, fusco-violaceae erectae. Glumae subaequales, acutae, rigido-membranaceae, 3-nerves laeves, I — 5.5 mm longa, II mucronata paululo brevior. Lemma chartacea fusiformis pilosa, 4 mm longa, apicem leviter constricta haud coronulam distinctam exhibens; callo 0.5 mm longo piloso. Palea oblongo, ecarinata, bene evoluta, pilosa, lemma sua aequans. Arista caducissima tenuissima, 3—3.5 mm longa. Antherae 3, 1.5—2 mm longae, glabrae.

**Argentina:** Jujuy, Dept. Susques, Cerro Tuzgle, 4900 m s.m. Coll. *A. L. Cabrera* no. 9105, 13-II-1946. *Typus speciei* in Herb. L. B. Parodi et Mus. Nac. La Plata.



*Stipa Henrardiana*. — spikelet, anthoecium and palea.  $\times 7.5$ . (*Typus* = *Cabrera* no. 9105).

Plant perennial, densely caespitose with a short and oblique rhizome. Culms erect, 15 to 20 cm high with 3 or 4 basal nodes very close together and enclosed in their respective foliar sheaths. Innovations with a large prophyllum in their axillary base 3 to 4 cm long, 2-awned, finely pubescent on the keels. Sheaths glabrous and shiny. Ligule membranaceous,

acuminate, up to 7 mm long. Blades slender and wiry closely involute, 0.3—0.4 mm in diameter by 5 to 10 cm long with a pungent apex. Floriferous culms erect, hardly longer than the foliar ends. Panicle linear, erect, 3 to 5 cm long, few-flowered with 8 to 15 spikelets; axis filiform, stiff and striate, finely pubescent; basal branches paired with 1 to 3 spikelets. Spikelets violet or brown coloured, erect, often covered with a resinous secretion, 5.5 mm long; pedicels filiform subtriangular, dark-brown and finely pubescent. Glumes lanceolate, acute, smooth, scarious, stiff, 3-nerved, with the dorsum rounded, entirely enclosing the fruit; the first 5.5 mm, the second hardly smaller with a mucronate apex. Anthoecium fusiform, pilose, greyish, smaller than the glumes; lemma 4 mm long tapering toward the end, papery, densely pilose, hairs whitish 1 to 1.5 mm long; marginal borders not overlapping; callus acute, 0.5 mm, scantily pubescent; awn capillary, arched, very deciduous, 3 to 3.5 mm long, glabrous except in the base where it is hardly pubescent. Palea lanceolate, navicular, 2-nerved, as long as the lemma, with the dorsum rounded and pilose. Stamens 3 with anthers glabrous, 1.5—2 mm long. Gynoecium fusiform.

**Distribution:** Inhabits the high andean mountains in the southwestern province of Jujuy (Susques) approximately 5000 m above sea level.

**Obs.** — Its appearance is similar to *S. saltensis* from which it differs by slightly stiffer blades and by the longer, slender and extremely deciduous awn; for that reason it is difficult to find mature fruits with awn attached.

I name this species in honour of Dr J. Th. Henrard, author of numerous and important papers on South-American grasses.

## SUMMARY.

A taxonomic study of the 6 species of *Stipa* that inhabit desert regions of the Puna de Atacama (*S. Bomani* Haum., *S. venusta* Phil., *S. obtusa* [Nees et Mey.] Hitchc., *S. rigidiseta* [Pilg.] Hitchc., *S. saltensis* O. Kuntze, and the new species *S. Henrardiana*) indicates that they constitute a natural group which I designate *Obtusae*, using as type the species *S. obtusa* which is the one with priority. The group is characterised by setose leaves, with ligules 3 to 10 mm long, by glumes that are scarious, smooth, depressed and usually unequal, by the fusiform anthoecium with the palea as long as the lemma and by glabrous anthers. These characters reveal a close relationship with *Orthachne* Nees and *Oryzopsis* Michx. More detailed studies are necessary to decide the generic relationships.

Some of the species studied (*S. Bomani* and *S. saltensis*) contain cyanoglucosides in their vegetative organs and consequently are feared by the inhabitants of the Puna as being toxic to livestock.

### References.

- (1) E. BOMAN, Dos Stipa de la America del Sud que desarrollan ácido cianhidrico. Spanish translation by S. Lanfranco, Rev. Fac. Nac. de Agronomía y Veterinaria, 2da Epoca-Año 1 (3—4): 83—89. La Plata. The original work appeared in Bull. Mus. d'Hist. Nat. Paris, 1905, nº 5, pag. 338. The author makes an extensive study of the toxicity of *S. leptostachya* Gr. and *S. hystrioides*, the latter being an erroneous determination of *S. Bomanii*.
- (2) Cf. JOHNSON, L., The Botan. Gazette, 107 (1): 1—32, 1945.
- (3) In STEUDEL, Synops. Plant. Gram., 121, 1854.
- (4) Kew Bull. Misc. Inf. 1923: 301, 1923.