

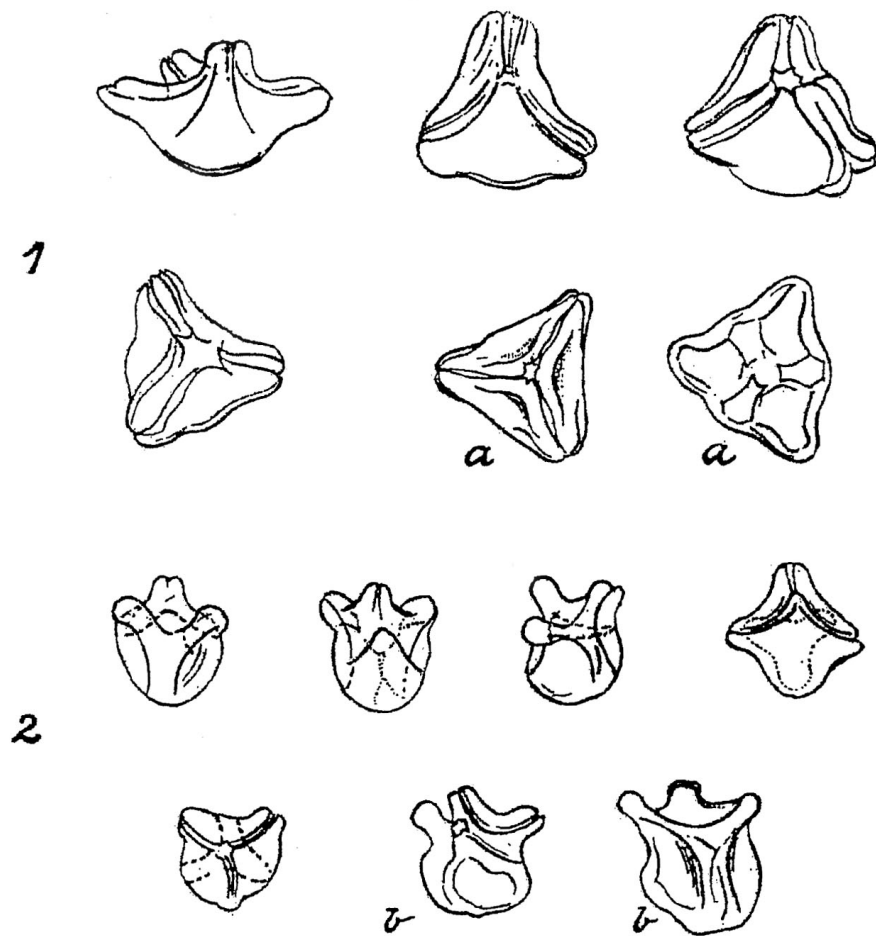
NOTES ON THE GENUS *ARJONA* (*)

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Among the plants collected by Dr. E. Ljungner during his trip to Lake Nahuel Huapi in 1933 and 34 is an *Arjona* that in my opinion cannot be separated from *A. longifolia* R. A. Philippi, discovered near San Rafael in Mendoza and described in the Anal. University of Chile, Volume 21 (1862), pg. 405 and in Linnaea, Volume 33 (1864-1965), pg. 232. Grisebach, Symb. ad Floram. Argent. (1879), pg. 150, gives a more detailed description, and his samples come from Catamarca (Schickendantz, as stated page. 1). Both indicate that the leaves are 10 to 16 lin. long, 1 lin. wide, ovate bracts, 3 lin. long. According to Philippi the perigone tube is two times longer than the bract, i.e. 6 lin., 6-9 by Grisebach. In addition Philippi notes that the apex of the stem is glabrous and hairy (otherwise, stem and leaves are glabrous, bracts and flowers silky), the internodes between the main leaf and the first bract measured 1 1/2 to 2 cm. In several quoted works *A. longifolia* of the Argentine side of the Cordillera, we now know of Catamarca, La Rioja, San Juan, Mendoza, Río Negro (near the boundary between R. N. and Neuquén, Ljungner) and Chubut, always pre-Andean and sub-Andean terrain. The northernmost place seems to be Catamarca, Quebrada Granadillas, then Sierra Velasco ($\pm 29^\circ$), the southernmost Rio Carrenleufú ($\pm 43^\circ 40'$). Hauman and Irigoyen, Catalogue des Phanérogames de l'Argentine, indicate the area of *A. longiflora* "La Rioja Mendoza couple jusqu'au Chubut". (Anal. Museum of Nat Hist, Nat Buenos Aires, t. XXXII, 1923, pg. 42).

(1) Read in session 120, April 28, 1940.



Pollen grains of *Arjona longifolia*:

1. From the microstylar form - 2. From the macrostylar form. In a and b a grain of each form with high and low focus. (1/12 Immerse. a, Zeichenokul. b, Leitz).

I regret not having seen the original sample of Philippi: I have examined two samples from Catamarca, Quebrada Granadillas, Schickendantz n. 253 and 291 (Herb. Berlin) and two of La Rioja, Sierra Velasco, Cuesta de la Punta de Piedra, Hieronymus n. 94, Herb. Berlin and Uppsala). When I published my little study “Zur Morphologie und Systematik der Gattung *Arjona* Cav.” (Svensk Botanisk Tidskrift 10, 1916) I had not seen but one incomplete specimen collected by Hieronymus (Herb. Uppsala). [It was] missing the subterranean parts. For the general similarity to “*Arjona brasiliensis*” K. Schum. (Name unpublished, Herb. Berlin, later described by R. Pilger, Notizblatt des Botan. Gartens und Museums zu Berlin-Dahlem X. 1930, p. 1029) I did the type of the new section *Xylarjona*, I had referred *A. longifolia* to this section, but Hieronymus’ plant n. 94 in the herb. Berlin showed that it does not belong to *Xylarjona* but has exactly the characteristics of a *Euarjona*. Another species of *Xylarjona* was described by Malme in Arkiv für Botanik t. 22 (1928) under the name of *A. megapotamica* (Rio Grande do Sul). It is closely related to *A. Schumanniana* Pilger and perhaps identical to it.

The all too brief description of Philippi can be completed with the help of samples of Catamarca and La Rioja already mentioned.

Rhizome mostly creeping, short and equally thickened throughout its length (as in *A. patagonica*, but less thick). Aerial stems to 40 cm. Tall, profusely branched from the base, branches simple, elongated and floriferous (some do not quite seem to develop flowers). At the top there are sometimes some sterile axillary branches. Leaves linear with a margin tightly revolute, slightly rough, but sharply acute, 25-30 mm. long, 1.5 - 2 mm. wide, trinerved (as indicated by Grisebach), glabrous, the ones above as well as the ones on the part of the stem below the inflorescence with long hairs and sparse; the samples of Hieronymus differ by their axillary branches bearing more numerous and more narrow leaves, 1-1.5 mm. In the same sample (Herb. Uppsala) leaves were observed that did not reach 20 mm. and other up to 27 x 1.7 mm. Bracts ovate, cuspidate, 6-7.5 mm. long and 3.5-4 mm. wide, firm, nerved, very woolly on the outside. Ovary 1.7-2 x 1.5-1.8 mm., glabrous. Perigone silky outside, the tube 12-14 mm. long and 0.8-1.8 mm. wide, the divisions 4.5-5.5 x 2.3-2.4 mm. (in the sample from Uppsala flowers are smaller). Anthers 1.7-2 x 0.5-0.6 mm., in

the macrostylar form located in the tube and barely reaching the base of the divisions of perigone, in the microstylar form conglomerated in the throat; the pollen grains 24-27 x 22-27 μ (f. macrostyl.) and 30-33 (36) x 36-48 (51) μ (f. microstyl.). Style in the macrostylar form longer than the tube, \pm 13 mm., slightly surpassing the anthers, in the other form even with the stigma, placed 1-3 mm. below the anthers.

Dr. Ljungner found his samples on the banks of the Peninsula Llaollao, Lake Nahuel Huapi, 5-XII (No. 524) and 27-XII (No. 580), 1933, 770 m above sea level. The filiform creeping rhizome measuring to over 40 cm.; the stem is simple, without basal branches but with sterile branchlets above. Leaves up to 18 mm. (n. 580) or 22.5 mm. (n. 524), 1.5-2 mm. wide, in the dry state distinctly 3-nerved, toward the base 5-nerved (2 very short lateral veins), the margin towards the apex, tightly curled, coarse. Bracts 8-8.5 x 5 mm., very shortly mucronate, less rigid and with weaker nerves and few hairs; bracteoles 6 x 2.5 mm. In one case there is an elongated internodes (1.5 cm.) below the spike. According to Philippi the naked apex reaches 5 cm.; but often there is no region devoid of leaves, so this character is worthless. All samples of Ljungner belong to the short-style form. Perigone tube 14-15 mm., diameter 1-1.8 mm., the divisions, 4.5-5.5 x 2-2.5 mm., anthers 2.2-2.6 x 0.5-0.6 mm., style 10-10.3 mm., stigma located 2.5-3 mm. below the base of the anthers. Pollen grains 30-36 x 36-48 μ , but prepared according to the Erdtman method a bit too small, 27-30 x 30-42 μ .

The plant of Ljungner agrees very well with those of La Rioja and Catamarca cited above, and also with the description of Philippi. Hosseus (Bol. de la Acad. Nac. de Ciencias, Córdoba XXVI, page 31) has illustrated a sample of the same species more branched than any I've seen and quite short leaves (assuming that figure is being reproduced at 3/4 natural size and did not exceed 15 mm.; the author did not specify the reduction.) The place where the Ljungner samples grew is located in the rainy, forested region, while in general *Arjona* species are plants of dry and open places in the mountains and the Andean pampas; only *A. pusilla* grows in moist soil on the banks of lagoons, etc. Peninsula Llaollao *missing text*.....

evergreen. The annual rainfall in Puerto Nuevo measured $\pm 1,700$ mm. as I write Dr. Ljungner.

Notes on the synonymy of some species

My small study in 1916 on *Arjona*, where I listed the species then known, was not known by Hauman and Irigoyen. So I want to repeat here some observations.

A. andina Phil. (Cordillera de Coquimbo, San Fernando and Linares, Mendoza) is identical with *A. ruscifolia* Poepp. With this also belongs *A. rigida* Miers. The author gives an illustrated description of the latter and also describes *A. ruscifolia* he regards as a distinct species, but the descriptions do not offer one noteworthy difference (Journ. Linn. Soc. Botany XVII. 1880). Hauman and Irigoyen cited *andina* and *rigida* of Mendoza. Hosseus refers to a plant in San Juan *A. rigida* (collected by F. Kurtz and named *A. andina*). According Hosseus it is different from the type of *A. andina*, and in my opinion both are forms of *A. ruscifolia*.

As I have shown, *A. patagonica* Hombr. et Jacq. is a very good species and its identification as *A. tuberosa* Cav., being glabrous, is inadmissible. Not knowing the reasons given by me, Hauman and Irigoyen say it is but a variety of *A. tuberosa*.

A. tandilensis O. K., reduced by Hauman and Irigoyen to a simple variety of *A. patagonica* by Spegazzini, an opinion adopted by them, has nothing to do with *patagonirosa*; Is provided with round tubers as also with *A. tuberosa*; its affinity is with it, thus I cannot reunite them. I considered good material Tandil, Cordoba and the Patagonian pampas.

Heterostyly in the genus *Arjona*

In a small study, "Ett fall af couple heterostyli i Parogoniens flora" (Botaniska Notiser. 1915, summary in German) described heterostyly in *Cruckshanksia* and *Arjona*. As is known, this phenomenon is quite common in Rubiaceae, while we knew of no case among Santalaceae. *Arjona* has the same differences that we know from the classic example in *Primula*, in the length of the style, stigma size and the papillae of the same, and in pollen grains. When I posted this

news I had forgotten A. Schulz (Beitrage zur Kenntnis der Bestäubungseinrichtungen Geschlechtsverteilung und bei den Pflanzen II. Bibliotheca Botanica 17, 1890, pg. 161) who indicated as the heterostylous Santalaceae plant *Thesium intermedium* Schrad. (= *Th. linophyllum* L.). However, the difference between the two forms is very small and perhaps not enough to talk about a true dimorphism. It is true that certain flowers like that measured 1.4-1.8 mm., in others only 1.0-1.2 mm., but there is also an intermediate type where the anthers are located at the level of the stigma. Among the stigmas some have no notable difference: 0.27 to 0.38 and 0.27 to 0.35 mm. in length, respectively, and although usually measured from 0.33 to 0.35 in the first case and 0.30 to 0.32 in the second, it takes a willingness to distinguish between two different forms, more so because the papillae are the same as well as the pollen grains. In *Arjona* not only does one notice a difference between the styles reaching 3 to 4 mm., but the stigma and style papillae length are 1 1/2 to 2 times longer than the short style. The pollen grains show a difference corresponding to the size of the papilla, and the form is also somewhat different. The grain structure is quite complicated and should be examined in fresh material. The figures may serve instead of a detailed description.

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