

BEAT ERNST LEUENBERGER

Opuntia paraguayensis* (Cactaceae) reassessed*Abstract**

Leuenberger, B. E.: *Opuntia paraguayensis* (Cactaceae) reassessed. – Willdenowia 31: 181-187. 2001. – ISSN 0511-9618.

The confusing history of the name *Opuntia paraguayensis* is described. A closer examination of the protologue as compared to the use of the name in literature revealed that it has been misapplied to *O. elata* and *O. cardiosperma*. The type specimen of *O. paraguayensis* was presumably destroyed in Berlin, in 1943. Another specimen under this name in the spirit collection at Berlin-Dahlem, collected by Hassler, is undoubtedly *O. ficus-indica*. It is designated as the neotype of *O. paraguayensis*.

Past use of the name

Opuntia paraguayensis (Schumann 1899a) from Paraguay is a name in *Cactaceae* that has never been critically assessed. Britton & Rose (1919) mentioned it in passing under *O. bonaerensis* Speg., noting that, if the two were synonyms, *O. paraguayensis* would supplant *O. bonaerensis*. The latter species was described from Tandil and the sierras of Curamalál and Tornquist in the Province of Buenos Aires, Argentina, some 1500 km south of Paraguay (Spegazzini 1901). Spegazzini (1925) held “*O. paraguayensis* K. Schum. (1903)” to be surely the same as his *Opuntia bonaerensis*.

Berger (1929) mentioned *Opuntia paraguayensis*, in small print only, under *O. delaetiana* (F. A. C. Weber) Vaupel, and next to the related species *O. mieckleyi* K. Schum. and *O. elata* Salm-Dyck. The latter name was attributed by Schumann (1898: 748, as “name only”) and by Berger (1929) to Link & Otto (Anonymous 1830: 434), but was formally published by Salm-Dyck (1834). Berger ignored *O. bonaerensis*, and he did not state if his classification was (as seems probable) based on literature only, or on specimens seen.

Castellanos (1957) noted that *O. paraguayensis* and *O. bonaerensis* belong to the same species without clear precedence for either, merely listing them as “*O. paraguayensis* = *O. bonaerensis*”.

Backeberg (1958: 401, 402, fig. 410) maintained the same species concept but recognized the priority of *Opuntia paraguayensis*. He illustrated under this name a plant without stated origin. This plant is similar to “*Opuntia elata* Link & Otto” and *O. canterae* Arech. in habit, stem characters and spination as illustrated by him, and it also agrees well with Spegazzini’s illustration of *O. bonaerensis*, stated to be “of the type” (Spegazzini 1925: 126). Backeberg’s illustrations all belong to *O. elata* (Leuenberger, submitted).

No authentic or otherwise relevant herbarium material of *Opuntia paraguayensis* appears to have been cited or mentioned in publications between 1900 and 1943 (when the type specimen in Berlin was destroyed). Apparently, after Schumann no author working on *Cactaceae* has ever seen the original material. Friedrich Ritter, who was well acquainted with the German cactus literature, did not mention *O. paraguayensis* and *O. bonaerensis*, or *O. chakensis*, for either Paraguay or for Argentina (Ritter 1979, 1980, 1981, see also Egli & al. 1996: 491). According to his treatment, Ritter (1979) apparently used the incorrect name *Platyopuntia cardiosperma* for plants identified by other authors as *O. paraguayensis* or *O. chakensis*. The plant from W Paraguay (*Arenas 1563*) described and illustrated by Arenas (1981: 261, 263, fig. 50B) as *O. paraguayensis* is *O. cardiosperma* K. Schum.

Esser (1982) mentioned *Opuntia paraguayensis* three times but provided no illustration. His two cited collection numbers (*Esser 14698, 14953*) could not be located, nor are living plants with these numbers extant in the Heidelberg Botanical Garden, where Esser specimens were accessioned (M. Sonnberger, pers. comm.).

Telford (1984: 69) used the name *Opuntia paraguayensis*, with “type unknown”, in the Flora of Australia for plants with orange flowers and stem segments normally without spines, or rarely with one spine of up to 4 cm on a few areoles. Plants naturalized in southern and southeastern Australia (New South Wales, Victoria and South Australia) were reported under this name by Swinbourne (1986: 335), Harden (1990: 204), Stajsic & Carr (1996: 126) and Forster (1996: 59). Hosking & al. (1988) noted that no records exist of the introduction of plants identified as *O. paraguayensis* and that the name was not mentioned in the early Commonwealth Prickly Pear Board bulletins. Neither *O. paraguayensis* nor the other species mentioned above are listed in Schumann (1899b) and Mann (1970). Some specimens from Australia filed at CBG and MEL as “*O. paraguayensis*” have been provisionally identified as *O. elata* and *O. cardiosperma* (Leuenberger, submitted).

Lambert (1998) illustrated *Opuntia paraguayensis* with a photograph of a plant from Catamarca showing orange flowers and long spines on older stem segments, features pointing to *O. elata*. Navarro (1996) listed *O. paraguayensis* for Bolivia, with *O. chakensis*, *Platyopuntia interjecta* and *P. pyrhantha* in synonymy. Hunt (1999) treated *O. paraguayensis* as a provisionally accepted name for plants from Paraguay, Uruguay and Argentina, with *O. bonaerensis* as synonym. Kiesling (1999) listed *O. paraguayensis* for Argentina, Paraguay and Brazil, with *O. bonaerensis* as synonym.

Herbarium material under the name *Opuntia paraguayensis* is scarce. No such specimens were located at BA, CTES, G, SI, US, W, Z and ZSS, and only one to a few specimens at each B, BAA, C and K (herbarium acronyms according to Holmgren & al. 1990). Several specimens listed in the TROPICOS database under *O. paraguayensis* (with duplicates located in December 2000 at AS and SI under *Opuntia* sp.) belong to *O. cardiosperma* as circumscribed and illustrated elsewhere (Leuenberger 2001).

The protologue

The protologue of *Opuntia paraguayensis* has never been critically analysed. The brief Latin diagnosis and the German description by Schumann (1899a: 149) are translated here in full: “Shrubby, erect, branched, stem segments obovate-oblong, obtuse, with narrowed base; spines none; flowers yellow, large. // The growth is shrubby, erect. The stem segments at hand are

19-21 cm long and in the upper third 8-8.5 cm broad; they are obovate-oblong, with obtuse apex and narrowed at the base. Probably in the dark room they have formed narrow, almost cylindrical shoots; these bear small, 2-3 mm long, subulate, acuminate leaves. The areoles are elliptic, 4-5 mm long, in juvenile stage they are circular with yellowish, somewhat curly indument, from which short yellowish glochids emerge; at an older stage they become naked. // The flowers are in lateral position; the overall length of the perianth is 4 cm. The perianth has 8 cm maximum diameter. Outer perianth segments ovate, in their axils there is brown felt, and from this numerous, yellow glochids emerge. The inner ones are spatulate, obtuse. The stamens reach the middle of the former.”

From the description it is not clear whether Schumann himself observed the flower characters. He explicitly mentions only the stem segments as being available for study. This might explain the scanty description of the flower and lack of diagnostically important receptacle characters. The description is hard to correlate with any particular known species. The mention of etiolated growth of stem segments may mean that Schumann had live material from Hassler, or that the material was dried very slowly, with etiolation occurring in the plant press.

Opuntia paraguayensis was described as a spineless plant with large obovate-oblong stem segments, spineless areoles and large yellow flowers with yellow glochids on the receptacle rim. This description does not fit any of the plants to which the name has subsequently been applied. It rather suggests a spineless form of *O. ficus-indica* (L.) Mill. (agreeing in the large yellow flowers with yellow glochids). Stem segment size varies greatly in *O. ficus-indica*, and the small dimensions given in the description do not preclude such an identity. Based on its vegetative characters, *O. elata* Salm-Dyck might also be considered, but this species normally produces strong spines on some segments and has neither yellow flowers nor yellow glochids. The small size (2-3 mm) of the leaves fits *O. elata* better than *O. ficus-indica*, where the leaves, both in normal segments and particularly in etiolated growth, attain 2-10 mm in length. The size of the areoles is rather large for *O. ficus-indica*. The yellow-flowered *O. stenarthra* K. Schum. can be excluded by its smaller flowers and differing habit. One cannot rule out the possibility that the description of *O. paraguayensis* was based on a mixture of material.

Schumann (1899a, 1903) placed *Opuntia paraguayensis* in *O. ser. Inarmatae* K. Schum., not in *O. ser. Armatae* K. Schum. alongside his other simultaneously described new taxa from Paraguay, *O. cardiosperma*, *O. assumptionis* and *O. stenarthra*. The latter species were based on liquid-preserved material received from Anisits (Schumann 1899a: 132, 133) and the type is still extant at Berlin-Dahlem (Leuenberger (1978, 1979). In the same paper, Schumann noted that he had received Hassler specimens collected between 1885 and 1896 from Chodat in Geneva “zur Bearbeitung”, i.e., for study. Unfortunately, no details about the nature of the material were given.

The original description of *Opuntia paraguayensis* was repeated textually by Schumann (1903: 160) under “*Opuntia paraguayensis* K. Sch. n. sp.” with the same specimen citation. Chodat & Hassler (1903: 248), in an annotated list of herbarium material collected by Hassler and identified by Schumann, inexplicably cited a different collection number. The entry reads “*O. paraguayensis* K. Sch., caulis erectus articulatus, aculei robustiores 0, flores flavi cerini, in rudis pr. Escobar, Sept., n. 450”. In a footnote Chodat & Hassler (1903: 246) referred to the original place of publication (Schumann 1899a). The specimen *Hassler 450* could not be located at either Berlin or Geneva, and if it were, it would not qualify as type. According to L. Ramella (pers. comm.), who kindly searched for *Hassler 450* and *1150* in the herbarium at Geneva (G) and in unpublished lists (dated 1937, 1940, and 1942) of Hassler collections, *Hassler 1150* is always listed as *O. paraguayensis*, whereas the specimen *Hassler 450* appears under various designations: *O. argentina*, *O. paraguayensis?* and (with the same number but a different locality), *Miconia calvescens* (*Melastomataceae*), also mentioned by Chodat & Hassler (1904: 1278). Thus, the cactaceous “*Hassler 450*” may be an artefact resulting from a slip of the pen (*450* instead of *1150*). Dams (1903), a translation of Chodat and Hassler’s (1903) *Cactaceae* report,

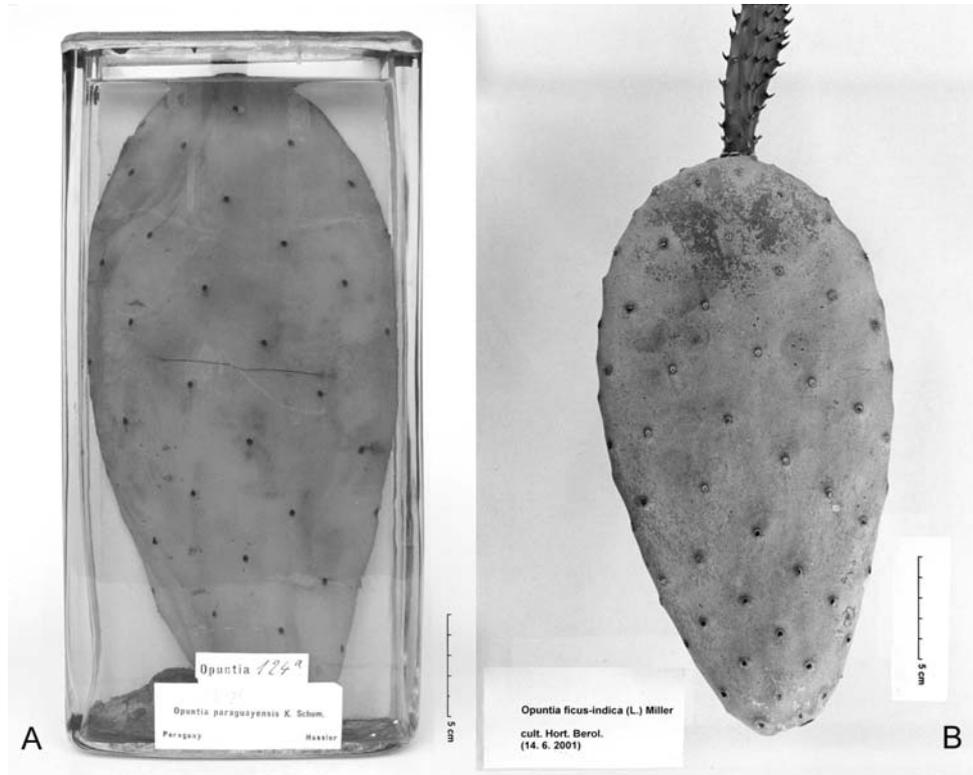


Fig. 1. A: Neotype specimen of *Opuntia paraguayensis* K. Schum., Paraguay, Hassler (B alc); B: stem segment of *O. ficus-indica* (L.) Mill., cultivated at Berlin-Dahlem (055-04-74-80).

with complementary observations by Hassler, mentions *O. paraguayensis* and its occurrence on “arid Campos” but does not detail individual collections.

The type

The only original element for *Opuntia paraguayensis*, and therefore the holotype, is the specimen cited in the protologue (Schumann 1899a: 149): “Paraguay: Escoban, Hassler 1150”. It was presumably destroyed in 1943 at Berlin-Dahlem. There is no duplicate in Geneva (Eggl 1987, Leuenberger 1978, 1979, Ramella, pers. comm.). The correct spelling of the locality is Escobar, as cited by Chodat & Hassler (1903), a place situated at 25°39'00"S, 57°01'00"W, in the Departamento Paraguari in central Paraguay, not far to the southeast of Asunción.

Taking into account the scanty description and the loss of the type of *Opuntia paraguayensis*, the presence of other, hitherto unnoticed Hassler material in the spirit collection at Berlin-Dahlem (B) is significant. The jar number 1408 [a rectangular glass jar of the kind formerly used in the display collection] bears a printed label “*O. paraguayensis* K. Schum., Paraguay, Hassler”, and a separate printed label “*Opuntia*” with the handwritten addition of the serial number 124a (Fig. 1A). The number corresponds with the entry *Opuntia paraguayensis* in Schumann’s “Nachträge” (appendix) to his monograph of 1898 (Schumann 1903). There are no other annotations. The jar contains one large, obovate, flat stem segment measuring ca. 32 × 14 cm, with unarmed areoles 3–4 mm in diam. and ca. 3–4 cm apart. The stem segment is of

larger size than the segment described in the protologue. It is easily identified as *O. ficus-indica* (compare Fig. 1B).

According to Ramella (pers. comm.), Hassler did not number live specimens, which is confirmed by some alcohol specimens of other species still extant at B. Four specimens under *Opuntia* and *Cereus* at B have handwritten labels “Paraguay, leg. Hassler, acc. 1902”, without further information. The Hassler specimen of *O. paraguayensis* bears no date and may well be older. While it cannot be proved (nor indeed disproved) that it forms part of the original material, it offers a suitable standard for the application of the name *O. paraguayensis* if, as here proposed, it is selected as its neotype.

Discussion

At first, it may seem rather improbable that Schumann would have described a new species based on a specimen of the well known *Opuntia ficus-indica*. However, a look at the classification outlined by Schumann (1899a) offers an explanation. Schumann placed *O. paraguayensis* in *O. ser. Inarmatae* (Schumann (1899a: 134, 149, 1903: 160) together with *O. inamoena* and *O. rubescens*, but *O. ficus-indica* in *O. ser. Subinermes* K. Schum. (Schumann 1897-98: 719, 1898). Hassler 1150 was a spineless plant not related to the simultaneously described *O. cardiosperma*. Schumann may have misinterpreted the label information (“an unkultivierten Orten...”) to mean “non-cultivated [i.e., natural] land”, thus assuming that the plant was truly native, whereas in fact it means “waste land” (Chodat & Hassler 1903 “in ruderis”) pointing to alien origin. *O. ficus-indica* was not listed by Chodat & Hassler (1903) for Paraguay, nor by Pin (1996) for the Ybicu’í National Park in the Department of Paraguari. This introduced species is notoriously undercollected and the Hassler gathering may well be the first documented record for Paraguay.

The Hassler specimen at B is better not considered a lectotype, because it lacks the collection number, bears no annotation by Schumann and is not the exact specimen described in the protologue. However, it is compatible with relevant parts of the protologue when one takes in account the size variations of stem segments in *O. ficus-indica*. It is well suited as a neotype, and as such it will resolve the past misapplications of the name *O. paraguayensis*.

Conclusion

Opuntia ficus-indica (L.) Mill., Gard. Dict., ed. 8. 1768
= *Opuntia paraguayensis* K. Schum. in Monatsschr. Kakteenk. 9: 149. 1899. – Holotype: Paraguay: Escobar, Hassler 1150 (B, destroyed). – Neotype (designated here): Paraguay, Hassler (B alc nr. 1408).

Acknowledgements

I wish to thank the curators of the herbaria AS, BA, BAA, C, CBG, CTES, G, MEL, MNES, MO, SI, US, W, Z and ZSS for access to collections or for photocopies, photographs or loans of specimens, L. Ramella (Geneva) for information on listings of Hassler material, E. Zardini (AS/MO) for photocopies, J. Solomon (MO), R. Kiesling (SI), M. Sonnberger (HEID) for further information on specimens, and W. Greuter for substantial advice on an earlier version of the manuscript and improving the text.

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Address of the author:

Dr Beat Ernst Leuenberger, Botanischer Garten and Botanisches Museum Berlin-Dahlem, Freie Universität Berlin, Königin-Luise-Str. 6-8, D-14191 Berlin, Germany; e-mail: b.leuenberger@mail.bgbm.fu-berlin.de