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SYNOPSIS OF *PARASTREPHIA* (ASTERACEAE: ASTEREAE)

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ABSTRACT

Previous treatments of the South American, central Andean genus *Parastrephia* have included five species, but the present study recognizes only three: *P. lucida* (including *P. phyliciformis*), *P. quadrangularis* (including *P. lepidophylla*), and *P. teretiuscula*. Comments on generic relationships, a generic description, key, and distribution maps are provided for *Parastrephia*.

KEY WORDS: *Parastrephia*, Asteraceae, Astereae, South America

Cabrera (1945) treated the species of *Parastrephia* Nutt. within the genus *Lepidophyllum* Cass., but he later recognized the distinctiveness of *Parastrephia* and segregated five species (Cabrera 1954) from the resultant, monotypic *Lepidophyllum*. All of these species are members of the New World "*Chiliotrichum* Cass. group," which is more broadly situated within the tribe Astereae subtribe Hinterhuberinae Cuatrecasas (sensu Nesom 1993).

Lepidophyllum cupressiforme (Lam.) Cass. appears to be part of the phylad that includes *Parastrephia*, the north Andean *Hinterhubera* Schultz-Bip., and the North American (Mexican) *Aztecaster* Nesom (Nesom 1993). Plants of all these genera are distinguished within the South American Hinterhuberinae by their combination of lack of receptacular pales, consistently pseudohermaphroditic central flowers, and markedly flattened achenes. *Lepidophyllum*, however, produces peripheral, pistillate flowers with yellow, typically expanded (though rather small) ligules, while the other three genera have peripheral flowers that are pistillate but merely tubular and usually five-lobed at the apex, apparently evolutionarily derived from central ones of "hermaphroditic" morphology. I have not been able to corroborate the observation by Gray (1862) that the ligulate corollas of *Lepidophyllum* are sometimes bilabiate. *Lepidophyllum* also differs from *Parastrephia*, *Hinterhubera*, and *Aztecaster* in

its (1) leaf arrangement (opposite vs. alternate) and morphology (abaxial surface smooth and punctate vs. with a distinct, central groove, epunctate), (2) oblong-ovate phyllaries with an evenly indurate texture (vs. lanceolate, with well-defined longitudinal zones), (3) multinerved achenes (vs. 2-4 nerved), and (4) pappus of flattened, subpaleate members (vs. terete bristles). Further, *Lepidophyllum* occurs along the coast of southernmost Argentina from around San Julian to Tierra del Fuego, distantly separated from the species of *Parastrephia*. Earlier, I viewed *Lepidophyllum* and *Parastrephia* as intimately related (Nesom 1993) but with further study acknowledge that their relationship must be less immediate.

Bentham (in Bentham & Hooker 1873) is nearly the only previous botanist to clearly observe that heads of *Parastrephia* produce sterile (pseudohermaphroditic) central flowers, this not recognized in my recent overview of the Hinterhuberinae (Nesom 1993) but corroborated in the present study. Cabrera (1945) noted in the generic description of *Lepidophyllum* sensu lato that the disc flowers were sometimes sterile, but in the more specific notes regarding the species as well as in later floristic accounts (1978), he described the disc flowers of *Lepidophyllum* and *Parastrephia* as hermaphroditic.

The corollas of the peripheral flowers in *Parastrephia quadrangularis* (Meyen) Cabrera are distinctly 5-lobed in many individuals, but in other plants of all three species, the corolla apex of the peripheral flowers varies from nearly truncate to ligulate with a minute, often 3-lobed extension. In all, however, the tube is relatively broad and the venation conspicuous and continuous up to the corolla apex, more like the corollas of central, tubular (hermaphroditic) flowers than those of peripheral, ligulate (pistillate) corollas typical of Astereae.

Bentham (in Bentham & Hooker 1873) divided *Parastrephia* between *Parastrephia* (comprising the single species *P. lucida* [Meyen] Cabrera) and *Lepidophyllum* (including the single species of *Lepidophyllum* sensu stricto as well as *Baccharis acaulis* [Weddell] Cabrera and *P. quadrangularis*). He placed this heterogeneous version of *Parastrephia* in the subtribe Baccharidinae, noting that the heads were androgynous but "submonoecious." Hoffmann (1890) also placed *Parastrephia* in the Baccharidinae, describing the heads as dioecious or polygamo-dioecious; he noted, however, that *Parastrephia* perhaps would be better treated as *Lepidophyllum*, which he placed in the Solidagininae.

Parastrephia occurs in the "puna" region of Bolivia and the immediately surrounding areas of Perú, Chile, and Argentina (Maps 1- 3). Cabrera (1954, 1978) has treated the genus as comprising five species, but only three are recognized here, allowing for variation primarily in habit and vestiture within two of the species. As such, each of the three constituent species is highly distinctive. There has been no chromosome count reported for *Parastrephia*, but *Lepidophyllum* has been reported as $2n$ = ca. 54 (Moore 1981). The synonymy is similar to that of Cabrera, except for the two new synonyms and a different interpretation of a *nomen novum* proposed by Asa Gray.

Parastrephia Nutt., Trans. Amer. Philos. Soc., ser. 2, 7:449. 1841. Type species: *Parastrephia ericoides* Nutt. (= *Parastrephia lucida* [Meyen] Cabrera).

Polyclados Philippi, *Fl. Atacama* 34. 1860. Type species: *Polyclados cupressinus* Philippi (= *Parastrephia quadrangularis* [Meyen] Cabrera).

Dolichogyne DC. sect. *Tola* Weddell, *Chloris Andina* 1:182. 1856. *Lepidophyllum* Cass. sect. *Tola* (Weddell) Cabrera, Bol. Soc. Argent. Bot. 1:50. 1945. Lectotype species (designated here): *Dolichogyne lepidophylla* Weddell (= *Parastrephia quadrangularis* [Meyen] Cabrera).

Low perennial shrubs, ca. 0.3-1.8 m tall, stems and leaves usually resinous but without apparent glands, with a white, matted or looser, arachnoid tomentum, usually quickly glabrescent. Leaves spirally arranged, crowded, coriaceous, deltate-ovate to linear-ericoid but widely flaring at the base, closely appressed to the stem (in *Parastrephia teretiuscula* [O. Kuntze] Cabrera and *P. quadrangularis*) or closely ascending (in *P. lucida*), basally adnate, the margins entire, involute. Heads discoid, solitary and terminal, sometimes clustered and loosely paniculate (in *P. lucida*); phyllaries in 2-4 graduated series, sometimes prominently glandular; receptacles epaleate, foveolate. Central flowers pseudohermaphroditic, corollas yellow-orange, sometimes reddish in *P. lucida*, 4.0-6.5 mm long, tubular, gradually ampliate into the limb, the lobes short, sharply spreading to slightly reflexed, with glandular hairs; anther thecae base rounded, not tailed; style branches short-hispid from the point of bifurcation to the apex, without collecting appendages; ovaries densely strigose, 2-nerved, sometimes elongating but not producing embryos; outer pappus of linear scales ca. 1/4 as long as the single series of inner bristles. Peripheral flowers equal or fewer than the central, in a single series, pistillate, fertile, yellow, tubular, 5-veined, usually with a minute, ligulate extension but commonly with 5 equal lobes in plants of *P. lucida*. Mature achenes oblong-oblanceolate to oblong-obovate, at least the upper third sessile-glandular, sparsely to densely strigose, (2.2-)3.0-4.0 mm long, plump but distinctly compressed, 2-3(-4) nerved; pappus of 2(-3) series of apically attenuate bristles, without a differentiated outer series.

KEY TO THE SPECIES

1. Leaves 2.0-2.5 mm long, deltate-ovate and nearly flat, tightly appressed to the stem, seemingly sunken in the dense, white cauline tomentum, the stem outline almost perfectly terete. ..... *P. teretiuscula*

1. Leaves 2-6 mm long with revolute margins, usually distinctly linear but towards ovate in the smallest size, ascending or appressed to the stem, but if appressed, the stems distinctly angular in outline. .....(2)

2. Leaves 4-6 mm long, not adnate to the stem, ascending to spreading-recurving; central flowers 13-28, peripheral flowers 7-16. .... *P. lucida*

2. Leaves 2-5 mm long, straight and tightly appressed to the stem, the basal portion adnate; central flowers 3-10, peripheral flowers 3-9. ..... *P. quadrangularis*

Parastrephia lucida (Meyen) Cabrera, Not. Mus. La Plata 17:57. 1954. BASIONYM: *Baccharis lucida* Meyen, *Reise Erde* 1:460. 1834. *Lepidophyllum lucidum* (Meyen) Cabrera, Bol. Soc. Argent. Bot. 1:51. 1945. TYPE: PERU. [Tacna]: near Tacora, 31 Apr 1833, *Meyen s.n.* (B, photo-F, photo-GH!, photo-US!).

Baccharis phyliciformis Meyen, *Reise Erde* 2:31. 1835. *Vernonia phyliciformis* (Meyen) Walpers, Nov. Acta. Acad. Caes. Leop. Carol. 19 (Suppl. 1):252. 1843. *Lepidophyllum phyliciforme* (Meyen) Hieronymus *ex* Fries, Nov. Acta Reg. Soc. Scient. Upsal., ser. 4, 1(1):77. 1905. *Parastrephia phyliciformis* (Meyen) Cabrera, Not. Mus. La Plata 17:57. 1954. TYPE: PERU. Arequipa, 31 Apr 1833, *Meyen s.n.* (B, photo-F, photo-US!).

Parastrephia ericoides Nutt., Trans. Amer. Philos. Soc., n. ser., 7:450. 1841. TYPE: PERU. near Arequipa, *Curson s.n.* (BM, *fide* Blake 1930).

Vernonia phyliciformis (Meyen) Walpers var. *resinosa* Walpers, Nov. Acta. Acad. Caes. Leop. Carol. 19 (Suppl. 1):253. 1843. *Lepidophyllum phyliciforme* (Meyen) Hieronymus *ex* Fries var. *resinosum* (Walpers) S.F. Blake, J. Washington Acad. Sci. 21:326. 1931.

Dolichogyne rigida Weddell, *Chloris Andina* 1:182. 1856. *Lepidophyllum rigidum* (Weddell) Benth. & Hook., *Gen. Pl.* 2(1):258. 1873. TYPE: PERU: [Tacna]: cordillera [sur le plateau] de Tacora, 1854, *Weddell s.n.* (HOLOTYPE: P, photo-GH!, photo-TEX!, photo-US!; Isotype: US!).

Dolichogyne rupestris Weddell, *Chloris Andina* 1:183. 1856. TYPE: BOLIVIA. environs de Potosí, dans la Quebrada de las lagunas, au niveau des neiges perpetuelles, March, *Orbigny 1382* (P, photo-US!).

Polyclados abietinus Philippi, Anal. Univ. Chile 43:492. 1873. *Lepidophyllum abietinum* (Philippi) Reiche, Anal. Univ. Chile 109:26. 1901. TYPE: CHILE. [Antofagasta]: Salitreras de Antofagasta, *Philippi s.n.* (HOLOTYPE: SGO, *fide* Cabrera 1945).

Dolichogyne glabra Philippi, Anal. Mus. Nac. Chile, sec. 2, Bot. 8:39. 1891. TYPE: ARGENTINA. Catamarca: Dept. Antofagasta de la Sierra, Lorohuasi, *Philippi s.n.* (HOLOTYPE: SGO, *fide* Cabrera 1945).

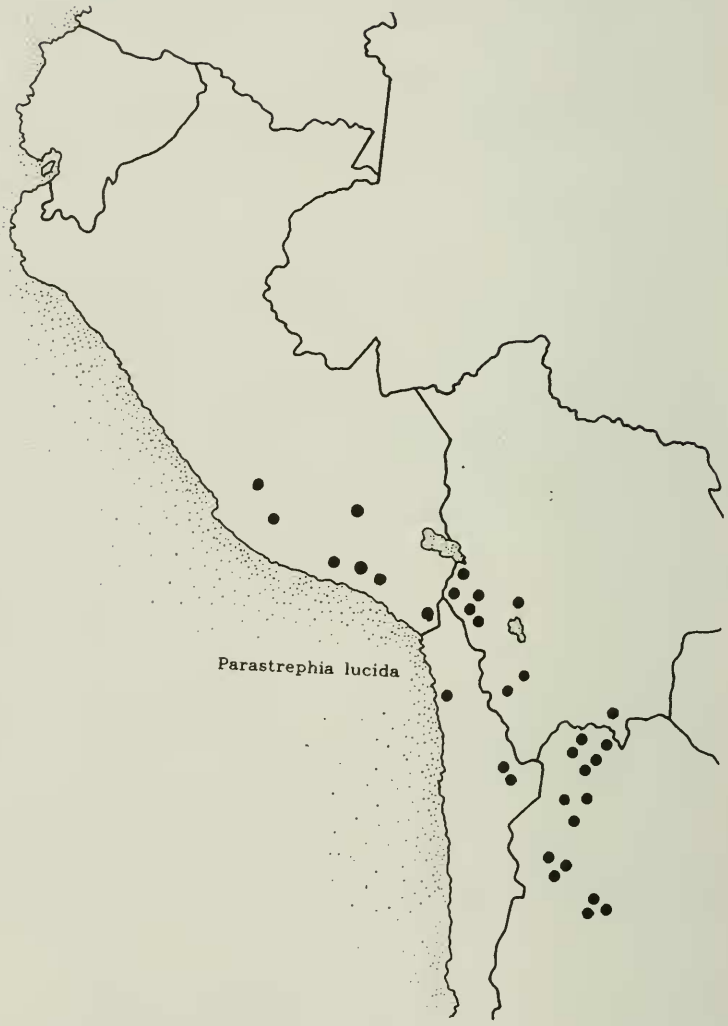
Nomenclatural combinations in *Lepidophyllum* were attributed by *Index Kewensis* to Asa Gray, based on *Dolichogyne rigida* Weddell and *Dolichogyne rupestris* Weddell, but it is clear that it was not his intention (Gray 1862) to publish these.

Perú (Arequipa, Ayacucho, Cuzco, Huancavelica, Tacna), Bolivia (La Paz, Oruro, Potosí, Tarija), Chile (Antofagasta, Tarapaca), and Argentina (Catamarca, Jujuy, Rioja, Salta, Tucumán) (Map 1); dry hills, páramo, (3200-)3500-4700 m; flowering October-April. Illustration in Cabrera (1978).

Cabrera (1945, 1954, 1978) has maintained *Parastrephia lucida* apart from *P. phyliciformis* but noted that the latter differs from the former only in its tomentose stems. The geographic ranges of these two taxa, also as outlined by Cabrera (1945, 1978), appear to be completely congruent. Blake (1931), following a much earlier publication by Walpers, regarded them as varieties of a single species, also noting that the only difference is in vestiture. Only a single species is recognized in the present treatment, with no formally designated infraspecific taxa. Plants with a slight amount of cauline tomentum or none at all (*P. lucida*) occur commonly throughout the range; plants with the most persistent and greatest density of cauline tomentum (*P. phyliciformis*) apparently are most abundant in Argentina, but persistently tomentose individuals also occur over the entire range of the species. The leaves, also, are usually initially tomentose in the ericoid groove on the abaxial surface and variably glabrescent. Plants intermediate in cauline vestiture are common, however, and there is no other way to separate them.

Nuttall described *Parastrephia ericoides* as having 5-lobed peripheral flowers in the outer series and filiform, pistillate ones in the center. Bentham (in Bentham & Hooker 1873) and Blake (1931) noted that Nuttall's type specimen may have been an abnormal plant, although the present study verifies the normal occurrence of peripheral flowers with 5-lobed corollas in *P. lucida*.

Parastrephia quadrangularis (Meyen) Cabrera, Not. Mus. La Plata 17:57. 1954. BASIONYM: *Baccharis quadrangularis* Meyen, *Reise Erde* 1:460. 1834. *Lepidophyllum quadrangulare* (Meyen) Benth. & Hook., *Gen. Pl.* 2:258. 1873. TYPE: PERU. [Tacna]: Tacora, *Meyen s.n.* (B, photo-F, photo-US!



Map 1. Distribution of *Parastrephia lucida*.

Polyclados cupressinus Philippi, *Fl. Atacama* 34, fig. 4,B. 1860. *Lepidophyllum cupressinum* (Philippi) O. Kuntze, *Rev. Gen. Pl.* 3(3):162. 1898. TYPE: CHILE. [Tarapaca]: "in monte Alto de Puquios," 12,600 ft, *Philippi s.n.* (SGO, photo-F).

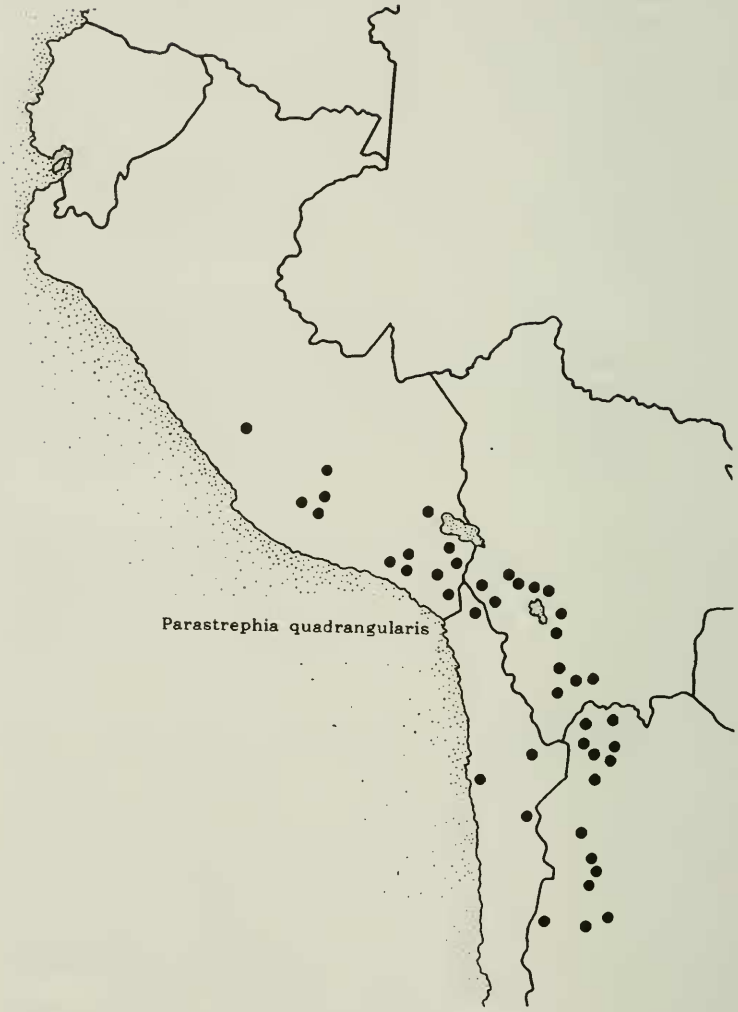
Dolichogyne lepidophylla Weddell, *Chloris Andina* 1:182. 1856. *Lepidophyllum meyenii* A. Gray [*nom. nov.*], Proc. Amer. Acad. Arts 5:123. 1862. *Lepidophyllum tola* Cabrera [*nom. nov. illeg.*], Bol. Soc. Argent. 1:56. 1945. *Parastrephia lepidophylla* (Weddell) Cabrera, Not. Mus. La Plata 17:57. 1954. SYNTYPES: specimens cited from Perú and Bolivia, from collections of Weddell, Pentland, Meyen, and d'Orbigny.

> Cabrera (1945) noted that Gray's new name was based on *Baccharis quadrangularis*, and thus Cabrera furnished *Lepidophyllum tola*. It is much more reasonable to assume, however, that Gray's intention was to avoid a tautonym, particularly since he equated *B. quadrangularis* with *Dolichogyne lepidophylla*, as did Reiche (1902), who followed Gray's taxonomy.

Perú (Arequipa, Ayacucho, Cuzco, Lima, Moquegua, Puno, Tacna), Bolivia (La Paz, Oruro, Potosí), Chile (Antofagasta, Tarapaca), and Argentina (Catamarca, Jujuy, La Rioja, Salta, San Juan, Tucumán) (Map 2); dry, rocky, shrubby hills, sometimes with cacti, páramo, 3440-4500 m; apparently flowering all year, collections studied from every month except March. Illustration in Cabrera (1978).

Cabrera (1978) noted that *Parastrephia quadrangularis* differs from *P. lepidophylla* in its habit (low shrubs 15-20 cm tall vs. erect shrubs 1.0-1.5 mm tall), thicker stems (2.0-2.5 mm wide vs. 1.0-1.5 mm), and phenology (flowering "en verano" vs. October-November), but these putative differences are greatly overlapping, and the identifications of specimens of these taxa have been markedly inconsistent. Only a single species is recognized in the present treatment. The plants of *P. lucida* range mostly from 0.25-0.80 m tall, but some occasionally reach 1.5 m; the stem thickness varies from 1.0-2.5 mm; there is no obvious correlation between phenology and any aspect of morphology. Pointed field observations of variation would be especially helpful in decisions regarding the taxonomy of these plants.

Collectors have noted that plants of this species are "resinous, highly flammable, and extensively used for firewood." The plants are "dug and tied in bundles for firewood." "A trainload of flat cars piled with bundles of this Composite was seen at La Paz," and between Arequipa and Juliaca it has been "sold in bundles along the railroad, used for fuel."



Map 2. Distribution of *Parastrephia quadrangularis*.

Parastrephia teretiuscula (O. Kuntze) Cabrera, Not. Mus. La Plata 17:57. 1954. BASIONYM: *Lepidophyllum teretiusculum* O. Kuntze, *Rev. Gen. Pl.* 3(3):162. 1898. TYPE: CHILE. [Tarapaca]: Conchi-Ascotan, 3000-3900 m, 7 Mar 1892, *O. Kuntze s.n.* (NY, *fide* Zanoni 1980, photo-US!).

Bolivia (Potosí) and Chile (Tarapaca, Antofagasta) (Map 3); dry, stony hills, ca. 3400-4000 m; flowering December-March.

I have seen only three collections of *Parastrephia teretiuscula.* The other two species apparently are much more abundant and have been collected in close proximity at a number of localities.

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LITERATURE CITED

Bentham, G. & J.D. Hooker. 1873. Compositae. *Genera Plantarum* 2:163-533.

Blake, S.F. 1930. Notes on certain type specimens of American Asteraceae in European herbaria. Contr. U.S. Natl. Herb. 26:227-263.

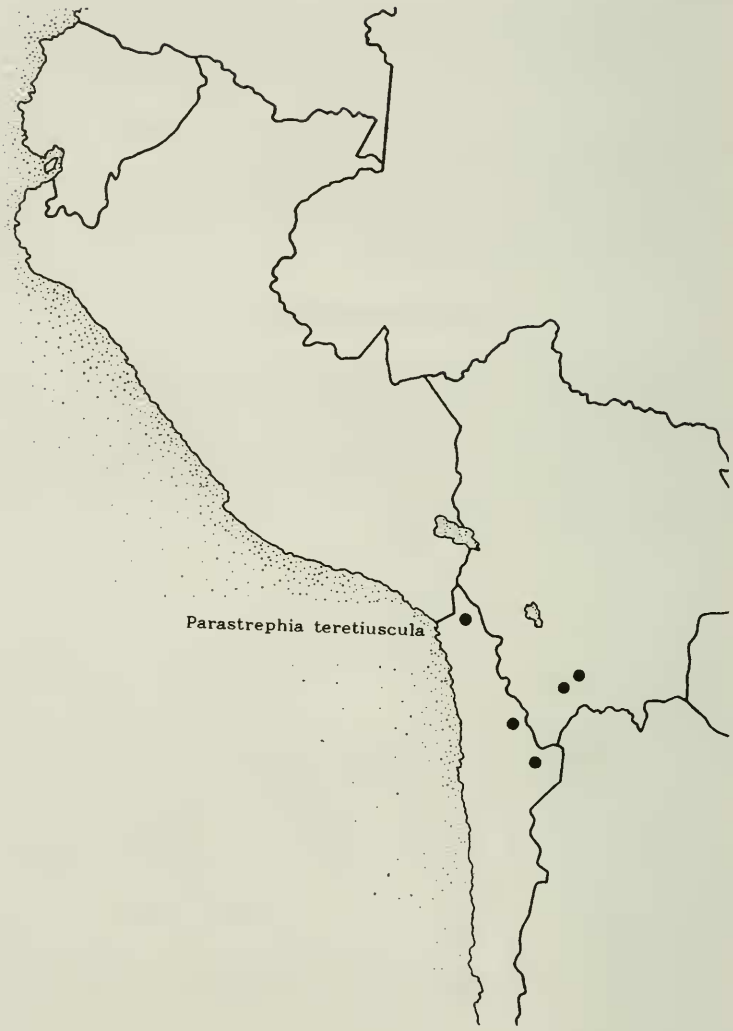
_____. 1931. Nine new American Asteraceae. J. Washington Acad. Sci. 21:325-336.

Cabrera, A.L. 1945. Sinopsis del género "*Lepidophyllum.*" Bol. Soc. Argent. Bot. 1:48-58.

_____. 1954. Las especies del género "*Nardophyllum.*" Notas Mus. La Plata 17:55-66.

_____. 1978. *Flora of de la Provincia de Jujuy.* Parte X - Compositae. Colección Cientifica del INTA, Buenos Aires, Argentina.

Gray, A. 1862. Characters of some Compositae in the collection of the United States South Pacific Exploring Expedition under Captain Wilkes, with observations, etc. Proc. Amer. Acad. Arts 5:114-146.



Map 3. Distribution of *Parastrephia teretiuscula*.

Hoffmann, O. 1890. Compositae. III. Tubuliflorae - Astereae. In *Die Natürlichen Pfanzenfamilien* (A. Engler & K. Prantl [eds.]) 4:142-172.

Moore, D.M. 1981. Chromosome number of Fuegian angiosperms. Bol. Soc. Brot., ser. 2. 53:995-1012.

Nesom, G.L. 1993. *Aztecaster* (Asteraceae: Astereae), a new ditypic genus of dioecious shrubs from México with redefinitions of the subtribes Hinterhuberinae and Baccharidinae. Phytologia 75:55-73.

Reiche, K. 1902. Familia Compuestas. *Fl. Chile* 3:255-381.

Zanoni, T.A. 1980. Otto Kuntze, botanist. I. Biography, bibliography and travels. Brittonia 32:551-571.