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Typifications in the genus *Trichocline* (Asteraceae: Mutisieae)

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Abstract: Concerning the genus *Trichocline* (Asteraceae: Mutisieae), a neotype is designated for the name *Bichenia aurea* ($\equiv T. aurea$) and lectotypes are designated for the names *Onoseris heterophylla* ($\equiv T. heterophylla$), *T. humilis* and *T. linearifolia*. Nomenclatural and taxonomic information and IUCN conservation status assessments are given for the four species *T. aurea*, *T. heterophylla*, *T. humilis* and *T. linearifolia*. In addition, a new record of *T. heterophylla* for Argentina is reported.

Key words: Argentina, South America, nomenclature, lectotype, neotype, new record, IUCN, conservation status, Asteraceae, Compositae, Mutisieae, Mutisioideae, *Trichocline*

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Introduction

Trichocline Cass. was described by Henri Cassini (1817) based on *T. incana* (Lam.) Cass. ($\equiv Doronicum incanum$ Lam.). It belongs to the predominantly South American tribe Mutisieae (Asteraceae) and comprises about 24 species distributed mainly in the Andes and S Brazil. The species of the genus are perennial herbs with broad and hemispherical involucre, bilabiate corollas, marginal ray florets with staminodes, and truncate cypselae with short, elliptical twin hairs (Hind 2001; Katinas 2004).

The most extensive revision of *Trichocline* was made by Zardini (1975), who provided extensive taxonomic information but without type designations for some of the names. Other studies such as Katinas & al. (2008) and Pasini & Ritter (2012) also lack type designations. A taxo-

nomic revision, in progress by the first author, compelled us to designate types for *Bichenia aurea* D. Don ($\equiv T. aurea$ (D. Don) Reiche), *Onoseris heterophylla* Spreng. ($\equiv T. heterophylla$ (Spreng.) Less.), *T. humilis* Less. and *T. linearifolia* Malme.

Material and methods

We have analysed material from the following herbaria: CNPO, CORD, CRI, CTES, FLOR, FURB, G, HAS, HB, HBR, HURG, ICN, LIL, LP, MBM, MO, MPUC, MVFA, MVJB, MVM, PACA, S, SALLE, SI, SMDB, SP and SPF. In other cases, high-resolution images of specimens available on websites of the B, G, GH, P, S and US herbaria were studied. The herbarium codes follow Thiers

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(2015+). In addition, we conducted a conservation status assessment of these species using the categories and criteria of the IUCN (2012). Direct observation of plant populations and analysis of specimens in the above-mentioned herbaria were used to apply IUCN categories and criteria. The specimens examined correspond to all subpopulations; for the definition of “subpopulation” and “location”, see IUCN (2014). Area of occupancy and extent of occurrence were calculated with Kew’s Geospatial Conservation Assessment Tool, GeoCAT (<http://geocat.kew.org>).

Results and Discussion

Trichocline aurea (D. Don) Reiche in *Anales Univ. Chile*, I, Mem. Ci. Lit. 115: 343. 1904 \equiv *Bichenia aurea* D. Don in *Trans. Linn. Soc. London*. 16: 237. 1830 \equiv *Chaetanthera berteriana* Less., *Syn. Gen. Compos.*: 111. 1832, nom. illeg. (Art. 52.1). – Protologue: “In Chili ad Coquimbo. *Caldcleugh*”. – **Neotype (designated here)**: Chile, “Santiago”, s.d. (fl.), A. *Caldcleugh* s.n. (G 00308260! [Fig. 1]).

Nomenclatural and taxonomic notes — *Trichocline aurea* was first described as *Bichenia aurea* by David Don (1830). In the protologue, Don gave the following location for where the specimen was collected: “In Chili ad Coquimbo. *Caldcleugh*”. No specimens and no herbaria were cited. The species description is poor and incomplete, in that the author cited only the floral features of the plant, such as number of series of ray florets, number of nerves in ray floret corollas, and pappus. Don (1830) clearly indicated that, by the time the species was described, he was studying material in Aylmer Bourke Lambert’s Herbarium. Furthermore, in her article about the sale of this herbarium, Miller (1970) pointed out that Obediah Rich – a bookseller from London – bought lot no. 15 of Aylmer Bourke Lambert’s Herbarium in which the *Caldcleugh* material was included. According to Lasègue (1845) this material was later transferred to the Delessert Herbarium in the P (Paris) herbarium. We asked the curator of P, and he informed us that this material is not housed there. Continuing our search, according to Miller (1970), in 1869 the Delessert heirs donated the herbarium to the municipality of Geneva. According to Stafleu & Cowan (1976), the David Don collection was donated to the Linnean Society of London (LINN) and other material is at BR. We searched the websites of both herbaria and asked the curators, who informed us that this material is not housed there. However, by searching the G herbarium website we located a *Caldcleugh* specimen (G 00308260) but with a different location: “Santiago”. This material is well preserved and has the characters of the original description. However, because the label gives a different location, we doubt that this specimen is part of the original material of *B. aurea*. In the apparent absence of any definite original material, we designate it here as the neotype.

Lessing (1832) described *Chaetanthera berteriana* (as “*Berteriana*”) honouring the Italian botanist Carlo Giuseppe Bertero. Because Lessing cited the earlier name *Bichenia aurea* in synonymy in the protologue, *C. berteriana* is an illegitimate name under Art. 52.1 of the *International Code of Nomenclature for algae, fungi, and plants* (ICN – McNeill & al. 2012) and is automatically typified by the type of *B. aurea* (Art. 7.5). Concerning the spelling, Hooker & Arnott (1835) cited the name as *C. berteriana*, a slightly different spelling of the original name. Later, Candolle (1838) cited *C. berteriana* as a synonym of “*C. berteriana*”, which probably caused confusion regarding the valid name and the correct spelling. The correct spelling according to Art. 60.12 and Rec. 60C.1 of the ICN for an epithet derived from a name like Bertero, when the gender of the genus name is feminine (as in *Chaetanthera*), is *berteroana*.

The name *Trichocline pedicularifolia* Walp. (Walpers 1840) was considered as a synonym of *T. aurea* by Zardini (1975) and Katinas & al. (2008); however these authors did not see its type material. In fact, Stafleu & Cowan (1988: 45) mentioned that the present location of Walpers’s specimens is unknown. In the protologue, Walpers cited material in the herbarium of August Lucae (“Chili. – E plantis Besserianis. – v. s. in hb. Lucaeano et Regio”), and according to Stafleu and Cowan (1981), Lucae’s specimens were housed in KIEL, which eventually was destroyed. However, the same authors also noted that duplicates could be found at BR, MW, P and W. We contacted the curators of these herbaria and were informed that the material is not housed there. Because we could not find any specimen collected by August Lucae associated with the name of *T. pedicularifolia*, we decided to remove this name from the synonymy of *T. aurea*.

Trichocline aurea is easily recognizable by its pinatisect leaves with serrate margins, thickened scape base, and smooth (vs papillose) anther tails. The latter two characters are not found in any other species in the genus.

Conservation status — According to the categories and criteria of the IUCN (2012, 2014), we assessed *Trichocline aurea* as Endangered: EN B2ab(ii,iii,iv). The species occurs in C Chile, from sea level (Zardini 1975) to c. 1400 m. According to our herbarium survey, the distribution is very narrow and the species can therefore be considered rare. The area of occupancy was calculated as 44 km². Even though there is a considerable amount of material of this species in South American herbaria, most of the specimens are duplicates of collections made almost 50 years ago, and most of the collections were made almost 70 years ago, with the most recent from almost 30 years ago. Most of the documented subpopulations occur in currently urbanized areas, and we therefore predict that the subpopulations are continually declining in their extent of occurrence, area of occupancy and quality of habitat.



Fig. 1. Neotype (G 00308260) of the name *Bichenia aurea* (\equiv *Trichocline aurea*). – Reproduced by kind permission, © Conservatoire et Jardin botaniques de la Ville de Genève.



Fig. 2. Lectotype (P 00455327) of the name *Onoseris heterophylla* (\equiv *Trichocline heterophylla*). – Reproduced by kind permission, © MNHN collection-Paris.



Fig. 3. Lectotype (LP 002572) of the name *Trichocline humilis*. – Reproduced by kind permission, © Museo de La Plata.

Additional specimens examined — CHILE: Concepción, La Florida, 10 Dec 1936, *E. Barros* 1207 (LP); Yumbel, camino de Hualqui a Rere, cerca de Gomero, 5 Jan 1959, *Martcorena & al. s.n.* (CONC 25221); Camino a Bulnes, antes del Puente Queime, 16 Nov 1967, *E. Ugarte & G. Cea s.n.* (CONC 35029); Aconcagua, Cuesta de Chacabuco, 12 Nov 1970, *M. Mahu* 5537 (LP); Santiago, Cerro Provincia, Cordillera de Santiago, Dec 1933, *C. Grandjot s.n.* (MO 1154214); Malleco, near El Vergel, 30 Dec 1935, *J. West* 4924 (LP, MO); Metropolitan Region, Cordillera de la Costa, 1300 m, 7 Jan 1983, *F. Hellwig* 585 (G); Ñuble, Itata, nueva Aldea, Fundo Santa Ana, 6 Mar 1936, *K. Behn s.n.* (CONC 21136).

Trichocline heterophylla (Spreng.) Less. in Linnaea 5: 289. 1830 = *Onoseris heterophylla* Spreng., Syst. Veg. 3: 503. 1826 = *Chaptalia heterophylla* (Spreng.) D. Don in Trans. Linn. Soc. London 16: 244. 1830. — Protologue: “Monte Video. Sello”. — **Lectotype (designated here)**: Uruguay, “*Onoseris heterophylla** Monte Video”, s.d. (fl.), *Sellow s.n.* (P 00455327! [Fig. 2]; isolectotypes: B 16017 [destroyed, photos at F 0BN016017!, SI!], K 000504268!, K 000504270!, NY 00274193!, P 00455326!, P 00455328!).

Nomenclatural and taxonomic notes — Sprengel (1826) described *Onoseris heterophylla*, which Lessing (1830) later transferred to *Trichocline*. We located six specimens (two at K, one at NY and three at P) that matched the species description and locality information given by Sprengel in the protologue. We have chosen the specimen P 00455327 as the lectotype of *T. heterophylla* because it is the most informative and because at least one of the other specimens – P 00455326 – was clearly not in Sprengel’s possession by the time the species was described, having been donated by the Berlin herbarium in 1861.

Moreover, we located three other collections made by Sellow: photographs (F and SI) of a specimen originally deposited at the Berlin herbarium (B 16017, destroyed) and two sheets in the Kew herbarium (K 000504268 and K 000504270). On these three sheets the collection localities are indicated as “*Brasilia Meridionalis*”, “*Brasilia*” and “*Brasil*”, respectively. When these specimens were collected, the political limits between Brazil and Uruguay were not the same as the current ones, so we believe that they were collected in what is today Uruguay and can be considered original material.

According to the herbarium specimens and literature, *Trichocline heterophylla* was recorded only from S Uruguay, but during our investigation we found a new record in E Argentina, province of Entre Ríos (*T. M. Pedersen* 7327, SI).

The species occurs in dry soil and rocky grasslands, and can be distinguished from other species by its petiolate, glabrescent to glabrous leaves, with crenate margins, scapes without bracts, and ovate phyllaries.

Conservation status — According to the categories and criteria of the IUCN (2012. 2014), we assessed *Trichocline heterophylla* as Endangered: EN B2ab(ii,iii,iv); C2a(i). The area of occupancy was calculated as 44 km². The fact that most of the specimens studied were collected nearly 70 years ago suggests that *T. heterophylla* is now rare. It is probable that some subpopulations no longer exist where plants were collected 80 or more years ago, e.g. Cerro de las Ánimas, Piriápolis, 2 Feb 1938, *B. Rosengurtt* 2415 (LP); Las Piedras, Canelones, 5 Jan 1891, *H. Sebert s.n.* (MVM 672). In fact, all the locations of the species in Uruguay are close to urbanized areas. In the course of fieldwork in Uruguay, the first author observed a small subpopulation of c. 20 individuals near a roadside in disturbed grassland, in which no more than ten mature individuals could be located. We believe that this pattern may occur in the other subpopulations.

Additional specimens examined — ARGENTINA: Entre Ríos, Crucecitas, 26 Nov 1964, *T. M. Pedersen* 7327 (SI). — URUGUAY: Canelones, Toledo, 27 Nov 1926, *C. Osten* 20104 (MVA); Florida, Cerro Colorado, Estancia San Pedro, Dec 1937, *Gallinal & al.* 2810 (LP); Maldonado, Piriápolis, Cerro de las Ánimas, s.d., *J. Chebataroff* 1722 (LP); Montevideo, Parque Lecoq, Camino Azarola, 8 Nov 2001, *Albarracín & Sastre s.n.* (MVJB 24245); Colón, 15 Jan 1942, *C. Osten* 3635 (G); Punta del Este, ruta 12, 6 Mar 2013, *E. Pasini* 963 (ICN).

Trichocline humilis Less. in Linnaea 5: 288. 1830 = *Trichocline heterophylla* var. *humilis* (Less.) Baker in Martius, Fl. Bras. 6(3): 372. 1884. — Protologue: “Sellow legit pr. S. José ad fluvium Uruguay Brasiliae meridionalis Febr. 1823. (v. sp. s. ∞.)” — **Lectotype (designated here)**: Brazil, “*Trichocline humilis* leg. Sello D 467. Bras. merid. Ex Mus. Berol.”, s.d. (fl.) (LP 002572! [Fig. 3]; isolectotypes: K 00504272!, K 00504273!, K 00504274! P 00455354!).

Nomenclatural and taxonomic notes — Lessing (1830) described *Trichocline humilis* citing a gathering by Sellow with a rather precise locality and date. We were able to locate five specimens of this gathering (three at K and one each at LP and P). We have chosen the specimen LP 002572 as the lectotype because not only is it the most informative material, but it is housed in a herbarium close to the collection site.

Some of the characters that distinguish the species are pinnatisect leaves with irregularly dentate margins, a well-developed xylopodium (c. 25 cm long), and brownish-coloured involucre bract margins.

Conservation status — According to the categories and criteria of the IUCN (2012. 2014), we assessed *Trichocline humilis* as Endangered: EN B2ab(ii,iii,iv); C2a(i). The



Fig. 4. Lectotype (S-R-6181) of the name *Trichocline linearifolia*. – Reproduced by kind permission, © Swedish Museum of Natural History.

populations are found in grasslands with wet or dry and sandy soils, associated with tree species such as *Prosopis affinis* Spreng., *P. nigra* Hieron. and *Vachellia caven* (Molina) Seigler & Ebinger (*Fabaceae*). *Trichocline humilis* occupies a total area of occupancy of 84 km² in S Brazil, E Argentina and Uruguay. There are only two records of the species from Brazil, in the Parque Estadual do Espinilho, a regional Conservation Unit located along the westernmost part of the state of Rio Grande do Sul. Many of the subpopulations are located along the S part of the Uruguay river, and any disturbance to the water levels could lead to local extinction or a drastic reduction of mature individuals. The subpopulation observed had approximately 50 mature individuals that were growing inside a protected area. We infer that other subpopulations do not contain more than 100 mature individuals and most of them are not located in protected areas.

Additional specimens examined — BRAZIL: Rio Grande do Sul, Barra do Quaraí, 16 Dec 2009, M. Grings & R. Paniz 984 (ICN); *ibid.*, 21 Apr 2011, E. Pasini & A. Aita 862 (ICN). — ARGENTINA: Corrientes, Dept. Curuzú Cuatiá, 8 Dec 1977, A. Schinini & O. Ahumada 13898 (CTES); Dept. Lavalle, Nov 1968, R. Herbst 1214 (CTES); Dept. Mercedes, 12 Dec 2006, M. Dematteis & *al.* 2464 (CTES); Dept. Paso de Los Libres, 28 Jan 1945, T. Ibarrola 2219 (CTES); Dept. Sauce, 22 Oct 1977, O. Ahumada & *al.* 1322 (CTES); Entre Ríos, Dept. Chajarí, 16 Dec 1957, A. L. Cabrera 12361 (LP); Dept. Colón, 15 Dec 1963, A. Burkart 24976 (LP, SI). — URUGUAY: Artigas, 15 Feb 2005, M. Dematteis & A. Schinini 1397 (CTES); Rocha, 5 Feb 1938, B. Rosengurt 2437 (LP); Salto, 2 Feb 1927, A. Burkart 1140 (LP); Soriano, s.l., Feb 1942, Gallinal & *al.* 4842 (LP).

Trichocline linearifolia Malme in Bih. Kongl. Svenska Vetensk.-Akad. Handl. 12(2): 114. 1933. — Protologue: “Tamanduá, 1/2 1909 (n. 7714). *Hab. in campo*.” — **Lectotype (designated here):** Brazil, “Tamanduá, in campo”, 1 Feb 1909 (fl.), P. Dusén 7714 (S-R-6181! [Fig. 4]; isoelectotypes: BR 552219!, G 00304761!, GH 00013174!, K 000504287!, LD 1228813, LP 002573!, M 0030653!, NY 00274194!, PH 00027927, S 10-36649!, US 00119946!).

Nomenclatural and taxonomic notes — We were able to locate 12 duplicates of the material cited in the protologue of *Trichocline linearifolia* (Malme 1933). We have chosen the specimen S-R-6181 as the lectotype because it includes the most informative material and Malme’s herbarium and types are deposited in S according to Stafleu & Cowan (1981) and Thiers (2015+).

The main characters that distinguish the species are the linear leaves, with entire to shortly lobate margins, and orangish to reddish ray florets.

Conservation status — According to the categories and criteria of the IUCN (2012. 2014), we assessed *Trichocline linearifolia* as Endangered: EN A4c; B2ab(ii). It is a rare species due to its narrow distribution, which is in high elevation areas, around 700–1200 m, in the high-altitude grasslands of S Brazil in the states of Paraná and São Paulo, where the species is endemic. It is clear that in the last 100 years the subpopulations have suffered a decrease in extent of occurrence. Some subpopulations occur inside urbanized areas that could have diminished the number of mature individuals and negatively changed the quality of the habitat. According to geographic information from herbarium specimens, the subpopulations are in drastically fragmented areas and are known from no more than five locations.

Additional specimens examined — BRAZIL: Paraná, Colombo, 24 Jan 1968, G. Hatschbach 18423 (CTES, LP, MBM); Curitiba, 30 Jan 1974, R. Kummrow 198 (LP, MBM); Palmeira, córrego da Anta, 2 Jan 1975, G. Hatschbach & T. M. Pederson 35878 (LP, MBM); Piraquara, 27 Jan 1971, N. Imaguire 2564 (CTES, MBM); Ponta Grossa, Parque Vila Velha, 2 Mar 1962, G. Hatschbach 8881b (ICN, HB, MBM); Quatro Barras, 29 Jan 1975, L. F. Ferreira 196 (LP, MBM); São Paulo, Ipiranga, 18 Feb 1912, A. C. Brade 5463 (HB, LP, S); Jabaquara, 20 Apr 1950, O. Handro 177 (SP).

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