

A contribution to the *Campylopus* flora of Chile

Jan-Peter Frahm

Nees Institut für Biodiversität der Pflanzen, Rheinische Friedrichs-Wilhelms Universität,
Meckenheimer Allee 170, D 53115 Bonn, Germany, Frahm@uni-bonn.de

Abstract: A key to the species of *Campylopus* known from Chile is given, completed by records of *Campylopodioideae* of the author in southern Chile. *Campylopus acuminatus* Mitt. var. *kirkii* (Mitt.) J.-P. Frahm is reported for the first time for Chile.

The first key to the *Campylopus* species of Chile was published by Frahm (1976). It was written to determine collections made by L. Landrum in 1969-71 and was based on an uncritical compilation of all species reported for Chile at that time. It included 33 species. An almost complete revision of the genus during the following twenty years resulted in a drastical reduction of species numbers by new synonyms. This concerns especially the austral regions, where many species have wide subantarctic ranges. Most taxonomic and nomenclatural changes were considered in the recent first checklist of the mosses of Chile by He (1998), with the following exceptions (see also Frahm 1999):

C. areodictyon (C. Müll.) Broth. This species distributed through the northern Andes (Frahm 1991) was reported for the Juan Fernandez Islands by Brotherus (Robinson 1975). Robinson (l.c.) attributed these records to *C. kunkelii* Bartr.,

a species which was regarded as synonymous with *C. pyriformis* (Schultz) Brid. (Corley & Frahm 1982).

C. flavissimus (C. Müll.) Besch. is synonymous with *Chorisodontium fulvatrum* Besch. according to Frahm (1987), a species now considered as synonymous with *C. aciphyllum* (Hook. f. & Wils.) Broth. (Hyvönen 1991).

Campylopus hamatus Bartr. is considered to be a species of *Chorisodontium* (Frahm 1999).

C. morenoi Dus. is not a *Campylopus* (Frahm 1999).

In general, most of the *Campylopus* species of Chile are austral in distribution (*C. introflexus*, *incrassatus*, *clavatus*, *acuminatus*, *pyriformis*, *purpureocaulis*, *vesticaulis*, cf. Frahm 1988). Endemic to Chile vz. southern South America

are (at the present state of knowledge) *C. chilensis*, *laxoventralis* and *modestus*. Tropical montane to subtropical is *C. pilifer* Brid. In addition, there are doubtful records of the neotropical *C. richardii* Brid. and the andine *C. asperifolius* Mitt., which are not considered in the following key. Due to the lack of any flora of Chile, a new key for the *Campylopus* species of this country is given here, which may be of help for other bryologists identifying collections from Chile.

Key to the species of *Campylopus* from Chile

- 1 Inner basal laminal cells incrassate, relatively short, 2-3:1, outer ones narrow in 8-10 rows. Upper laminal cells subquadrate. Leaves epilose. Costa in transverse section with ventral hyalocysts and dorsal stereids.....
..... *C. spiralis*
- 1* Inner basal laminal cells thin-walled.....2
 - 2 Leaves ending in a hyaline hairpoint (which can be reduced in shaded habitats).....3
 - 2 Leaves without hairpoints.....12
 - 3 Hairpoints reflexed or recurved.....4
 - 3* Hairpoints straight.....7
 - 4 Hairpoints reflexed.....*C. introflexus*
 - 4* Hairpoints recurved, if reduced, costa very wide, filling 2/3-3/4 of leaf width, widest above leaf base.....5
- 5 Upper laminal cells subquadrate. Costa in transverse section with lax ventral hyalocysts.....*C. laxoventralis*
- 5* Upper laminal cells oval. Costa in transverse section with small ventral hyalocysts, 10-15 μm wide.....6
- 6 Costa with dorsal lamellae... *C. aureonitens*
- 6* Costa without dorsal lamellae... *C. chilensis*
- 7 Costa with dorsal lamellae, 4 cells high.....
.....*C. pilifer*
- 7* Costa smooth or ridged, without lamellae...8
- 8 Upper laminal cells quadrate or rectangular.....9
- 8* Upper laminal cells oval.....11
- 9 Upper laminal cells quadrate.....10
- 9* Upper laminal cells rectangular.....
.....*C. purpureocaulis*
- 10 Leaves broadly lanceolate. Costa percurrent in a short mucro. lamina reaching the leaf tip.....*C. modestus*

- 10* Laves narrowly lanceolate. Costa excurrent in a long awn. Lamina vanishing above midleaf.....
.....*C. incrassatus*
- 11 Transverse section of costa with ventral stereids. Costa filling 1/2-3/4 of leaf width.
.....*C. clavatus*
- 11* Transverse section of costa with ventral hyalocysts. Costa filling 1/3-1/2 of leaf width, with side nerves. Plants robust, blackish, vermicular foliate. Upper laminal cells elongate oval, strongly pitted.....
.....*C. acuminatus*
- 12 Upper laminal cells rectangular.....13
- 12* Upper laminal cells oval...*C. vesticaulis*
- 13 Transverse section of costa with ventral stereids... *C. purpureocaulis* ssp. *aberrans*
- 13* Transverse section of costa with ventral hyalocysts*C. pyriformis*

Interestingly, there is only one of 14 species with incrassate basal laminal cells in Chile and 10 of 14 species have hyaline hairpoints, both a very unusual percentage as compared with other floras.

List of new records of *Campyloporioideae*

During fieldwork for the BRYO AUSTRAL project in southern Chile in 2001, several *Campyloporioideae* have been collected which are compiled here.

The first number of the collecting number indicates the locality (list of localities see appendix).

Campyloporium medium (Duby) Giese & Frahm 8-4. New to region X.

Campylopus acuminatus Mitt.

11-4, 20-2. The specimen 20-2 is from a bog, 11-4, however, from a lava flow. The latter has narrower, more elongate leaves. The leaves are usually straight but plants with hamate leaves are intermixed.

Campylopus acuminatus Mitt. var. *kirkii* (Mitt.) J.-P. Frahm, new to Chile

20-3, 20-4. A variety with cucullate instead of piliferous leaf tips, which was so far only known from Australia and New Zealand. Interestingly, both taxa were found in mixed tufts. There are several species with cucullate and piliferous varieties. The cucullate varieties have perichaetial leaves with piliferous hairpoints. The reasons causing these varieties are not known. 20-4 has elongate leaves at stem tips, perhaps for vegetative reproduction.

Campylopus chilensis De Not.

12-4

Campylopus clavatus (R. Brown) Wils. & Hook.f.

8-1a, 8-3, 11-3, 15-1

Campylopus introflexus (Hedw.) Brid.

8-1b, 8-2, 12-2, 20-3, 21-1, 24-1.

Campylopus pilifer Brid.

12-1. A remarkable southern record. The species is usually a vicariant species of *C. introflexus*. However, like in other parts of the world, the ranges of both species sometimes overlap (e.g. in southern Brazil or South Africa). *Campylopus pilifer* was recorded only three times before from Chile (from IX and X. region, Valdivia and Juan Fernandez Islands), and this locality is situated several hundred kilometres south of Valdivia, the former southernmost record. The plants of this specimen have conspicuous short upper laminal cells.

Campylopus pyriformis (Schultz) Brid.

12-3

Pilopogon schilleri Herz.

15-2

(1) XII. Region; Prov. Magallanes, Punta Arenas, Reserva Forestal Magallanes, Nothofagus pumilio-N. betuloides Wald (ca. 15 m hoch), 250-350 m, Nothofagus pumilio-Wald (max 12 m) 350-430 m. 53° 09' 10'' S, 71° 01' 34,9'' W. 14.2.01 u. 21.2.01.

(2) XII. Region. Parque Nacional Torres del Paine, 2 km NW Refugio Pingo am Rio Pingo, Nothofagus

pumilio-Wald (ca. 15 m hoch), 200 m, 51° 06' 28'' S, 73° 06' 28'' W, 17.2.01.

(3) XII. Region, Parque Nacional Torres del Paine, Pfad von der Puente Weber zur Laguna Verde, Nothofagus pumilio- u. N. antarctica-Wälder (bis 10 m hoch), 380 m, 51° 8' 13,9'' S, 72° 55' 12'' W, 18.2.01.

(4) XII. Region, Parque Nacional Torres del Paine, Rio Ascensio oberhalb Hosteria Las Torres, Pfad zum Mirador, Nothofagus pumilio-Wald (bis 18 m hoch) in einer Schlucht, 500-650 m, 50° 57' 9,7'' S, 72° 55' 18'' W, 19.2.01.

(5) XII. Region; Prov. Magallanes, Reserva Nacional Lago Parrillar 50 km S Punta Arenas, feuchte Nothofagus pumilio-Wälder (ca. 18 m) am Seeufer, ca. 270 m, 53° 24' 25'' S, 71° 15' 44'' W, 21.2.01.

(6) XII. Region; Prov. Magallanes, Fuertes Bulnes ca. 50 km S Punta Arenas, Nothofagus pumilio – N. betuloides-Wald ca. 100 m, 53° 37' 25,5'' S, 70° 55' 53,9'' W, 22.2.01.

(7) X. Region, Parque Nacional Alerce Andino ca. 45 km WSW Puerto Montt, Weg zur Laguna Sargazo, immergrüner Laubwald (Laurelio-Weinmannietum) 350-400 m, 41° 30' 51'' S, 72° 38' 38'' W, 24.2.01.

(8) X. Region, Parque Nacional Alerce Andino ca. 45 km WSW Puerto Montt, Straße zwischen Parkgrenze und Rio Lenca, Laurelio-Weinmannietum, 350 m, 24.2.01.

(9) X. Region, Parque Nacional Alerce Andino ca. 45 km WSW Puerto Montt, NE Laguna Sargazo, Pfad vom Refugio Rio Sargazo zum Alerzal, immergrüner Wald (Laurelio-Weinmannietum mit Nothofagus nitida, Saxegothaea conspicua u. Drimys winteri, Fitzroyetum, 350-500 m, 41° 30' 51,2'' S, 72° 38' 38,8'' W, 25.2.01 (u. 27.2.01).

(10) X. Region, Parque Nacional Alerce Andino ca. 45 km WSW Puerto Montt, Pfad zum Rodal Alerce, Laurelio-Weinmannietum u. Fitzroyetum, 350-400 m, (27.2.01 u.) 22.3.01.

(11) X. Region, Reserva Nacional de Llanquihue 50 km WSW Puerto Montt, Sector Rio Blanco, Weg zum Vulkan Calbuco, Lavaströme, Fitzroyetum, Pilgerodendronetum, Nothofagus betuloides-, N. pumilio- u. N. antarctica-Wald, 400-1350 m, 41° 20' 41,3'' S, 72° 38' 7,4'' W, 28.2.01 u. 21.3.01.

(12) X. Region, Hornopirén, Rio Blanco, südl. Flussufer, Eucryphietum mit N. dombeyi (ca. 25 m hoch), 10 m, 41° 56' 27'' S, 72° 23' 26'' W, 2.3.01 u. 3.3.01.

(13) X. Region, Hornopirén, Weg zum Vulkan Hornopirén, 250 m, Eucryphietum, 2.3.01.

(14) X. Region, Hornopirén, Carretera 7 zwischen Cholgo und Pichanco, Laurelia-Sekundärwald (max. 15 m), 20 m, 42° 07' 47,3'' S, 72° 27,5' 51,2'' W, 3.3.01.

- (15) X. Region, Hornopirén, Carretera 7 bei Cholgo, Flussuferwald mit vorherrschend *Drimys winteri*, *Laurelia philippiana* u. *Nothofagus nitida*, ca. 30 m, 42° 04' S, 72° 27' W., 3.3.01.
- (16) IX. Region, Parque Nacional de Huerquehue ENE Villarrica, Weg zu den Tres Lagos, Laurelio-Weinmannietum mit *Nothofagus dombeyi*, *Saxegothaea conspicua* (bis 40 m hoch) über Granit 750-1000 m, *Nothofagus dombeyi*-*Nothofagus pumilio*-Wald 1000-1200 m, *Araucaria*-Stufe 1200-1250 m, 39° 08' 59,2'' S, 71° 42' 52,1'' W, 6.3.01.
- (17) IX. Region, Parque Nacional Villarrica, Vulkan Villarrica S Pucón, Straße zum Skigebiet, *Nothofagus pumilio*-Wald (1300-1400 m) und N. antarctica-Gebüsch an der Waldgrenze (1400-1450 m), 39° 23' 50,3'' S, 71° 58' 3,9'' W, 7.3.01.
- (18) IX. Region, Parque Nacional Villarrica, Vulkan Villarrica S Pucón, Straße zum Refugio Viejo, *Nothofagus dombeyi*-Wald, 20 m hoch, 1100 m, 7.3.01.
- (19) IX. Region, Parque Nacional Conquillio, Pfad von der Laguna Conquillio zur Sierra Nevada, *Nothofagus obliqua*-Wald (1200-1250 m), *Nothofagus alpina*-N. *dombeyi*-Wald (1250-1420 m), *Nothofagus pumilio*-*Araucaria araucana* (1420-Waldgrenze (1770 m)), 38° 39' 2,3'' S, 71° 37' 9,5'' W, 9.3.01.
- (20) X. Region, Cordillera Pelada S Valdivia, Straße La Union - Puiculla, Alerce-Wälder und Moore 765-1000 m, 40° 10' 13,4'' S, 73° 27' 17,2'' W, 13.3.01.
- (21) X. Region, Küstenkordillere 50 km S Valdivia, Reserva Nacional Valdivia, immergrüner Wald mit *Drimys winteri*, *Eucryphaea cordifolia*, *Laurelia philippiana*, *Nothofagus dombeyi* und N. *obliqua*, 600-650 m, 40° 02' 22,7'' S, 73° 17' 54'' W, 14.3.01.
- (22) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, Sendero El Pionero, Bosque Siempreverde am NE-Hang (*Eucryphietum*), 460-675 m, 40° 44' 15,9'' S, 72° 18' 53,3'' W, 16.3.01.
- (23) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Anticura, Salto del Indio, immergrüner Wald (*Eucryphietum* mit *Nothofagus dombeyi*), 325 m, 40° 40' 7,3'' S, 72° 10' 20,1'' W, 16.3.01.
- (24) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Anticura, Pfad zum Mirador El Puma, *Eucryphietum* 350-650 m, 16.3.01.
- (25) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, Laguna El Espejo, *Eucryphietum* mit *Nothofagus dombeyi* u. *Saxegothaea conspicua*, 500 m, 18.3.01.
- (26) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, Rio Pescadero, *Saxegothaea conspicua*-*Nothofagus dombeyi*-Wald ca. 30 m hoch, 700 m, 18.3.01.
- (27) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, oberhalb Lago El Toro, *Nothofagus dombeyi*-Wald mit *Laurelia philippiana* (bis 30 m hoch) u. dichten *Chusquea*-Unterwuchs, 750 m, 18.3.01.
- (28) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, *Nothofagus dombeyi*-*Saxegothaea conspicua*-Wald mit *Chusquea*-Unterwuchs, 850 m, 18.3.01.
- (29) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, *Nothofagus dombeyi*-N. *betuloide*-Wald (ca. 20 m hoch) auf Lava, 950 m, 18.3.01.
- (30) X. Region, Parque Nacional Puyehue 50 km E Osorno, Sector Antillanca, nahe Centro de Ski, *Nothofagus pumilio*-Wald (max. 15 m) 1050-1160 m, *Nothofagus pumilio*-N. antarctica-Wald 1160 m-Waldgrenze (1200m), 18.3.01.
- (31) X. Region, Straße Hotel Termas - argentinische Grenze am Parque Nacional Puyehue, 50 km E Osorno, Myrtaceen-Sumpfwald im Tal des Rio Gol Gol, 200 m, 40° 40' 27,4'' S, 70° 17' 23,3'' W, 19.3.01.
- (32) X. Region, Vicente Perez Rosales Nacional Park, Auffahrt zum Refugio Vulcan Osorno, *Eucryphietum* mit *Nothofagus dombeyi*, 400 m, 20.3.01.

Acknowledgements

This study resulted from fieldwork BRYO AUSTRAL, supported by the German Research Foundation (Fr 481/9-3). I like to thank the Corporación Nacional Forestal (CONAF) for research permits.

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