

Studies on the moss flora of the Bío-Bío region of Chile: Part 2

Robert R. Ireland¹, Gilda Bellolio², Juan Larraín² & Roberto Rodríguez²

¹ Smithsonian Institution, Botany Dept., National Museum of Natural History, MRC-166, P.O. Box 37012, Washington, D. C., 20013-7012, U.S.A (irelandr@si.edu).

² The Flora of Chile Project, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Casilla 160-C, Concepción, Chile. (gilbell@hotmail.com; juanlarraín@udec.cl; rrodrigu@udec.cl)

Abstract: The mosses reported in this paper are the result of an earlier study (Ireland et al. 2006) on the moss flora of the Bío-Bío Region (Región VIII) in south-central Chile in 2001–2003. Identifications of more of the collections made during this period, plus some recent ones (2006–2010), yielded additional records that are reported for the four provinces, namely Arauco, Bío-Bío, Concepción and Ñuble, two of which are new to Chile, and 13 for the Bío-Bío Region. Furthermore, five species are excluded from the moss flora of Chile.

Keywords: Bryophyta, mosses, Chile, Bío-Bío Region, distribution, southern South America.

Introduction

Additional identifications of the collections made in the Bío-Bío Region (Región VIII) of Chile during the time of collecting in 2001–2003, in addition to some recent collections made by J. Larraín in 2006–2010, have produced two new records for Chile, 13 for the Bío-Bío Region, and several for each of the four provinces in the Bío-Bío Region. The original checklist of the mosses of Chile by He (1998) has been recently updated by Müller (2009) after several studies by bryologists, including Ireland et al. (2006), which have produced a number of new records. Additional information for some of the mosses of the Bío-Bío Region collected by us, many of which were listed by Müller (2009) taking information from the Missouri Botanical Garden (Tropicos) and the New York Botanical Garden (C.V. Starr Virtual Herbarium) online databases, is presented in this paper. The phytogeographic description, climate and geomorphology of the Bío-Bío region are all described in the first report (Ireland et al. 2006). Collection numbers are those of Ireland and Bellolio unless another collector is cited. Specimens have been identified by R.R. Ireland or J. Larraín, unless indicated otherwise. Voucher specimens are at CONC, MO and most others at US, with many at NY. Nomenclature mainly follows that of Crosby et al. (2000) with authors of plant names abbreviated following Brummitt & Powell (1992). The distribution information following the taxa in the section “Mosses New to the Bío-Bío Region of Chile” are from Müller’s (2009) updated checklist.

Mosses New to Chile

Splachnobryum obtusum (Brid.) Müll. Hal.—Concepción Prov., Tumbes, 36°38’S, 73°07’W, alt. 0–58 m, 31619.

This species was previously reported from Chile without locality information by Arts (2001). A specimen annotated in US by T. Arts in July 1995 as *S. obtusum* and originally det. as *Splachnobryum valdiviae* Müll. Hal. from Malleco Prov., Curacautín, Manzanares, G. Montero 7799, is *Bryum* sp. (det. R.R. Ireland 2007).

Syntrichia robusta var. *recurva* (Lightowlers) R.H. Zander – Ñuble Prov., Termas de Chillán, trail to Aguas Calientes, 36°54’S, 71°23’W, alt. ca. 2350 m, 36029 (det. M.T. Gallego 2006).

Mosses New to the Bío-Bío Region of Chile

Achrophyllum anomalum (Schwägr.) H. Rob. – Bío-Bío Prov., camino entre Polcura y Antuco, 5 km más arriba de la central hidroeléctrica, 37°19’S, 71°42’W, alt. ca. 700 m, Larraín 26248 (det. H.E. Robinson 2007).

Previously known as far north as Región IX (Malleco Prov.).

Bucklandiella orthotrichacea (Müll. Hal.) Bednarek-Ochyra & Ochyra – Ñuble Prov., small end of Las Truchas Lake, 36°41’S, 71°11’W, alt. ca. 1300 m, 36162; alrededores del hotel Termas de

Chillán, ca. 100 m más arriba del Gran Hotel, 36°54'S, 71°24'W, alt. ca. 1600 m, *Larrai* 25906.

Previously reported for Región VII (Talca Prov.), and from Región XIV (Valdivia/Ranco Provs.) to Región XII. These collections fill a gap in its distribution range in southern Chile.

Dicranoloma chilense (De Not.) Ochyra & Matteri – Arauco Prov., Cordillera de Nahuelbuta, Pino Huacho, 37°42'S, 73°10'W, alt. ca. 750 m, *Larrai* 26292. Bío-Bío Prov., 37.7 km S of El Barco Lake, 38°02'S, 71°21'W, alt. ca. 950 m, no. 34292.

Known north of the Bío-Bío Region from Región V and south from Región IX–XII, as well as the Juan Fernández Is.

Ditrichum conicum (Mont.) Mitt. – Bío-Bío Prov., Embalse Callaqui at Bío-Bío River, 37°50'S, 71°41'W, alt. ca. 400 m, 35494.

Previous to this record known only as far north as Región IX (Cautín Prov.).

Notoligotrichum minimum (Cardot) G.L. Sm. – Bío-Bío Prov., Alto Bío-Bío, Reserva Nacional Ralco, Laguna La Mula, 37°53'S, 71°21'W, alt. ca. 1550 m, *Larrai* 31775.

This is a northern range extension for this species. It was previously reported from Región IX (Malleco Prov.) to Cape Horn, as well as for the Juan Fernández Is.

Orthotrichum densum Lewinsky – Ñuble Prov., Termas de Chillán & environs, 36°55'S, 71°42'W, alt. ca. 1660 m, 30553a.

This is a northern range extension from Región IX (Cautín Prov.).

Sphagnum* cf. *subsecundum Nees – Arauco Prov., Pino Huacho, Cordillera de Nahuelbuta, 37°42'S, 73°10'W, alt. ca. 750 m, *Larrai* 26291.

Notwithstanding that all the reports of *S. subsecundum* from southern Chile might refer to an undescribed species (R. Andrus, pers. com.), we report this taxon as new for the Bío-Bío Region because it is the only *Sphagnum* section *Subsecunda* in the study area. This probably undescribed taxon has been reported only for Chiloé and Llanquihue Provinces, both in the Los Lagos Región (X), as *Sphagnum subsecundum*.

Syntrichia fragilis (Taylor) Ochyra – Bío-Bío Prov., Trapa-Trapa, 37°42'S, 71°16'W, alt. ca. 980 m, 35584, 35587 (as *Tortula laevinervis* (Broth.) Dusén, see Cano & Gallego 2008). Concepción Prov., Periquillo, 5 km W of Hualqui, 36°57'S, 72°57'W, alt. ca. 49 m, 31403. Ñuble Prov., Las Trancas, Palo Huacho, 36°54'S, 71°28'W, alt. ca. 1600 m, 36079 (det. M.T. Gallego 2006).

Previously reported from three regions to the north (XV, IV and V).

Syntrichia princeps (De Not.) Mitt. – Bío-Bío Prov., Alto Bío-Bío, Reserva Nacional Ralco, en la entrada por sector Ralco Lepoy, junto a la administración de CONAF, 37°59'S, 71°18'W, alt. ca. 1000 m, *Larrai* 31792.

This taxon was previously reported from Región V and from Región IX–XII. Although Ochyra et al. (2008) stated that all reports of *S. princeps* from the Southern Hemisphere are erroneous, the specimen examined was observed to have hydroids present in the cross section of the costa with the presence of a 4–6 layered stereid band and leaves with strongly serrated hyaline awns. These characters would distinguish it from *S. magellanica* (Mont.) R.H. Zander and other species of this complex from southern South America.

Syntrichia ruralis (Hedw.) F. Weber & D. Mohr – Arauco Prov., S side of Lleu-Lleu Lake, 6 km E of Hwy. P-70, 38°12'S, 73°22'W, alt. ca. 217 m, 36448. Bío-Bío Prov., El Toro Hydroelectric Plant, 37°19'S, 71°36'W, alt. ca. 600 m, 35107; Trapa-Trapa, 37°42'S, 71°16'W, alt. ca. 980 m, 35585; Ralco National Reserve, 38°06'S, 71°23'W, alt. ca. 880 m, 35642. Ñuble Prov., Shangrila, road to ruins of old German hotel, 36°52'S, 71°30'W, alt. ca. 1500 m, 30868; Termas de Chillán & environs, 36°55'S, 71°42'W, alt. ca. 1660 m, 30570.

Before these records this species was known only from Regiones VII and XII.

Syntrichia scabrinervis (Müll. Hal.) R.H. Zander – Bío-Bío Prov., road from El Pangue to Pitrillón, 37°53'S, 71°36'W, alt. ca. 540 m, 35705.

Reported previously in the north from Regiones II, IV and V, as well as from the Juan Fernández Is.

Syntrichia squarripila (Thér.) Herzog – Bío-Bío Prov., 19 km NE of Ralco, 37°45'S, 71°31'W, alt. ca. 630 m, 35562; Ralco National Reserve, 38°05'S, 71°23'W, alt. ca. 770 m, 35649; Queuco Valley, 36.8 km NE of Ralco, 1.5 km after bridge over Ñiremetún River, 37°43'S, 71°23'W, alt. ca. 760 m, 35572, 35575. Ñuble Prov., Las Truchas River, 36°42'S, 71°11'W, alt. ca. 1250 m, 36229; Confluence of Los Tábanos River with Ñuble River, 37°43'S, 71°23'W, alt. ca. 790 m, 36247; La Gloria, 3 km E of Hwy. 5, 36°23'S, 71°51'W, alt. ca. 250 m, 34604, 34609.

Before these records known only in the north from Región V (Aconcagua and Valparaíso Provinces).

Tortula jaffuelii Thér. – Arauco Prov., Tubul, on N side of río Tubul, 37°15'S, 73°26'W, alt. ca. 50 m, 31855 (mixed with *Syntrichia robusta* (Hook. & Grev.) R.H. Zander). Concepción Prov., Hwy.

148 to Florida, 15 km E of Concepción, 36°49'S, 72°47'W, alt. ca. 127 m, 31501 (det. M.J. Cano 2007). Ñuble Prov., road to garbage dump, 12 km E of Quirihue, 36°17'S, 72°25'W, alt. ca. 350 m, 32355 (det. M.J. Cano 2007).

A southward extension from Regiones IV–VI.

Mosses New to the Provinces of the Bío-Bío Region of Chile

*Previously reported Provincial records listed by Müller (2009) in parenthesis.

Aongstroemia gayana (Mont.) Müll. Hal. – Concepción Prov., road from Dichato to Burca, 3 km N of Dichato, 36°31'S, 72°54'W, alt. ca. 89 m, 32222. (Bío-Bío, Ñuble)

Brachythecium conostomum (Taylor) A. Jaeger – Bío-Bío Prov., Saltillo del Itata, small falls of Itata River, 37°04'S, 72°09'W, alt. ca. 210 m, 34955; 19 km NE of Ralco, 37°45'S, 71°31'W, alt. ca. 630 m, 35523. (Arauco, Ñuble)

Brachythecium rutabulum (Hedw.) Schimp. – Arauco Prov., Cupaño bridge, 37°36'S, 73°29'W, alt. ca. 39 m, 33799. (Bío-Bío, Ñuble)

Brachythecium subpilosum (Hook. f. & Wilson) A. Jaeger – Arauco Prov., Llico, on hill at the Virgin's Grotto, 37°11'S, 73°34'W, alt. ca. 150 m, 31827; coast area, 5 km E of Lloncao, 37°54'S, 73°30'W, alt. 0–20 m, 33706. Concepción Prov., Caleta Chome Punta Hualpén, 36°46'S, 73°12'W, alt. ca. 36 m, 31992 (mixed with *Juratzkaea seminervis* (Kunze ex Schwägr.) Lorentz). (Bío-Bío, Ñuble)

Brachythecium subplicatum (Hampe) A. Jaeger – Arauco Prov., Tubul, on N side of río Tubul, 37°15'S, 73°26'W, alt. ca. 50 m, 31851; Huillenco stream, 38°06'S, 73°16'W, alt. ca. 40 m, 33562. (Bío-Bío, Concepción, Ñuble)

Breutelia dumosa Mitt. – Bío-Bío Prov., National Park Lake Laja, Los Barros Military Base, 37°27'S, 71°19'W, alt. ca. 1500 m, 34094. (Concepción)

Bryum laevigatum Hook. f. & Wilson – Arauco Prov., Cordillera de Nahuelbuta, Fundo Trongol, 1 km al sur de la Piedra del Queso, 37°40'S, 73°07'W, alt. ca. 1250 m, *Larraiñ et al.* 31294. (Bío-Bío)

Bucklandiella rupestris (Hook. f. & Wilson) Bednarek-Ochyra & Ochyra – Bío-Bío Prov., National Park Lake Laja, Los Barros Military Base, 37°27'S, 71°19'W, alt. ca. 1500 m, 34101. (Ñuble)

Campylopus aureonitens (Müll. Hal.) A. Jaeger subsp. *recurvifolius* (Dusén) J.-P. Frahm – Concepción Prov., Campus Universidad de Concepción, frente al edificio de Ciencias Naturales, 36°49'S, 73°02'W, alt. ca. 30 m, *Larraiñ* 26111. (Bío-Bío)

Campylopus vesticaulis Mitt. – Ñuble Prov., Diguillín River at Los Cipreses Farm, 36°57'S, 71°32'W, alt. ca. 970 m, 35811 (det. J.-P. Frahm 2007). (Arauco, Concepción)

Chileobryon callicostelloides (Broth. ex Thér.) Enroth – Bío-Bío Prov., Rehuén Waterfalls, 5 km SE of Mulchén, 37°46'S, 72°15'W, alt. ca. 265 m, 35750. (Arauco, Concepción, Ñuble)

Cratoneuron filicinum (Hedw.) Spruce – Arauco Prov., coast area, 5 km E of Lloncao, 37°54'S, 73°30'W, alt. 0–20 m, 33698. (Bío-Bío, Ñuble)

Cratoneuropsis relaxa (Hook. f. & Wilson) M. Fleisch. ex Broth. subsp. *minor* (Wilson & Hook. f.) Ochyra – Concepción Prov., University of Concepción campus waterfalls, 36°50'S, 73°02'W, alt. ca. 80 m, 32201. (Arauco, Bío-Bío, Ñuble)

Daltonia gracilis Mitt. – Bío-Bío Prov., Salto del Laja, por el sendero hacia el salto, 37°13'S, 72°23'W, alt. ca. 120 m, *Larraiñ & Atala* 31921. Ñuble Prov., Saltos del Itata, 37°03'S, 72°11'W, alt. ca. 200 m, *Larraiñ & Bellolio* 26163. (Arauco)

Dicranella campylophylla (Taylor) A. Jaeger – Ñuble Prov., Termas de Chillán, Aguas Calientes Valley, 36°54'S, 71°22'W, alt. ca. 2450 m, 36058; large end of Las Truchas Lake, 36°41'S, 71°11'W, alt. ca. 1320 m, 36182. (Arauco, Bío-Bío)

Dicranella hookeri (Müll. Hal.) Cardot – Concepción Prov., waterfalls at toll booth near Sta. Juana, 1 km S of Curali, 37°15'S, 72°57'W, alt. ca. 135 m, 33947. Ñuble Prov., Termas de Chillán & environs, 36°55'S, 71°42'W, alt. ca. 1660 m, 30632; Las Truchas region, Maranto Rivulet Valley, 36°41'S, 71°09'W, alt. 2100 m, 36218. (Bío-Bío)

Dicranoloma perremotifolium (Dusén) Broth. – Arauco Prov., Matraquín River, 10 km E of Tirúa, on N side of Tirúa River, 38°20'S, 73°24'W, alt. ca. 195 m, 33328; Huilquihue, 37°53'S, 73°14'W, alt. ca. 540 m, 33441. (Bío-Bío)

Didymodon rigidulus Hedw. – Bío-Bío Prov., Pitril, 9 km N from Ralco, ferry site along Queuco River, 37°49'S, 71°35'W, alt. ca. 525 m, 34358. Concepción Prov., El Águila, 1 km N of Hualqui, 36°57'S, 72°56'W, alt. ca. 61 m, 31433; Quebrada Honda, 36°41'S, 72°58'W, alt. ca. 104 m, 31672. (Arauco, Ñuble)

Ditrichum hookeri (Müll. Hal.) Hampe – Bío-Bío Prov., Jaujau Farm (Mininco), 38°02'S, 71°57'W, alt. ca. 760 m, 35458. Ñuble Prov., Cayumanque Hill, 36°42'S, 72°31'W, alt. 483–792 m, 31567; Termas de Chillán, Aguas Calientes Valley, 36°54'S, 71°22'W, alt. ca. 2450 m, 36038. (Arauco)

Drummondia obtusifolia Müll. Hal. – Bío-Bío Prov., 19 km NE of Ralco, 37°45'S, 71°31'W, alt. ca.

- 630 m, 35554; Ralco National Reserve, 38°05'S, 71°23'W, alt. ca. 770 m, 35644. (Ñuble)
- Dryptodon austrofunalis*** (Müll. Hal.) Ochyra & Żarnowiec – Concepción Prov., road from Quilacova to Talcamávida, 10 km S of Quilacova, 37°10'S, 72°50'W, alt. ca. 211 m, 32122; camino entre Concepción y Santa Juana, justo antes del cruce a Patagual, 36°49'S, 72°24'W, alt. ca. 40 m, *Larrai* 26181. Arauco Prov., Las Corrientes, 9 km E of Hwy. P-60-R, 37°16'S, 73°09'W, alt. 90 m, 32939, 32941. (Bío-Bío, Ñuble)
- Fissidens curvatus*** Hornsch. – Arauco Prov., 6 km S of Contulmo, near limit of Region VIII, 38°00'S, 73°13'W, alt. ca. 100 m, 31162; 11 km S of Contulmo, 38°01'S, 73°15'W, alt. ca. 100 m, 31189. (Bío-Bío, Concepción, Ñuble)
- Gymnostomum aeruginosum*** Sm. – Concepción Prov., hills between Small Lake and Big Lake San Pedro, 36°52'S, 73°05'W, alt. ca. 320 m, 31731. (Bío-Bío, Ñuble)
- Gymnostomum calcareum*** Nees & Hornsch. – Concepción Prov., General Cemetery in Concepción, 36°49'S, 73°04'W, alt. ca. 10 m, 33840. Ñuble Prov., Renegado Falls, Recinto, 36°52'S, 71°39'W, alt. ca. 850 m, 35867. (Bío-Bío)
- Gymnostomum tenerrimum*** (Müll. Hal.) Wijk & Margad. – Concepción Prov., Nonguén Valley, CORFO farm, 36°53'S, 72°59'W, alt. ca. 102 m, 31379. (Ñuble)
- Kindbergia praelonga*** (Hedw.) Ochyra – Arauco Prov., Monumento Natural Contulmo, 38°01'S, 73°11'W, alt. ca. 330 m, *Larrai* 26295. (Bío-Bío, Concepción)
- Leptotheca gaudichaudii*** Schwägr. – Ñuble Prov., Coihueco, camino a Reserva Los Huemules de Niblinto, 36°41'S, 71°35'W, alt. ca. 1000 m, *Larrai et al.* 31321. (Arauco, Bío-Bío, Concepción)
- Lopidium concinnum*** (Hook.) Wilson – Bío-Bío Prov., Ralco National Reserve, 38°00'S, 71°29'W, alt. ca. 740 m, 35677. (Arauco)
- Macromitrium crassiusculum*** Lorentz – Arauco Prov., Matraquín River, 10 km E of Tirúa River, 38°20'S, 73°24'W, alt. ca. 195 m, 33331. Bío-Bío Prov., 19 km NE of Ralco, 37°45'S, 71°31'W, alt. ca. 630 m, 35557. (Concepción)
- Microcampylopus leucogaster*** (Müll. Hal.) B.H. Allen – Concepción Prov., hills between Small Lake and Big Lake San Pedro, 36°52'S, 73°05'W, alt. ca. 320 m, 31738; Caracol Hill, 36°49'S, 73°02'W, alt. ca. 250 m, 31893 (det. B.H. Allen 2009). Ñuble Prov., road from Punta Pullay to Copilemo, 36°01'S, 72°44'W, alt. ca. 460 m, 32412a. [First reported for Chile from Arauco Prov. by Müller (2009) based on 32952 (det. B.H. Allen) in Tropicos; also known in Arauco Prov. from specimen 33482]
- Orthotrichum anaglyptodon*** Cardot & Broth. – Bío-Bío Prov., El Barco Lake, 37°56'S, 71°16'W, alt. ca. 1290 m, 34195; valley of Rucué River, 37°23'S, 71°40'W, alt. ca. 640 m, 35011. (Ñuble)
- Orthotrichum araucarieti*** Müll. Hal. – Bío-Bío Prov., valley of Rucué River, 37°23'S, 71°40'W, alt. ca. 640 m, 35012; Ralco National Reserve, 38°05'S, 71°23'W, alt. ca. 770 m, 35649a. (Ñuble)
- Orthotrichum assimile*** Müll. Hal. – Arauco Prov., Huillenco stream, 38°06'S, 73°16'W, alt. ca. 40 m, 33558. (Bío-Bío, Concepción, Ñuble)
- Orthotrichum brotheri*** Dusén ex Lewinsky – Arauco Prov., San Alfonso, 25 km E of Antihuala, 37°42'S, 73°10'W, alt. ca. 770 m, 33749. Concepción Prov., road to Roa, 8 km N of Hwy. 148, 36°44'S, 72°47'W, alt. ca. 130 m, 34014. (Bío-Bío, Ñuble)
- Orthotrichum pariatum*** Mitt. ? – Bío-Bío Prov., El Toro Hydroelectric Plant, 37°19'S, 71°36'W, alt. ca. 600 m, 35111. [*Ireland & Bellolio* 30669, from Ñuble Prov., with the species identity also in question, was the first province cited from Región VIII by Müller (2009) in Tropicos where it was collected at Termas de Chillán & environs, 36°55'S, 71°41'W, alt. ca. 1660 m]
- Orthotrichum tristriatum*** Lewinsky – Arauco Prov., Bajo Ranquil, 26 km N of Ranquil village, on Hwy. P-40, 37°17'S, 73°29'W, alt. ca. 21 m, 33820. Bío-Bío Prov., Ecological Reserve Coligual, 37°23'S, 71°40'W, alt. ca. 630 m, 35200; Piulo Bridge, canyon on Bío-Bío River, 37°42'S, 71°49'W, alt. ca. 350 m, 35722. Ñuble Prov., La Gloria, 3 km E of Hwy. 5, 36°23'S, 71°51'W, alt. ca. 250 m, 34613; Avendaño Lake, 36°46'S, 72°26'W, alt. ca. 120 m, 34906. (Concepción)
- Philonotis nigroflava*** Müll. Hal. – Bío-Bío Prov., valley of Rucué River, 37°23'S, 71°40'W, alt. ca. 640 m, 35081; Quilaco, 37°40'S, 72°01'W, alt. ca. 350 m, 35481. (Arauco, Ñuble)
- Platyneurum praealtum*** (Mitt.) Ochyra & Bednarek-Ochyra – Arauco Prov., Cordillera de Nahuelbuta, fundo Butamalal, 37°45'S, 73°04'W, alt. ca. 1100 m, *Larrai et al.* 31556. (Bío-Bío, Ñuble)
- Pleuroidium subnervosum*** (Müll. Hal.) A. Jaeger ex Paris – Ñuble Prov., Cayumanque hill, 36°42'S, 72°31'W, alt. 483 to 792 m, 31527. [Reported from Concepción Prov. in Bío-Bío Region by Müller (2009) as *P. macrothecium*, considered a synonym of *P. subnervosum* by Yip (2000)]
- Polytrichum juniperinum*** Hedw. – Concepción Prov., road from Quilacova to Talcamávida, 10 km S of Quilacova, 37°10'S, 72°50'W, alt. ca. 211 m, 32139. (Arauco, Bío-Bío, Ñuble)
- Pseudocrossidium crinitum*** (Schultz) R.H. Zander – Concepción Prov., Camino a Santa Juana, ca. 20 km SE of Concepción, 37°01'S, 72°59'W, alt. ca. 56 m, 30356; road from Copilemu to Hualqui,

- 36°54'S, 72°49'W, alt. ca. 265 m, 31805. (Bío-Bío, Ñuble)
- Rigodium implexum** Kunze ex Schwägr. – Arauco Prov., Mocha Island, trail in National Park, 38°20'S, 73°53'W, alt. 15–350 m, 33123, 33133. Ñuble Prov., Cerro Cayumanque, bosques aledaños a antena central, 36°42'S, 72°31'W, alt. ca. 800 m, *Larraín et al.* 28185A. (Concepción)
- Schistidium apocarpum** (Hedw.) Bruch & Schimp. – Concepción Prov., road from Quilacoya to Talcamávida, 10 km S of Quilacoya, 37°10'S, 72°50'W, alt. ca. 211 m, 32149. (Bío-Bío, Ñuble)
- Schistidium scabripes** (E.B. Bartram) Deguchi ? – Bío-Bío Prov., El Salto on Queuco River, 15 km N of Ralco, 37°47'S, 71°32'W, alt. ca. 530 m, 34395. (Ñuble)
- Symblepharis krausei** (Lorentz) Ochyra & Matteri – Bío-Bío Prov., waterfall on cliff along Bío-Bío River, close to Hosteria Doña Pola, 37°46'S, 71°43'W, alt. ca. 350 m, 34166 (det. B.H. Allen 2008), 34154, 34160; road from El Pangue to Pitirillón, 37°53'S, 71°36'W, alt. ca. 540 m, 35713. Ñuble Prov., 22 km E from San Fabián de Alico, road by Ñuble River, 36°39'S, 71°21'W, alt. ca. 730 m, 34725; Diguillín River at Los Cipreses Farm, 36°57'S, 71°32'W, alt. ca. 970 m, 35822. (Arauco)
- Syntrichia laevipila** Brid. – Ñuble Prov., Cayumanque Hill, 36°42'S, 72°31'W, alt. 483–792 m, 31611. (Arauco, Concepción)
- Syntrichia robusta** (Hook. & Grev.) R.H. Zander – Arauco Prov., Tubul, on N side of río Tubul, 37°15'S, 73°26'W, alt. ca. 50 m, 31855 (mixed with *Tortula jaffuelii* Thér.). Bío-Bío Prov., road by Rucué River, 5 km E from swinging bridge, 37°24'S, 71°39'W, alt. ca. 720 m, 35260, 35279. Concepción Prov., road to Las Pataguas, 3 km N from Hwy. 148, 36°49'S, 72°53'W, alt. ca. 222 m, 31741; road to Agua de la Gloria, 5 km N from Hwy. 0-50, 36°52'S, 72°56'W, alt. ca. 228 m, 31791. (Ñuble)
- Syntrichia serrulata** (Hook. & Grev.) M.J. Cano – Arauco Prov., 11 km S of Contulmo, 38°01'S, 73°15'W, alt. ca. 100 m, 31179; Reserva Forestal Contulmo, 38°01'S, 73°12'W, alt. ca. 400 m, 31210, 31213. Concepción Prov., Periquillo, 5 km W of Hualqui, 36°57'S, 72°57'W, alt. ca. 49 m, 31429. (Bío-Bío, Ñuble)
- Tortula truncata** (Hedw.) Mitt. – Bío-Bío Prov., Los Ángeles, Fundo El Avellano, por Av. Sor Vicenta entrando por Santuario Schönstat, 37°26'S, 72°20'W, alt. ca. 160 m, *Larraín* 31849. (Concepción)
- Ulota macrodontia** Dixon & Malta ? – Concepción Prov., Valle Nonguén, 36°52'S, 72°59'W, alt. ca. 56 m, 30454. (Arauco, Ñuble)
- Ulota rufula** (Mitt.) A. Jaeger – Bío-Bío Prov., Ralco National Reserve, 38°06'S, 71°23'W, alt. ca. 880 m, 35643a. (Arauco, Ñuble)
- Willia brachychaete** (Dusén) R.H. Zander – Ñuble Prov., Los Cipreses Farm, 36°56'S, 71°33'W, alt. ca. 1010 m, 35845; San Fabián de Alico, playa rocosa casi al llegar a Caracol, junto al río Ñuble, 36°39'S 71°23'W, alt. ca. 600 m, *Larraín* 31503. (Bío-Bío)
- Zygodon hookeri** var. **leptobolax** (Müll. Hal.) Calabrese – Arauco Prov., road from Caramávida to Pino Huacho, 22 km E of Antihuala, 37°42'S, 73°11'W, alt. ca. 750 m, 33732. (Bío-Bío, Concepción, Ñuble)

Discussion

In his updated checklist, Müller (2009) reported 315 moss taxa for the Bío-Bío Region, which after a careful search through his paper we found they correspond to 304 species and 11 infraspecific taxa. Of this number, five taxa should be excluded, giving a final number of 310 taxa, corresponding to 299 species and 11 infraspecific taxa. The excluded species are as follows:

Sphagnum flexuosum Dozy & Molk. was reported by Müller (2009) from Ñuble Province, while He (1998) reported this same taxon as *S. recurvum* P. Beauv. This record originates from a single collection made by the Chilean pharmacist and botanist Hugo Gunckel, determined by M.R. Henry as *S. amblyphyllum* (Russ.) Warnst., and reported by Thériot (1934) from “San Carlos”. We found a duplicate of the specimen cited by Thériot (*Gunckel* 2047 at CONC), but the collection does not come from the well known locality of San Carlos in Ñuble Province, as believed by He (1998) and Müller (2009), but it comes from Caleta San Carlos, a small hamlet located 2 km farther north from Niebla, along the coast of Valdivia Province, as it is clearly stated on the specimen label. In addition, it corresponds to *S. fimbriatum* Wilson, not *S. flexuosum*, so this taxon should be excluded from the Chilean moss flora, and the genus *Sphagnum* from Ñuble Province. Indeed, the northernmost record for *Sphagnum* in Chile is at Cordillera de Nahuelbuta, in Arauco Province.

All records of *Bucklandiella crispula* (Hook.f. & Wilson) Bednarek-Ochyra & Ochyra from Chile are erroneous and mostly correspond to misdeterminations of *B. didyma* (Mont.) Bednarek-Ochyra & Ochyra, *B. orthotrichacea* (Müll. Hal.) Bednarek-Ochyra & Ochyra, *B. rupestris* (Hook. f. & Wilson) Bednarek-Ochyra & Ochyra, or other related species (J. Larraín, unpublished data). *Bucklandiella crispula* is an endemic species from the Auckland Islands and Campbell Island, located south of New Zealand (Ochyra et al. 2008).

Bartramia potosica Mont. was first reported from Chile by Ireland et al. (2006). The three specimens

Table 1. Numbers of moss taxa for each of the provinces, and the total, for the Bío-Bío Region (VIII). Müller 2009 represents the information available before this study. (sp=species; ist=infraspecific taxa; *=total numbers excluding the deleted species in this study)

		Arauco	Bío-Bío	Concepción	Ñuble	VIII Region
Müller 2009	taxa	155	171	169	185	310*
	sp/ist	152/3	168/3	164/5	181/4	299*/11
This study	species	22	29	21	20	12
	ist	0	0	0	1	1
Total	taxa	177	200	190	206	323
	sp/ist	174/3	197/3	185/5	201/5	311/12

that were reported from Ñuble Province do not correspond to this species, but to *B. ithyphylla* Brid. subsp. *patens* (Brid.) Fransen, a taxon already reported for this province (Müller 2009).

Dicranella harrisii (Müll.Hal.) Broth. was reported from Concepción Province by Müller (2009), based on a single collection reported in Tropicos and deposited in MO (Ireland & Bellolio 31893). This specimen was renamed by Bruce Allen as *Microcampylopus leucogaster*, and reported in this paper. Therefore, *Dicranella harrisii* should be excluded from the moss flora of Chile.

Müller (2009) reported *Pleuridium andinum* Herzog from Chile based on specimens reported in Tropicos (Ireland & Bellolio 31527 & 31965). However, both specimens are *P. subnervosum*, a species reported as *P. macrothecium* Dusén by Müller (2009) and first synonymized by Yip (2000). The new record for this taxon from Ñuble Province is indicated in this paper, in section "Mosses New to the Provinces of the Bío-Bío Region of Chile." *Pleuridium andinum* should also be excluded from the moss flora of Chile.

Deleting these species from the taxa reported by Müller (2009) for Bío-Bío region, and including the new records reported in this paper, we can update the total number of moss taxa for the region to 323, corresponding to 311 species and 12 infraspecific taxa. In the case of the four provinces, we have reported several new moss taxa for each of them, which are summarized in Table 1.

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