De: Nicolas Guillermo Lavandero Lopez <[redacted]>
Enviado el: sábado, 15 de junio de 2024 22:21
Para: DS Lista Sitios
Asunto: Antecedentes sitios prioritarios Coquimbo
Datos adjuntos: Sitios_prioritarios_NLAVANDERO.zip

Estimadas y estimados,

En el marco de la recepción de antecedentes para determinar los Sitios Prioritarios de la Estrategia Nacional de Biodiversidad y las Estrategias Regionales de Biodiversidad que pasarán a regirse por la ley 21600, adjunto la información de dos enclaves muy importantes de biodiversidad en la region de Coquimbo:

1. Cerro Talinay de Huentelauquén (coordenadas de referencia 31°29'12.3"S 71°32'04.3"W)

Comprende el cordón montañoso donde, debido a la morfología del cerro, se genera un oasis de niebla como el presente en el PN Fray Jorge. El bosque está formado principalmente por Myrceugenia correifolia, Azara celastrina, Citronella mucronata, Myrceugenia rufa y Griselinia scandens. Es un sector muy afectado por incendios producto del tendido eléctrico que hay hacia las antenas de telecomunicación que tiene en su cima, además de la ganadería (ovejas, cabras, vacas). Su bosque relicto presenta una enorme diversidad de especies de briófitas, algunas nuevas para la ciencia y otras por describir. Adjunto al correo va un listado de especies de briófitas y de plantas vasculares observadas en el sector.

2. Complejo de bosques de nieblas y quebradas de Los Vilos (coordenadas de referencia 31°58'24.8"S 71°27'17.0"W)

Incluye los sectores conocidos como:
Quebrada el Boldo
Quebrada Pan de Azucar
Quebrada El Negro
Quebrada Agua Buena
Quebrada Cascabeles
Quebrada El Durazno
Fundo Cascabeles
Fundo Caracas
Es un cordón montañoso de hasta 1000 msnm, que debido a sus características geomorfológicas, captura agua de la niebla, al igual que el bosque relicto del PN Fray Jorge. En sus quebradas corre agua de manera constante durante todo el año.
En este sector se encuentran especies higrófilas como Aextoxicon punctatum, Gunnera Magellanica, Citronella mucronata y la población más nortina de Passiflora pinnatistipula en Chile.
Lamentablemente este sector ha sido intervenido innumerables veces por la parcelación que se encuentra en el fundo cascabeles, de donde también han extraido agua de las vertientes de manera ilegal para abastecer de agua a las parcelas, destruyendo y dinamitando el bosque relicto.
Otra fuente de daño fue la instalación de torres de alta tensión en el cordón montañoso, que cortó bosque sin permiso de conaf.

En este lugar se han identificado muchas especies de musgos, algunos nuevos para la ciencia y otros por describir.

Adjuntamos a este correo los kmz aproximados de ambos sectores, además de listados de flora y de estudios de especies nuevas descritas en dichos sectores.
Espero que sea suficiente información para proteger estos enclaves de biodiversidad, que han sido muy poco estudiados y conservados. Es urgente tomar medidas antes que estos sectores se pierdan para siempre.

Saludos cordiales

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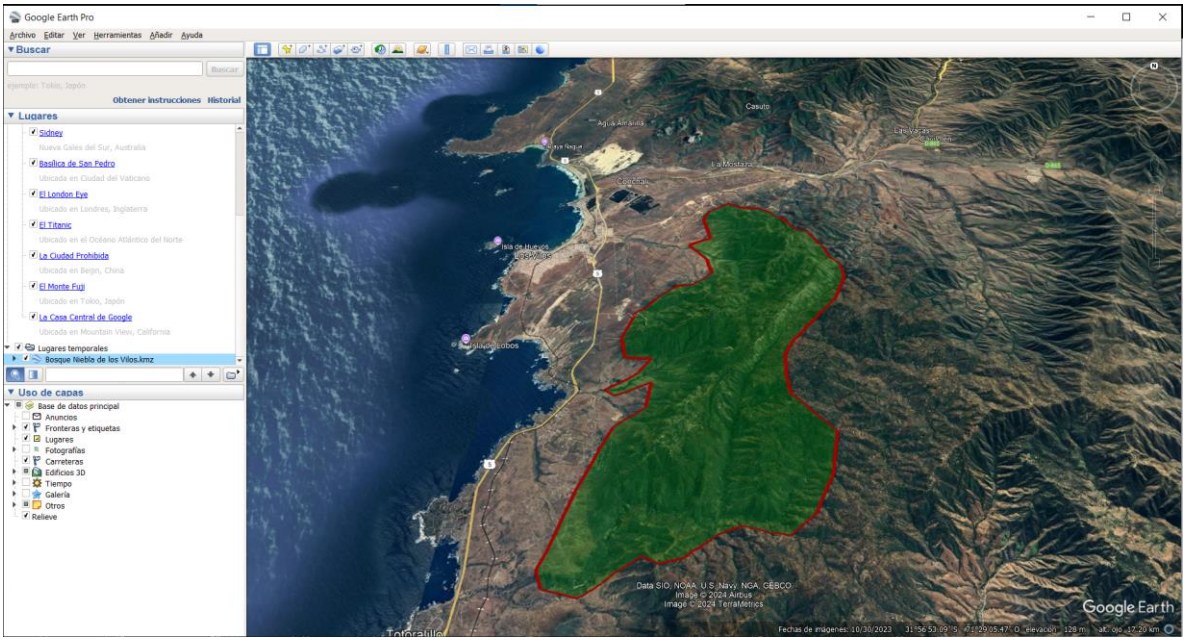
CONSTANCIA DE PIEZA EXCEPTUADA

Se deja constancia del ingreso, en calidad de pieza exceptuada del Expediente de la Macrozona Centro en el marco del artículo 8vo transitorio de la Ley 21.600 que mandata el proceso para el establecimiento de Sitios Prioritarios de la Estrategia Nacional y las Estrategias Regionales de Biodiversidad, a los siguientes archivos digitales recibidos a través de correo electrónico el 15 de junio 2024, cuyo nombre de archivo es el siguiente:

“Bosque Niebla de los Vilos.kmz”



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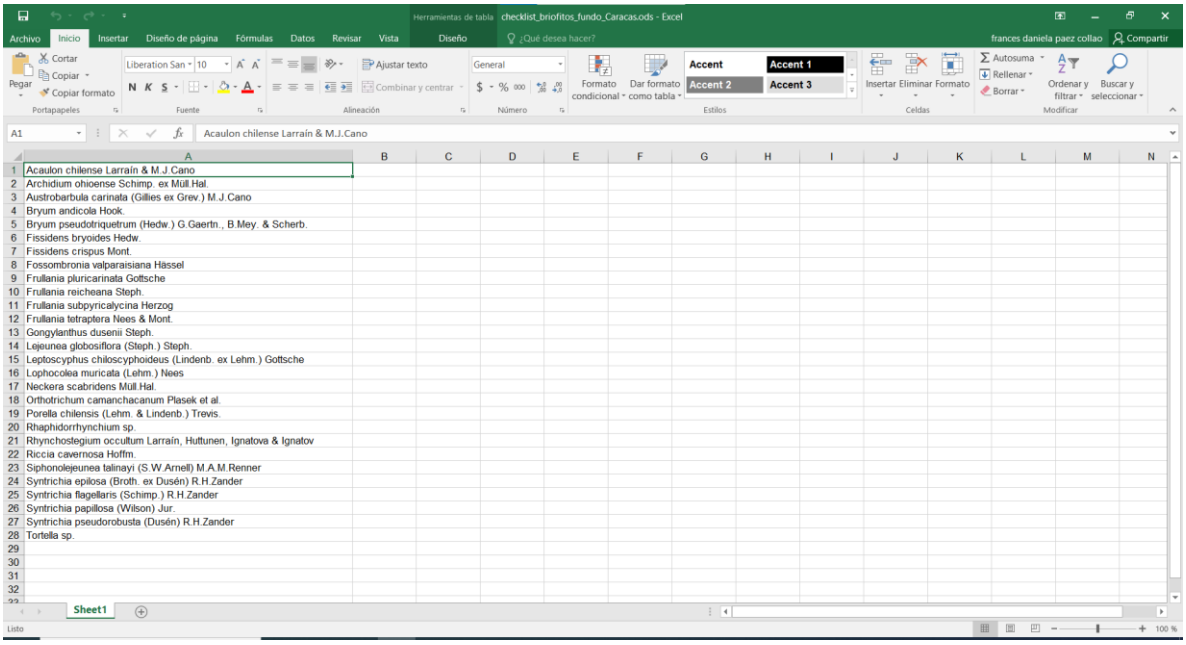
“checklist_briofitos_fundo_Caracas.ods”



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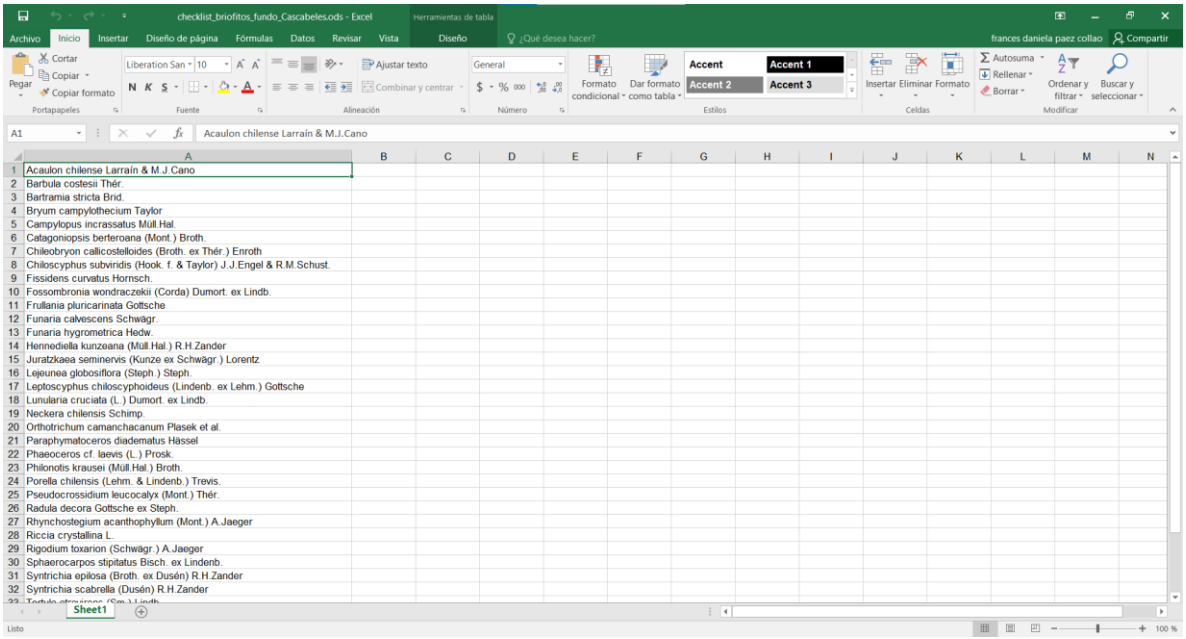
“checklist_briofitos_fundo_Cascabeles.ods”



	A
1	Acaulon chilense Larraín & M.J.Cano
2	Barbula costesii Thér.
3	Bartramia stricta Brid.
4	Bryum campylothecium Taylor
5	Campylopus incrassatus Müll.Hal.
6	Catagoniopsis berteroana (Mont.) Broth.
7	Chileobryon callicostelloides (Broth. ex Thér.) Enroth
8	Chiloscyphus subviridis (Hook. f. & Taylor) J.J.Engel & R.M.Schust.
9	Fissidens curvatus Hornsch.
10	Fossombronia wondraczekii (Corda) Dumort. ex Lindb.
11	Frullania pluricarinata Gottsche
12	Funaria calvescens Schwägr.
13	Funaria hygrometrica Hedw.
14	Hennediella kunzeana (Müll.Hal.) R.H.Zander
15	Juratzkaea seminervis (Kunze ex Schwägr.) Lorentz
16	Lejeunea globosiflora (Steph.) Steph.
17	Leptoscyphus chiloscyphoideus (Lindenb. ex Lehm.) Gottsche
18	Lunularia cruciata (L.) Dumort. ex Lindb.
19	Neckera chilensis Schimp.
20	Orthotrichum camanchacanum Plasek et al.
21	Paraphymatoceros diadematus Hässel
22	Phaeoceros cf. laevis (L.) Prosk.
23	Philonotis krausei (Müll.Hal.) Broth.
24	Porella chilensis (Lehm. & Lindenb.) Trevis.
25	Pseudocrossidium leucocalyx (Mont.) Thér.
26	Radula decora Gottsche ex Steph.
27	Rhynchostegium acanthophyllum (Mont.) A.Jaeger
28	Riccia crystallina L.
29	Rigodium toxarion (Schwägr.) A.Jaeger
30	Sphaerocarpos stipitatus Bisch. ex Lindenb.
31	Syntrichia epilosa (Broth. ex Dusén) R.H.Zander
32	Syntrichia scabrella (Dusén) R.H.Zander

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Rhynchostegium occultum (Brachytheciaceae), a new species from relict forests of central Chile

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Abstract

We present a description of the new species *Rhynchostegium occultum* from central Chile, including illustrations, a distribution map, and preliminary molecular data that supports its taxonomic placement. The new taxon is restricted to coastal relict forests of central Chile. An overview of the Chilean taxa of *Rhynchostegium,* and a key for local species are also provided. The new combination *Rhynchostegium corralense*, and new synonyms for *Rhynchostegium acanthophyllum* and for *Cratoneuropsis chilensis* are proposed. *Oxyrrhynchium hians* is newly reported for Chile, apparently being a recent introduction. Lectotypes are selected for *Hypnum corralense*, *Hypnum acanthophyllum*, and for *Rhynchostegiella acanthophylla* var. *robusta*.

Keywords: Bryophyta, *Eriodon*, *Eurhynchiella*, southern South America, taxonomy

Introduction

The genus *Rhynchostegium* Schimper in Bruch *et al.* (1852: 197) is still scarcely known in southern South America. Many of the names available for the Neotropical and southern South American species have not yet been revised, which makes naming collections from this area somewhat troublesome. The genus is difficult to circumscribe morphologically but could be defined by the plants with little differentiation between stem and branch leaves, ovate-lanceolate leaves more or less complanate, acuminate and serrulate throughout, weak single costae often ended in a dorsal spine, autoicous sexual condition, smooth setae, and long-rostrate opercula (Buck 1998, Gradstein *et al.* 2001). Recent integrative taxonomic studies have broadened the former concept of the genus with the inclusion of *Eriodon* Montagne (1845: 98), *Platyhypnidium* Fleischer (1923: 1536) and *Eurhynchiella* Fleischer (1923: 1566) in its circumscription (Huttunen & Ignatov 2010). Adding to this, the genus *Eurhynchium* Schimper in Bruch *et al.* (1854: 217) has been narrowed to include only two boreal-temperate species (Ignatov & Huttunen 2002). The total number of species of *Rhynchostegium* recorded so far for Chile would be seven following the latest available checklist (Müller 2009).

During the ongoing Bryophyte Flora of Central Chile project led by the first author, a particular species of *Rhynchostegium* has been found that does not match any of the known species of the genus in Chile. This taxon has been repeatedly collected in relict humid forests of coastal central Chile, in the Coquimbo, Valparaíso, and O'Higgins regions, and it seems to be restricted to these environments. The forests where this new taxon is found have an interesting paleo-history, being most likely remnants of a flora that dominated central and south Chile in the Tertiary, that started to segregate during the Miocene and are currently restricted to a handful of localities that allow their existence due to particular climatic conditions, surrounded by much more arid vegetation that nowadays dominates in central Chile (Schmithusen 1956, Villagrán & Armesto 1980, Villagrán *et al.* 2004). These forests are nowadays isolated from the continuous forest cover found further south along the Chilean coast, and which extends from ca. 37°S

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towards the southern tip of the continent, at ca. 56°S. They are maintained by the continuous humidity provided by the coastal fog blown by the Westerlies winds and stopped by the coastal hills, precipitating due to the existing tree cover, creating a microclimate similar to the climate found in the much rainier southern provinces of the country.

Here we present a description of the new taxon, including illustrations, a distribution map, and preliminary molecular data. An overview and a key for the species of *Rhynchostegium* from Chile are also provided.

Methods

Data collection

Bryophyte collections from central Chile from herbaria BM, CONC, H, JE, MO, NY, PC, RO, and S have been studied in the last years for the preparation of a bryophyte flora of the area. Additionally, several localities have been visited throughout central Chile from 2005 to 2019, obtaining fresh material for morphological and molecular studies of selected taxa.

Molecular data and phylogenetic analyses

Taxon sampling and molecular markers. The phylogenetic position of the new species was tested with a data set including 53 accessions from the family Brachytheciaceae Schimper (1876) (Table 1) and one genomic marker, the internal transcribed spacer region of the nuclear ribosomal DNA (ITS1-5.8S-ITS2). Sequences for ten specimens were newly obtained for this project, 39 derived from our earlier projects on Brachytheciaceae (Huttunen & Ignatov 2010, Huttunen *et al.* 2018) and four accessions were taken from GenBank (Vanderpoorten *et al.* 2002, Wynns *et al.* 2009).

DNA isolation, PCR-amplification and sequencing. Extraction, PCR and sequencing protocols for sequences generated in earlier projects are described in Huttunen *et al.* (2008) and Huttunen & Ignatov (2010). Laboratory work for newly sequenced samples was done in the molecular laboratory in the Turku University Herbarium (TUR), University of Turku, and (for isotype) in the molecular laboratory in N.V. Tsitsin Main Botanical Garden, Moscow. DNA was extracted using the Nucleospin Plant II DNA Extraction Kit (Machery-Nagel) following the respective manufacturer's protocol. Uncleaned PCR products were sent to Macrogen Inc., South Korea (www.macrogen.com) for purification and sequencing. Sequences were edited manually with PhyDE® v0.9971 (Müller *et al.* 2005). All sequences are deposited in EMBL (European Molecular Biology Laboratory) or NCBI (The National Center for Biotechnology Information) GenBank. The sequencing protocol for *R. occultum* in the molecular laboratory of the N.V. Tsitsin Main Botanical Garden differed so that amplification products were separated on a 1% agarose gel in 1x TAE with ethidium bromide staining and purified using MinElute © Gel Extraction Kit (Qiagen, Germany). Purified PCR products were sequenced using the ABI PRISM © BigDye™ Terminator v.3. kit (Applied Biosystems) and further analyzed on an ABI PRISM 3730 automated sequencer (Applied Biosystems) at the "Genom" Common Facilities Centre, Moscow, Russia. Accession numbers of the sequences and voucher information of the specimens are listed in Table 1.

Sequence editing and phylogenetic analyses. Alignment of the sequence data was performed manually in PhyDE (Müller *et al.* 2005) using alignment from Huttunen and Ignatov (2010) as scaffold. Indels were coded into a binary data matrix using a simple indel coding (SIC) strategy (Simmons & Ochoterena 2000) as implemented in SeqState (Müller 2005). Parsimony analysis were performed using the program TNT (Goloboff *et al.* 2008). TNT analyses were run using the default settings in a new technology search (NTS) except that alignment gaps in DNA sequence data were always treated as missing data and the search was terminated after a minimum length tree was found five times. Jackknife support for clades was calculated using 1000 jackknife replications. Trees for jackknifing were obtained from an analysis similar to the original NTS for the most parsimonious tree.

Bayesian analyses were performed on the CIPRES Science Gateway (Miller *et al.* 2010) with MrBayes v3.2.7 (Ronquist *et al.* 2012). Best-fit substitution models were inferred from jModeltest v.2.1.10 (Darriba *et al.* 2012), and following its output the GTR+Γ+I model was applied for the sequence data. The restriction site model was applied for the binary indel partition in the MrBayes analysis.

Posterior probability (PP) distributions of trees were calculated using the Metropolis-coupled Markov chain Monte Carlo (MCMCMC) method, and the search strategies suggested by Huelsenbeck & Ronquist (2001) and Huelsenbeck *et al.* (2002). Four runs with four chains (5×10^6 generations each) were run simultaneously. Chains were sampled every 500 generations and the respective trees written to a tree file. The sampled parameters were studied to check that

chains have reached stationarity, and following default settings in MrBayes, 25% of trees from beginning of chains were discarded before calculating the consensus tree.

For both methods, analyses were performed both with and without the information in the indel events. The phylogenetic tree was finalized using TreeGraph2 (Stöver & Müller 2010). In the tree, Posterior Probabilities (PP) for clades are given above branches and Parsimony Jackknife (PJ) support below branches, with the first value indicating support without indels and the latter including indel events (e.g. 0.95/0.96 and 62/65; Fig. 1).

TABLE 1. Specimens used for phylogenetic analyses, including isolate extraction number (no.), GenBank accession numbers for both ITS1 and ITS2 sequences, and voucher information.

Taxon	no.	ITS1	ITS2	Voucher
Outgroup				
Brachythecium rivulare Schimp.	SH131	FM161081	FM161081	Finland, Hyrynsalmi, *A. Parnela*, 19.V.1996 (H)
Helicodontioideae				
Donrichardsia bartramii Ignatov & Huttunen	SH235	DQ200083	DQ200962	Hawaii, Maui, *W.J. Hoe 4296*, 28.VI.1976 (H)
Donrichardsia macroneuron (Grout) H.A.Crum & L.E.Anderson		AF167350	AF167350	USA, *P.L. Redfearn, Jr. 27208* (sequences from GenBank, Vanderpoorten *et al.* 2002)
Donrichardsia patulifolia (Cardot & Thér.) Ignatov & Huttunen	SH96	FM242658	FM242658	China, Hunan, *T. Koponen et al. 53920*, 1.X.1998 (H)
Donrichardsia pringlei (Cardot) Huttunen & Ignatov	SH268	FM242659	FM242659	Mexico, Michoacan, *C. Delgadillo*, 12.IX.1996 (H 3114221)
Oxyrrhynchium hians (Hedw.) Loeske	SH486	LR813216	LR813216	USA, North Carolina, *L.E. Anderson 24292*, 30.IX.1983 (S)
Oxyrrhynchium savatieri (Schimp. *ex* Besch.) Broth.	SH120	FM242667	FM242667	China, Hunan, *T. Koponen et al. 51775*, 8.X.1997 (H)
Eurhynchioideae				
Aerobryum speciosum Dozy & Molk.	SH13	FM242657	AF403619	China, Hunan, *T. Koponen et al. 52753*, 9.X.1997 (H)
Eurhynchium striatum (Schreb. *ex* Hedw.) Schimp.	SH147	FM242661	FM242661	Russia, Caucasus, *Makridin*, 13.VIII.1998 (H)
Eurhynchium angustirete (Broth.) T.J.Kop.	SH795	MK120836	MK120836	Russia, South Siberia, Kemerovo Prov., *O. Yu. Pisarenko*, 22.VII.2007 (S B158498)
Oticodium laevisetum (Sande Lac.) Huttunen, Hedenäs & Ignatov	SH67	FM242663	FM242663	China, Hunan, *T. Koponen et al. 54066*, 30.VII.1998 (H)
Palamocladium euchloron (Bruch *ex* Müll. Hal.) Wijk & Margad.	SH407	MK120843	MK120843	Turkey, Trabzon Prov., *E. Nyholm 147/82*, 8.X.1982 (S B101851)
Palamocladium leskeoides (Hook.) E.Britton	SH18	FM242673	FM242673	China, Hunan, *T. Koponen et al. 52596*, 10.X.1997 (H)
Palamocladium leskeoides (Hook.) E.Britton	SH1180	MK120851	MK120851	Brasil, Paraná, *D.F. Peralta & al. 12710*, 17.XI.2012 (TUR 118674)
Plasteurhynchium striatulum (Spruce) M.Fleisch.	SH153	FM242656	FM242656	Georgia, Abkhazia, *M. Ignatov*, 1.VIII.1987 (MHA)

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TABLE 1 (Continued)

Taxon	no.	ITS1	ITS2	Voucher
Plasteurhynchium meridionale (Schimp.) M.Fleisch.	SH410	FM242660	FM242660	France, Alpes Maritimes, *G. & P. Een*, 26.IX.2001 (S B62881)
Rhynchostegium acanthophyllum (Mont.) A.Jaeger	SH311	DQ336904	DQ336904	Chile, Prov. Arauco, *R.R. Ireland & G. Bellolio 31187*, 19.IX.2001 (H)
Rhynchostegium alopecuroides (Brid.) A.J.E.Sm.	SH633	LR813219	LR813219	Spain, Toledo, *S. Huttunen Es-41*, 31.VII.2009 (TUR)
Rhynchostegium ambiguum (Schwägr.) W.R.Buck	SH1175	LR813222	LR813222	Brazil, São Paulo, *D.F. Peralta 13938 & E.P. Fortes*, 26.IV.2013 (TUR)
Rhynchostegium aquaticum A.Jaeger	SH512	LR813220	LR813220	Argentina, Salta, *S.P. Churchill & M.M. Schiavone 19991*, 24.XI.1999 (S B40848)
Rhynchostegium assumptionis Besch.	SH334	FM242679	FM242679	Paraguay, Dpto. Paraguarí, *W.R. Buck 11808,* 4.X.1984 (H)
Rhynchostegium beskeanum (Müll.Hal.) A.Jaeger	SH1178	LR813223	LR813223	Brazil, São Paulo, *D.F. Peralta 13855* & A. Gugliota A., 17.IV.2013 (TUR)
Rhynchostegium brachypterum (Hornsch.) A.Jaeger	SH333	FM242680	FM242680	South Africa, Cape Prov., *R.E. Magill 6259*, 20.I.1979 (H)
Rhynchostegium brachypterum (Hornsch.) A.Jaeger	SH341	FM242681	FM242681	South Africa, Grootboskloof, *K. Hylander*, 16.XI.2000 (S)
Rhynchostegium brevinerve Huttunen & Ignatov	SH277	DQ200103	DQ200973	Australia, North Queensland, *A. Cairns & D. Meagher 11043*, 4.X.2004 (S)
Rhynchostegium celebicum (Sande Lac.) A.Jaeger	SH336	FM242682	FM242682	Papua New Guinea, Morobe prov., *T. Koponen 28202*, 16.V.1981 (H)
Rhynchostegium comorae (Müll.Hal.) A.Jaeger	SH332	FM242683	FM242683	Tanzania, Arusha District, *T. Pócs & R. Ochyra 88149/C*, 24–25.VI.1988 (H)
Rhynchostegium compridense (Müll.Hal. *ex* Broth.) Paris	SH1170	LR813221	LR813221	Brazil, São Paulo, *D.F. Peralta et al. 2138*, 18.II.2004 (TUR)
Rhynchostegium confertum (Dicks.) Schimp.	SH29	DQ200109	AF403622	Georgia, Caucasus, *M. Ignatov*, 27.VIII.1987 (MHA)
Rhynchostegium confusum Cezón, J.Muñoz, Hedenäs & Huttunen	SH642	LR813224	LR813224	Spain, Toledo, *K. Cezón* (MA-Musci 37821)
Rhynchostegium conostomum (Mont.) Huttunen & Ignatov	SH312	DQ336903	DQ336903	Chile, Ancud, *J. Larraín 288*, 22.I.2003 (H)
Rhynchostegium conostomum (Mont.) Huttunen & Ignatov	SH1610	LR813217	LR813217	Chile, Región de los Lagos, *E. Fuertes Lasala & J. Larraín*, 29.III.2010 (H 321589)
Rhynchostegium distratum (Hampe) A.Jaeger	SH328	FM242684	FM242684	Australia, New South Wales, *H. Streimann 38796 & J.A.Curnow*, 10.IX.1987 (H)
Rhynchostegium distratum (Hampe) A.Jaeger	SH342	FM242686	FM242686	Australia, New South Wales, *H. Streimann 60634*, 20.IV.1998 (S)

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TABLE 1 (Continued)

Taxon	no.	ITS1	ITS2	Voucher
Rhynchostegium fuegianum (Cardot) Huttunen & Ignatov	SH266	AY737450	AY737450	Chile, *Goffinet 8440* (CONN, H)
Rhynchostegium horridum Broth.	SH325	FM242687	FM242687	Tanzania, Nguru Mountains, *G. Kis & T. Pócs 9125/W*, 7.II.1991 (H)
Rhynchostegium hunanense Ignatov & Huttunen	SH313	FM242688	FM242688	China, Hunan prov., *T. Koponen et al. 54623* (H)
Rhynchostegium javanicum (Bél.) Besch.	SH340	FM242689	FM242689	Malaysia, Pahang, *L. Hedenäs MY92-483*, 25.III.1992 (S)
Rhynchostegium megapolitanum (Blandow *ex* F.Weber & D.Mohr) Schimp.	SH388	FM242692	FM242692	Portugal, Alentejo Baixo, *G. & P. Een*, 18.III.1999 (S B18444)
Rhynchostegium murale (Hedw.) Schimp.	SH547	LR813225	LR813225	Germany, Bonn, *J.-P. Frahm*, 2008 (TUR)
Rhynchostegium occultum Larraín, Huttunen, Ignatova & Ignatov	OK2557	LR813226	LR813226	Chile, Provincia de Choapa, *J. Larraín et al. 43598*, 25.VI.2019 (MHA)
Rhynchostegium pallidifolium (Mitt.) A.Jaeger	SH43	DQ200110	AF403618	China, Hunan, *T. Koponen et al. 51301*, 3.X.1997 (H)
Rhynchostegium psilopodium Ignatov & Huttunen	SH138	-	AF403643	China, Hunan, *T. Koponen et al. 51803*, 8.X.1997 (H)
Rhynchostegium riparioides (Hedw.) Cardot	SH219	DQ336918	DQ200968	U.S.A. Kentucky, *W.R. Buck 20775*, 15.IX.1991 (H 3114472)
Rhynchostegium rotundifolium (Scop. *ex* Brid.) Schimp.	SH47	DQ200111	AF403611	Russia, Caucasus, *V. Onipchenco*, 31.VIII.1999 (S)
Rhynchostegium scariosum (Taylor) A.Jaeger	SH339	FM242693	FM242693	Mexico, Mpio. Ocuilán , *L. Hedenäs ME95-6*, 9.VIII.1995 (S)
Rhynchostegium serrulatum (Hedw.) A.Jaeger	SH41	DQ200112	AF403620	U.S.A., New Jersey, *B.C. Tan*, 12.IX.1992 (H)
Rhynchostegium serrulatum (Hedw.) A.Jaeger		FJ476004	FJ476004	U.S.A., Tennessee, *D.K. Smith & P.G. Davison 194* (TENN; sequences from GenBank, Wynns *et al.* 2009)
Rhynchostegium serrulatum (Hedw.) A.Jaeger		FJ476005	FJ476005	U.S.A., Arkansas, *W.R. Buck 40412* (NY; sequences from GenBank, Wynns *et al.* 2009)
Rhynchostegium serrulatum (Hedw.) A.Jaeger		FJ476006	FJ476006	U.S.A., Pennsylvania, *J.T. Wynns 296* (BOON, NY; sequences from GenBank, Wynns *et al.* 2009)
Rhynchostegium subrusciforme (Müll.Hal.) A.Jaeger	SH214	DQ336919	DQ200974	Mexico, *C. Delgadillo M.*, 23.X.1990 (H 3114503)
Rhynchostegium tenuifolium (Hedw.) Reichardt	SH335	FM242694	FM242694	Australia, Australian Capital Territory, *H. Streimann 50179*, 20.X.1992 (H)
Rhynchostegium zeyheri (Spreng. *ex* Müll. Hal.) A.Jaeger	SH274	DQ200085	DQ200960	South Africa, Cecilia Ravine, *K. Hylander 10885*, 1.I.2001 (S)

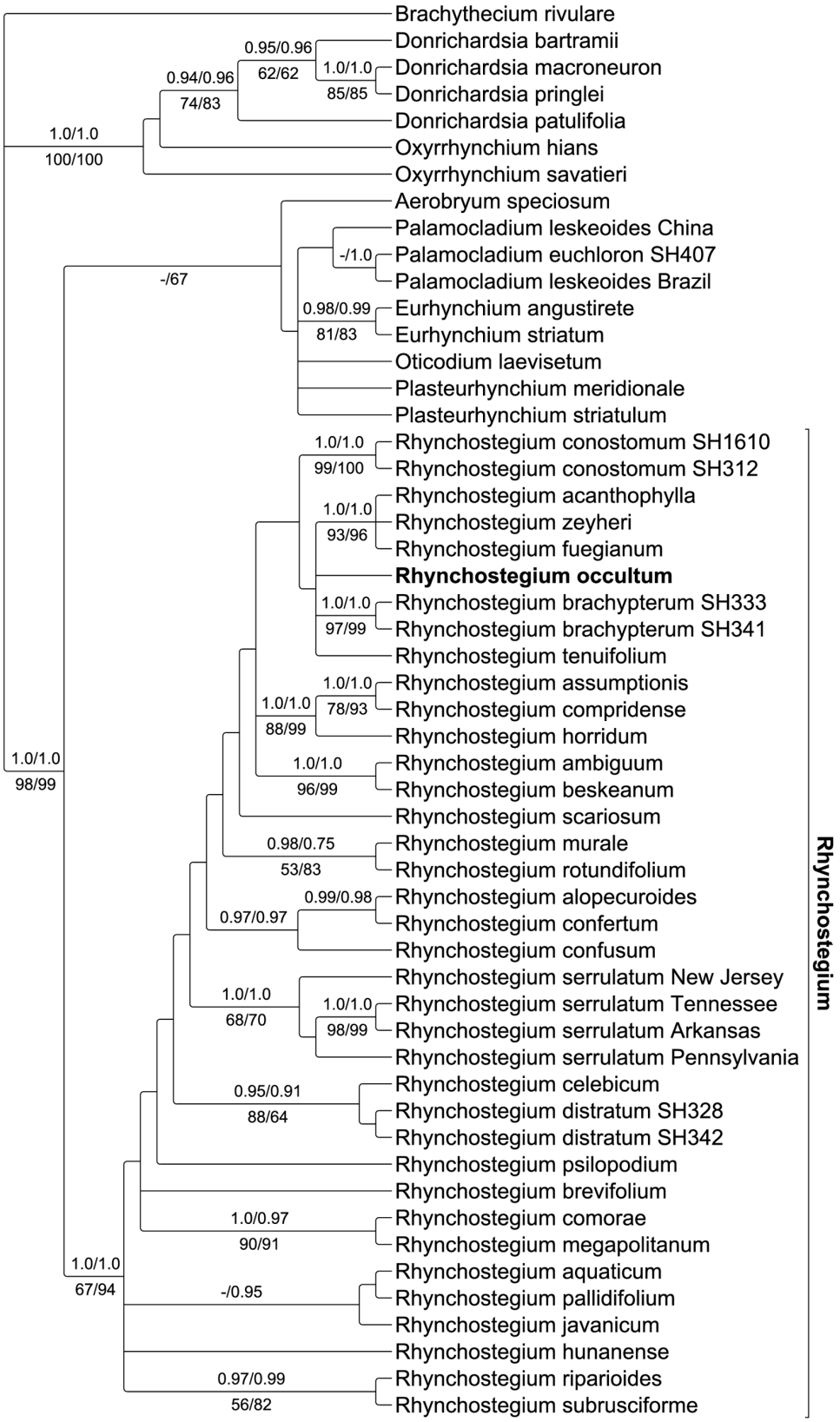

FIGURE 1. Position of *Rhynchostegium occultum* Larraín, Huttunen, Ignatova & Ignatov *sp. nov.* in the phylogenetic tree based on nuclear ribosomal ITS1-5.8S-ITS2 sequence data with indels included in analysis as binary coded matrix. The tree represents the majority consensus of trees sampled after stationarity in the Bayesian analyses. Values above nodes indicate posterior probabilities (PP) from Bayesian inference (first value without indels, second with indel data) and below nodes Jackknife support parsimony analysis (first value without indels, second with indel data). Only PP support > 0.95 and Jackknife support > 65 are indicated.

Results

Alignment and phylogenetic analyses

The alignment used for phylogenetic analyses contained 807 positions of which 22.5% were variable and 12.1% parsimony informative. A matrix with binary coded indel positions added in analyses 121 variable characters.

In the molecular tree the subfamily Eurhynchioideae Milde (1869: 298) was well-supported (PP 1.0/1.0, PJ 98/99; Fig. 1) including a *Rhynchostegium* clade that had high support in all analyses except in the parsimony analysis without indels (PP 1.0/1.0, PJ 67/94). The new *Rhynchostegium* species was resolved within the *Rhynchostegium* clade. However, in parsimony and Bayesian analyses including indel data it was included in a clade without any significant PP or PJ support, with seven other South American species, *R. conostomum* (Montagne 1845: 99) Huttunen & Ignatov (2010: 805), *R. acanthophyllum* (Montagne 1845: 90) Jaeger in Jaeger & Sauerbeck (1878: 364), *R. fuegianum* (Cardot 1905: 1010) Huttunen & Ignatov (2010: 805), *R. assumptionis* Bescherelle (1877: 271), *R. compridense* (Brotherus 1895: 63) Paris (1898: 1125), *R. ambiguum* (Schwägrichen 1827: 165) Buck (1998: 355) and *R. beskeanum* (Müller 1857: 384) Jaeger in Jaeger & Sauerbeck (1878: 375), three African species, *R. zeyheri* (Müller 1855: 785) Jaeger in Jaeger & Sauerbeck (1878: 364), *R. brachypterum* (Hornschuch 1841: 142) Jaeger in Jaeger & Sauerbeck (1878: 372), and *R. horridum* Brotherus (1910: 173), and an Australian sample of the Australasian *R. tenuifolium* (Hedwig 1801: 283) Reichardt (1870: 191). In all analysis methods, resolution within *Rhynchostegium* was poor and none of the all deep nodes got significant support or remained unresolved in the analysis without indel data.

Discussion and taxonomy

The molecular tree resolved the new species within the *Rhynchostegium* clade with high support (Fig. 1). The phylogenetic analyses also suggest a support for its position in a group of South Hemisphere taxa, but does not cluster with any of the species included in the analysis. Although a relationship with a group of other South Hemisphere taxa is suggested with part of the analysis methods, our result is not exceptional as low differentiation of ITS region at species level is fairly common in large genera of the Brachytheciaceae. Short genetic distances between the species in the *Rhynchostegium* clade are explained by young evolutionary age and high diversification rates in Brachytheciaceae (Laenen *et al.* 2014). Especially in the subfamily Eurhynchioideae, including genus *Rhynchostegium,* it is difficult to find markers with sufficient amount of variation for resolving phylogenetic relationships (Huttunen & Ignatov 2010). Besides *Rhynchostegium* there are numerous examples in *Brachythecium* Schimper in Bruch *et al.* (1853: 6) and *Sciuro-hypnum* (Hampe 1867: 76) Hampe (1874: 220), where distinct and universally accepted species differ only by one substitution in ITS, or are occasionally totally identical (Ignatov & Milyutina 2010, Hedenäs *et al.* 2012, Huttunen *et al.* 2018).

In Brachytheciaceae, ITS region is the most variable among widely used markers. Resolving the species level relationships in *Rhynchostegium* with high support would require sequencing of multiple plastid markers, finding new markers with similar amount of variable sites as in ITS, or using other type of DNA data, such as microsatellites. In addition, among Brachytheciaceae the plastid markers are usually better in resolving relationships at deep nodes but not among the terminals (unpublished results based on datasets used in Huttunen & Ignatov 2004, Huttunen & Ignatov 2010, Huttunen *et al.* 2018). Although inefficient concerted evolution has shown to cause divergent intraindividual ITS sequences in some acrocarpous moss taxa, this phenomenon has not yet been observed among hypnalean mosses (Kosnar *et al.* 2012, Lewis *et al.* 2016). Therefore we feel that phylogeny based only on ITS1-5.8S-ITS2 provides sufficient and reliable information on relationships of the new taxon.

Because our Chilean species of relict forests is morphologically distinct and does not cluster with any other species, we describe it as new for science.

Rhynchostegium occultum Larraín, Huttunen, Ignatova & Ignatov, ***sp. nov.*** Fig. 2

Holotype: CHILE, Región de Coquimbo, Provincia de Choapa, Comuna de Canela, Cerro Talinay de Huentelauquén, en quebrada boscosa con *Myrceugenia correifolia* y *Acrisione denticulata*, justo al W de las antenas de telecomunicación, sobre rocas en el suelo del bosque, 31°29'15.4"S, 71°32'50.4"W, 400 m a.s.l., 25 June 2019, *J. Larraín 43598*, with M. Ignatov, E. Ignatova, Y. Mamontov & P. Drapela (CONC). Isotype: MHA.

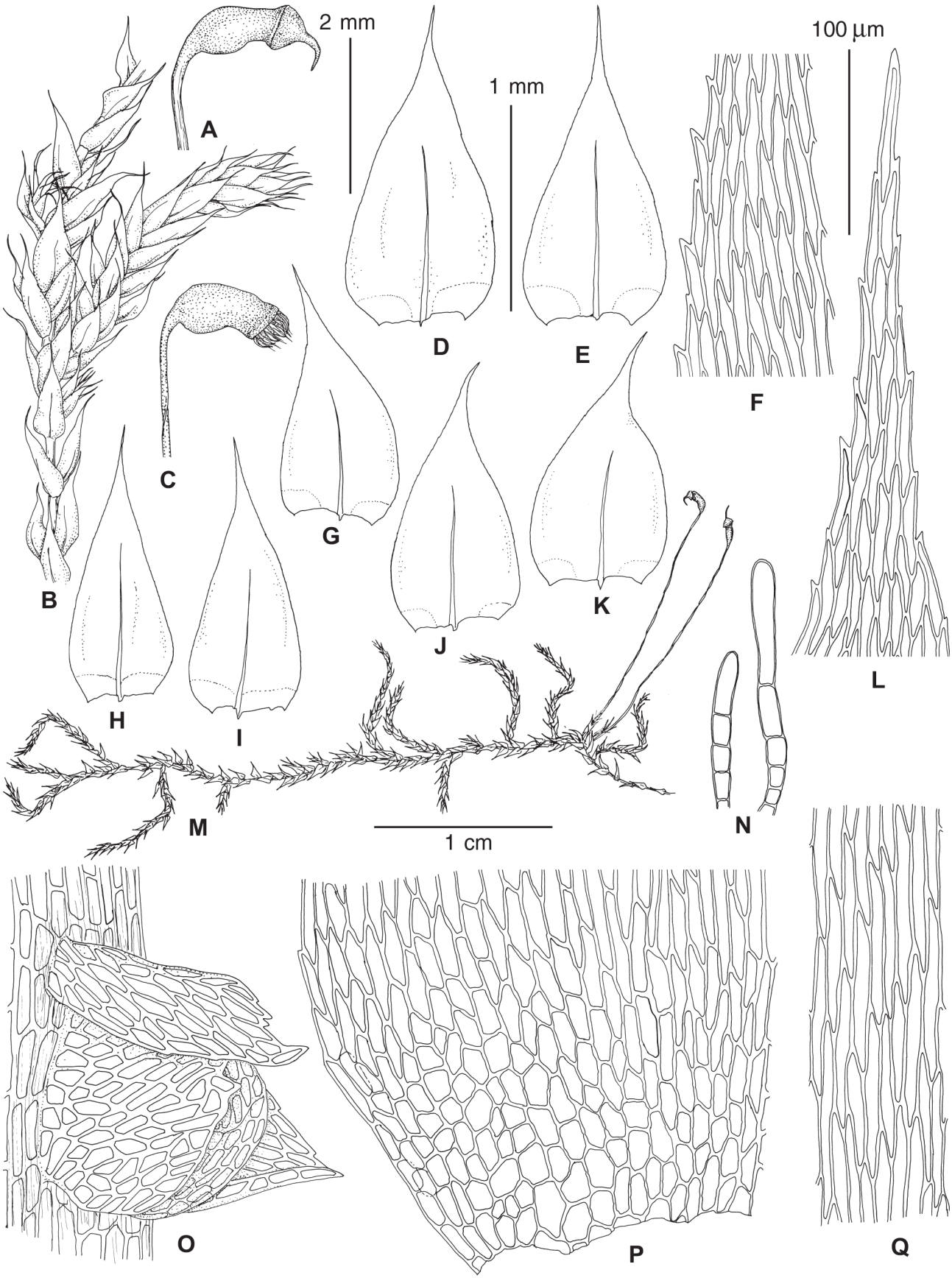

FIGURE 2. *Rhynchostegium occultum* Larraín, Huttunen, Ignatova & Ignatov *sp. nov.* (from Chile, *Larraín 43598* & al., isotype specimen, MHA). A, C: capsules; B: part of stem and branch, dry; D–E, G, J–K: stem leaves; F: mid-leaf cells at leaf margin; H–I: branch leaves; L: lamina cells at apical portion of leaf; M: plant with sporophytes, dry; N: axillary hairs; O: branch primordium; P: basal lamina cells; Q: mid-leaf cells. Scale bars: 1 cm for M; 2 mm for A–C; 1 mm for D–E, G–K; 100 µm for F, L, N–Q. (Illustrations by Elena Ignatova)

Diagnosis: *Plants with scarce differentiation between stem and branch leaves, both being ovate-lanceolate, longer than 1 mm long, acuminate, ended in a subpiliferous apex, with differentiated alar cells, forming a well developed group of cells or extending to costa*. *It differs from* R. fuegianum *in having long acuminate vs. short acuminate leaves; from* R. conostomum *in its shorter peristome teeth; from* R. peruviense *in narrow vs. stout costa*; *from* R. acanthophyllum *and South African* R. zeyheri *in medium-sized vs. small plants; from* R. corralense *in non cordate vs. cordate leaf base; from* R. complanum *in alar cells usually differentiated in a large group vs. undifferentiated or differentiated in small group; from Australasian* R. tenuifolium *in having not or slightly cordate vs. cordate leaf base and wider basal cells, 25(–30) µm vs. 15(–20) µm; and from South African* R. brachypterum *in long vs. short leaf acumina and also less concave leaves.*

Description: Plants medium-sized, light to dark green, shiny to rather dull, in loose mats. Stems creeping, with abundant rhizoids along attaching points, irregularly to subpinnately branched, seldom scarcely branched, to 7 cm long, branch length variable, mostly shorter than 1 cm long in subpinnate plants, or to 2 cm in freely branched plants, with erect leaves, seldom complanate, densely foliate; main stem 250–300 µm in diameter, slightly elliptic in cross section, with 2−4 external layers of smaller, thicker-walled cells, and a medulla of 13–16 cells across, central strand weak but present, consisting of a few cells with collapsed walls; branches similar in shape and anatomy with main stem but weaker, 160–200 µm in diameter; axillary hairs scarce, mostly minute, with 1–2 short basal cells, and 1–3 longer distal cells, 80–120 µm long; outer leaves of branch primordia triangular to ovate, acuminate, with slightly serrulate margins. Stem leaves ovate-triangular to triangular-lanceolate, symmetric or often somewhat asymmetric in lateral leaves, widest at 0.10−0.17 the leaf length, rounded to the insertion, 1.25–1.50 mm long, 0.60–0.70 mm wide, tapered gradually and then more abruptly contracted to a subpiliferous acumen, 0.15−0.25 mm long, straight to flexuose or bent, with apex sometimes ending in a uniseriate row of 2−3 cells, with terminal cell longer than cells immediately below it; costa to 0.50–0.70 the leaf length, 25–40 µm wide below, terminating in a small tooth, in cross section consisting in 5–7 undifferentiated cells; margins sharply serrate throughout; leaf cells 50–100 µm long, 6–8 µm wide, thin-walled, becoming shorter distally, alar cells differentiated in ca. 8 rows along leaf margin, 15–25(–30) µm long, 12–15 µm wide, irregular in shape, including short rectangular and triangular, with flexuose walls somewhat thicker than those in mid-leaf cells, not porose, moderately abruptly delimited from cells above, while delimitation from juxtacostal basal cells variable, sometimes even within one leaf: alar cells sometimes clearly differentiated from more regularly shaped and more thin-walled juxtacostal cells, or alar group almost reaching the costa. Branch leaves slightly differentiated from stem leaves, narrower, ovate-lanceolate, widest at 0.15–0.25 the leaf length, 1.00−1.40 mm long, 0.35−0.50 mm wide, with piliferous acumen less developed than in stem leaves.

Gonioautoicous. Perigonia small, bud-like, scarce compared to perichaetia, located on the proximal part of branches and also on leading stems, alternating with perichaetia; antheridia 8–10 per perigonium, stalked, 200–250 µm long, stalk ca. 50 µm long, paraphyses few; perigonial leaves with lax areolation, entire to uneven, costa very weak to absent, ovate to lanceolate, 500–800 µm long, 200–300 µm wide, innermost perigonial leaves almost hyaline, elliptical and acuminate. Perichaetia abundant along leading stems and branches, bearing 14–18 archegonia, 450–500 µm long, with abundant paraphyses, paraphyses to 23 cells long, smooth, hyaline, with basal cells quadrate becoming longer towards the distal part, distal cells 50–80 µm long; outer perichaetial leaves small, scale-like, ca. 1 mm long and 400 µm wide, with slightly dentate margins, ovate and abruptly contracted into a broad acumen, without a costa or costa very weak, inner perichaetial leaves much longer, serrulate, ending in a narrow acumen, to 1.5 mm long, costa very weak, base sheathing, more or less hyaline, areolation similar to vegetative leaves. Setae straight, smooth, 0.8–1.0 cm long, red at maturity, 150 µm in diameter, in cross section perfectly circular, with 2–3 cortical layers of smaller, thick-walled cells, and a medulla of 4–5 layers of larger and thinner-walled cells, with central strand; capsules 1.0–1.2 mm long, inclined, slightly arched and slightly strumose at base, slightly constricted below the mouth when dry, exothecial cells irregular in shape, mostly rectangular at the middle of the capsule, 2–4:1 times longer than wide, with evenly thickened and slightly sinuose walls, cells smaller at the capsule mouth, quadrate to short-rectangular or irregular in shape; annulus well developed; peristome double, exostome inserted slightly below capsule mouth, teeth reddish in proximal half, yellowish distally, to 350 µm long, in the proximal half transversally striolate with minute papillae above striae, more coarsely papillose and without striae in the distal half, trabeculate on the inner surface, with a hyaline border at each side at the proximal two thirds of their length; endostome the same length as the exostome, hyaline, minutely papillose on the distal half, composed of a high basal membrane reaching half the length of the endostome, segments keeled and fenestrate, becoming divided to the middle when old (down to the basal membrane), and cilia single. Stomata very few at base of capsule, with a rounded pore. Opercula oblique long-rostrate from a conic base, 1.0–1.2 mm long. Spores 12–15 µm in diameter, yellowish-green, very finely verrucose. Calyptra cucullate, smooth.

Other specimens seen (paratypes): CHILE: Región de Coquimbo. **Provincia de Limarí,** Comuna de Ovalle, Loma Fray Jorge, Coquimbo, 670 m, *C. & I. Skottsberg 502* (S); Coquimbo, Cerro Talinay, ad ramos in silva, 700 m, *C. & I. Skottsberg 370* (S). **Provincia de Choapa**, Comuna de Canela, Cerro Talinay de Huentelauquén, 400 m a.s.l., *J. Larraín 43595,* with *M. Ignatov, E. Ignatova, Y. Mamontov & P. Drapela* (CONC). Región de Valparaíso, **Provincia de Petorca**, Comuna de Zapallar, Quebrada El Tigre, 350 m, *J. Larraín 29529* (CONC), 440 m, *J. Larraín 29559* (CONC), *J. Larraín 29566* (CONC); sector Quebrada Magdalena, 212 m, *J. Larraín 42583* (CONC); Parque El Boldo, 300 m, *J. Larraín 42744* (CONC). Región del Libertador Bernardo O'Higgins, **Provincia Cardenal Caro**, Comuna de Pichilemu, Predio forestal Tanumé, CONAF, 250 m, *J. Larraín 28799* (CONC).

Etymology: the specific epithet, meaning "hidden", refers both to the relict forest habitats where the new taxon is found, and to the cryptic morphology that has prevented its description, despite being collected for the first time by Carl and Inga Skottsberg in 1917, in Fray Jorge forest in the Coquimbo Region.

Habitat and distribution: the new species grows on rocks, on soil, or on exposed roots in the forest floor, tree bark, tree stumps or fallen logs, in dense evergreen coastal relict forests dominated by *Aextoxicon punctatum* Ruiz & Pavón (1798: 260), with *Cryptocarya alba* (Molina 1782: 350) Looser (1950: 65)*, Peumus boldus* Molina (1782: 350), *Acrisione denticulata* (Hooker & Arnott 1830: 29) Nordenstam (1985: 586)*, Myrceugenia* Berg (1855: 5) spp. and *Beilschmiedia miersii* (Gay 1849: 298) Kostermans (1938: 860) as accompanying trees, eventually also with *Citronella mucronata* (Ruiz & Pavón 1802: 9) Don (1832: 243) and *Dasyphyllum diacanthoides* (Lessing 1832: 95) Cabrera (1959: 44) in the southernmost part of its known distribution (Pichilemu). It has been collected in the Coquimbo, Valparaíso and O'Higgins regions (Fig. 3).

Phytogeography and comparison with other sympatric *Rhynchostegium* species:

The new species here described is restricted to relict forests of coastal central Chile. The distribution pattern of *R. occultum* is not new for bryophyte taxa. Species currently known to be endemics of these relict forests include *Austrolejeunea talinayi* (Arnell 1956: 309) Pócs (2006: 187), *Frullania reicheana* Stephani (1910: 427), *Plagiochila frayjorgensis* Hässel de Menéndez (1983: 103), *P. talinayi* Arnell (1956: 312), *Pleurorthotrichum chilense* Brotherus (1905: 1), and *Taxilejeunea diaphana* (Lehmann 1857: 12) Stephani (1914: 463). Of these, only *Pleurorthotrichum chilense* has a distribution range that extends to the north, with scattered populations in "lomas" formations of Atacama and Antofagasta regions [*Zündorf 21411* (JE)!, *Zöllner 5880* (MO)!], where it is an epiphyte on columnar cacti. Additionally, several more widely distributed Neotropical bryophyte taxa are only reported for Chile from these same relict forest habitats. These include *Blepharolejeunea securifolia* (Stephani 1912: 128) Schuster (1980: 424), *Leptodontium filicola* Herzog (1916: 34), and *Odontolejeunea lunulata* (Weber 1815: 33) Schiffner (1893: 128).

South American *Rhynchostegium* members have not been revised since Brotherus' (1925) contribution to *Die Natürlichen Pflanzenfamilien,* and taxonomy of many names remains unclear. After the recent reorganization of the Brachytheciaceae (Ignatov & Huttunen 2002, Huttunen & Ignatov 2004), and the transfer of the endemic Chilean genus *Eriodon* and the endemic species *Eurhynchiella acanthophylla* (Montagne 1845: 90) Fleischer (1923: 1566) and *Eurhynchium fuegianum* Cardot (1905: 1010) to *Rhynchostegium* (Huttunen & Ignatov 2010), there are currently seven species of the genus reported for Chile (Müller 2009), including the new taxon here described: *Rhynchostegium acanthophyllum*, *R. complanum* Mitten (1869: 553) Jaeger in Jaeger & Sauerbeck (1878: 374), *R. conostomum*, *R. fuegianum*, *R. occultum*, *R. peruviense* Williams (1916: 332) Ochyra in Schultze-Motel & Menzel (1987: 56), and *R. tenuifolium*. A further endemic species, *Eurhynchium corralense* (Lorentz 1866: 189) Jaeger in Jaeger & Sauerbeck (1878: 351), was not addressed by Huttunen & Ignatov (2010), but should also be treated in this genus, so we propose the new combination below.

Rhynchostegium corralense (Lorentz) Larraín ***comb. nov.***

≡ *Hypnum corralense* Lorentz, Bot. Zeitung (Berlin) 24: 189. 1866. ≡ *Eurhynchium corralense* (Lorentz) A.Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876–77: 351 (Gen. Sp. Musc. 2: 417). 1878. ≡ *Oxyrrhynchium corralense* (Lorentz) M.Fleisch. *ex* Reimers, Hedwigia 66: 72. 1926. Lectotype [designated here, following the annotation by Ochyra of 1988]: [CHILE]. *Hypnum Corralense* Ltz. n.sp. Ad arborum truncos, prope Corral, puerto de Valdivia. Leg. Dr. H. Krausse. Det. P. G. Lorentz. NY 01243867! (isotypes: NY01243869!, NY01243870!, JE04004527!).

= *Eurhynchium confusum* Thér., Revista Chilena Hist. Nat. 22: 89. 6 f. 3. 1918. Holotype: [CHILE]. Herbier Thériot, Type, *Eurhynchium confusum* Thér. n.sp. 1916, Chili, leg. Porter (PC0702933!).

= *Rhynchostegium subsquarrosum* Herzog, Hedwigia 64: 18. 1923. Holotype: [CHILE]. Herbarium Theodor Herzog, Jena, *Rhynchostegium subsquarrosum* H. n. sp. Fl. v. Chile, Auf Waldboden im Stadtpark von Valdivia, Dezember 1911, leg. Th. Herzog 5243 (JE04004529!).

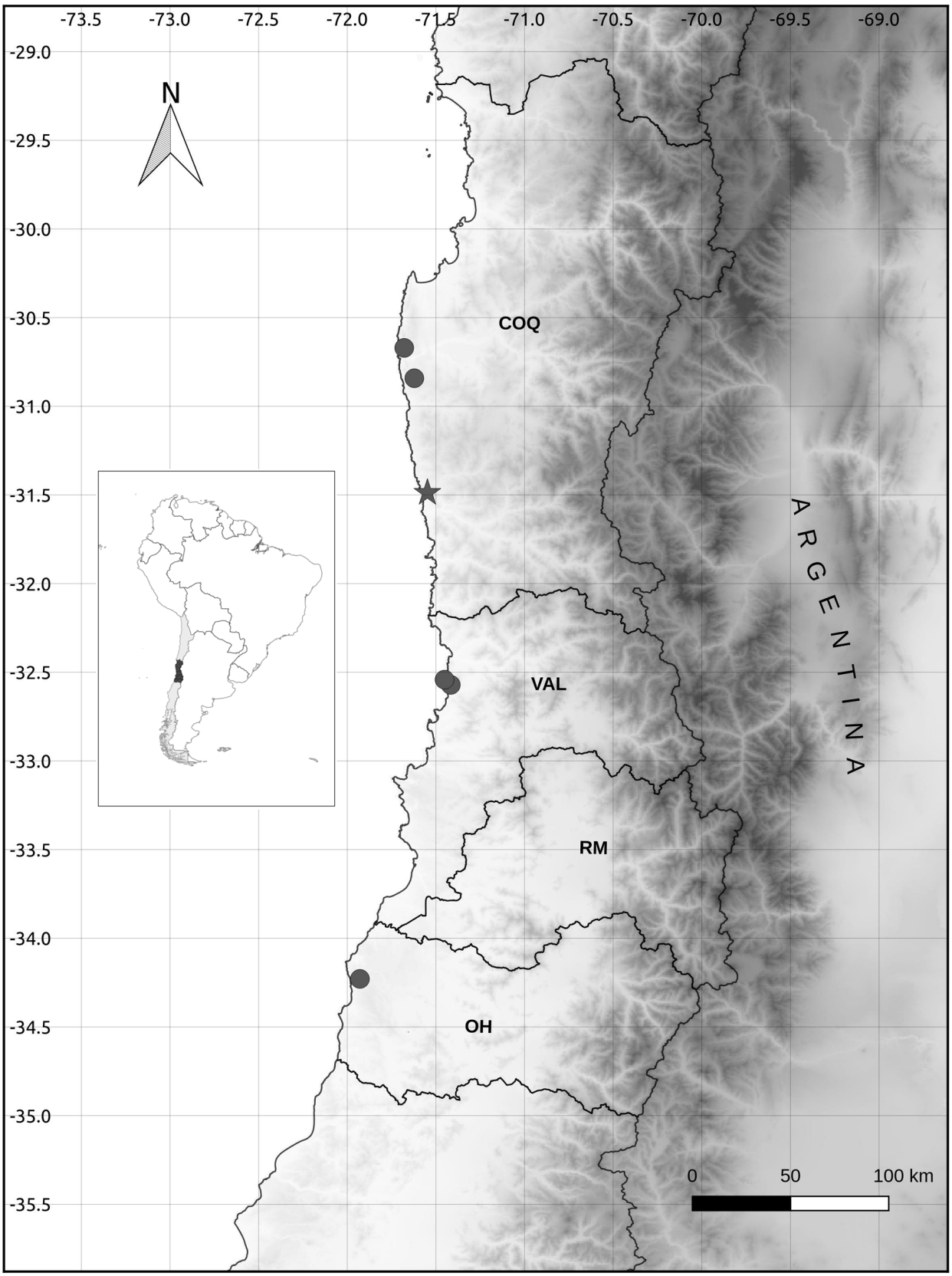

FIGURE 3. *Rhynchostegium occultum* Larraín, Huttunen, Ignatova & Ignatov *sp. nov.*, distribution map, showing Región de Coquimbo (COQ), Región de Valparaíso (VAL), Región Metropolitana de Santiago (RM), and Región del Libertador Bernardo O'Higgins (OH). Inset: map of South America with Chile in gray and the regions outlined above in black. The star indicates the type locality. Uplands and mountains are shaded; darker shades indicate higher elevations.

The publication of Lorentz entitled «Musci frondosi in Chile prope Valdiviam et prope Corral lecti per Dr. Krause» includes a long list of species without repeats of locality information, providing only habitat data, and diagnoses for new species. The lectotype label repeats essential information on the collecting locality and collector, given in the title of Lorentz (1866) paper, while differs in habitat description (walls in protologue, trunks in labels of all specimens in NY and JE). Specimens in NY and JE agree in their morphology with the *Hypnum corralense* descriptions and are annotated by Lorenz "n.sp.". Considering destruction of Lorentz herbarium at B in the second world war, we follow the ICN (Shenzhen Code) Art. 9.12 that in such case a lectotype must be chosen from among the uncited specimens that comprise remaining original materials, if these exist.

The slightly plicate leaves of *E. corralense* contradicts its placement in *Eurhynchium,* following the narrower concept of the genus introduced by Ignatov & Huttunen (2002) which only includes plants with strongly plicate leaves. Other character states of *R. corralense* are: light-green plants with spreading leaves, differentiation of stem and branch leaves, with stem leaves wide-cordate, auriculate, and branch leaves ovate, costa ending at or above three quarters the leaf length (seldom short and double in some stem leaves), ended in an often notorious spine, alar cells scarcely differentiated only in leaf auricles, smooth seta, and obliquely long-rostrate operculum. Such a combination of traits suggests the placement of *Eurhynchium corralense* in the genus *Rhynchostegium*.

Eurhynchium confusum Thér. (1918: 89) is a synonym of *R. corralense*. Thériot (1918) described it based on a specimen collected by Porter in Antuco, Biobío Province (*Porter s.n.*, PC0702933!), which shows the typical spreading leaves, wide-cordate stem leaves, and capsules constricted below the mouth. Thériot (1918) listed five additional paratypes when describing *E. confusum*, four of them from the Valdivian rainforest region (specimens from Valdivia and Victoria), and one from Tanumé, in Comuna Pichilemu, same locality as one of the paratypes of *Rhynchostegium occultum* (*Larraín 28799*, CONC). We studied the paratype from Tanumé (*Costes 42*, PC702932!), and it matches in all traits the type of *Hypnum corralense* Lorentz (1866: 189). The same is true for *Rhynchostegium subsquarrosum* Herzog (1923: 18), typified with a specimen collected by Herzog in Valdivia in 1911 (*Herzog 5243*, JE04004529!), sharing all relevant morphological traits with the type of *Hypnum corralense*.

Rhynchostegium acanthophyllum is a very common taxon in central and south Chile. It is easy to recognize since it is the smallest of the *Rhynchostegium* species of Chile, with small leaves usually less than 0.5 mm long, short laminal cells 30–40 µm long, and capsules strongly urceolate when dry. It is a major component of the bryophyte flora of sclerophyllous forests of central Chile, where it grows on rocks, roots of trees, and on soil banks inside the forest, between 0–1350 m a.s.l. It may be confused with some forms of the ubiquitous *Cratoneuropsis chilensis* (Lorentz 1866: 188) Ochyra (2008: 389), but it is immediately recognized in the field by its urceolate capsules, or if sterile, by the costa vanishing at leaf apex and the serrulate leaf margins (costa filling the acumen and leaf border mostly entire or seldom uneven in *C. chilensis*). It is distributed between Choapa and Capitán Prat provinces (Müller 2009, Larraín 2016), although much more common in the northern half of its distribution range. Since some of the provinces where this taxon is common are not listed in Müller (2009), we provide below a list of selected specimens to fill out the distribution gaps for this taxon. There is some variability on the leaf shape of this species, with some collections having long-acuminate leaves with longer costae. These forms were described by Thériot (1917) as *Rhynchostegiella acanthophylla* var. *robusta* Thériot (1917: 22), but besides the slight difference in leaf shape, all other diagnostic characters are identical between the types of these two names and further collections assignable to each of these taxa studied by us. We then propose this latter name to be a synonym of *Rhynchostegium acanthophyllum.*

Rhynchostegium acanthophyllum (Mont.) A.Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1876–77: 364 (Gen. Sp. Musc. 2: 430). 1878. ≡ *Hypnum acanthophyllum* Mont., Ann. Sci. Nat., Bot., sér. 3, 4: 90. 1845. ≡ *Eurhynchiella acanthophylla* (Mont.) M.Fleisch., Musci Fl. Buitenzorg 4: 1566. 1923. ≡ *Rhynchostegiella acanthophylla* (Mont.) Broth., Nat. Pflanzenfam. I(3): 1162. 1909. Lectotype (designated here): [CHILE]. *Hypnum acanthophyllum* Montg. MB10101 (PC0146650!).

= *Rhynchostegiella acanthophylla* var. *robusta* Thér., Revista Chilena de Historia Natural 21: 22. 1917. ≡ *Eurhynchiella acanthophylla* var. *robusta* (Thér.) Ochyra, Fragm. Florist. Geobot. 42: 579. 1997, ***syn. nov.*** Lectotype (designated here): [CHILE]. Herbier I. Thériot, *Rhynchostegiella acanthophylla* (Mont.) Broth. f. *robusta*. Chili, Marga-Marga, près de Valparaiso, leg. *N. Costes*, juni, 1915, 2 formes en mélange, l'une robuste, l'autre plus grêle (PC0702921!).

Selected specimens studied: CHILE, Región de Valparaíso, **Provincia de Marga-Marga**, Comuna de Limache, Limache, Cerro La Huinca, 32°58'34.1"S, 71°16'03.3"W, 350 m, *J. Larraín 40952* (CONC). Región Metropolitana de Santiago, **Provincia de Chacabuco**, Comuna de Lampa, Chicauma, sector "Los Pozones", 33°13'04"S, 70°55'53"W, 580 m, *J. Larraín 29131* (CONC); **Provincia de Talagante**, Comuna de El Monte, El Paico Alto, cerros ladera sur, camino a la "laguna azul", 33°38'13"S, 71°02'23"W,

650 m, *J. Larraín 29021* (CONC); **Provincia de Maipo**, Comuna de Paine, Reserva Privada Altos de Cantillana, Quebrada El Cepillo, 33°51'19.9"S, 70°59'03.3"W, 605 m, *J. Larraín 42234* (CONC); **Provincia de Melipilla**, Comuna de Alhué, El Asiento, Lomas del Talamisano, 34°04'00"S, 70°59'30"W, 800 m, *J. Larraín 28919* (CONC). Región del Libertador Bernardo O'Higgins, **Provincia de Cachapoal**, Comuna de Machalí, Reserva Nacional Río los Cipreses, sector Sendero de los Peumos, valle del Río Cachapoal, 34°18'07"S, 70°26'59"W, 1150 m, *J. Larraín 30147* (CONC); **Provincia de Colchagua**, Comuna de Placilla, entre Nancagua y San Fernando, Lo Moscoso, valle del Río Tinguiririca, 34°35'49"S, 71°07'43"W, 490 m, *J. Larraín 31682* (CONC).

Rhynchostegium conostomum is an endemic of the Valdivian rainforests, distributed in Chile between Biobío and Capitán Prat Provinces (Müller 2009, Larraín 2016). The report of this taxon from Argentina in Neuquén Province (Matteri 2003) is erroneous, as the source cited by Matteri (Neger 1899) does not mention this species as collected in Argentina. It is a common species in the humid lowlands (below 500 m a.s.l.), growing on trunks and twigs of shrubs in forest gaps or in open places in forest borders or on roadsides through forested environments. It is immediately recognized by its unique sporophyte morphology, with long-cylindrical capsules with a very long peristome ca. 1 mm long, with exostome spreading and endostome forming a cone of white processes the same length or even longer than the exostome. Until recently it was placed in its own genus *Eriodon*, but was found nested within *Rhynchostegium* in phylogenetic studies (Huttunen & Ignatov 2010). It is the oldest generic name available for the *Rhynchostegium* clade, but it has been rejected against *Rhynchostegium* to keep taxonomic stability due to the extensive usage in bryological literature of the latter name, and the large number of *Rhynchostegium* species currently known (Ignatov & Huttunen 2010, Klazenga 2011).

Rhynchostegium fuegianum is another endemic of southern South America, distributed in Chile between the Ñuble Province and Cape Horn (Müller 2009), and between the Río Negro and the Tierra del Fuego provinces in Argentina (Matteri 2003). It is a strict rheophyte, growing on rocks in rivers and creeks in the interior of forests. This taxon has been extensively described and illustrated in Matteri & Ochyra (1989), so no further comments are needed here.

Rhynchostegium peruviense is a rare taxon only known from a couple of specimens from Peru (Williams 1916), and from a single collection from Chile, found growing in water in a high Andean irrigated meadow ("vega") in the Atacama Province at ca. 4000 m a.s.l. (Bartram 1943). We have not studied this voucher, and Bartram (1943) identified it with some degree of hesitation, but stated that costa structure and areolation matches the type specimen from the Cusco Province, Peru.

Rhynchostegium tenuifolium has been repeatedly reported from Chile and adjacent Argentine provinces (Mitten 1869, Herzog 1954, He 1998). However, this Hedwigian name has been neotypified upon a collection from Victoria, Australia (Hedenäs 1996), so the presence in South America of this Australasian taxon needs deeper morpho-molecular studies to be confirmed. Hedenäs (2002, 2012) included South America in the distribution of *R. tenuifolium* based only on literature reports. Our preliminary results support at least that the new species described is not conspecific with this taxon [Fig. 1, cf. Fig. 78 in Beever *et al.* (1992) for *R. tenuifolium*]. Most of the specimens from Chile reported under *R. tenuifolium* that we have studied belong to *Rhynchostegium corralense*, so we prefer to provisionally exclude the former name from the continental Chile moss flora until stronger evidence is available about the actual distribution of *R. tenuifolium*. Populations from the Juan Fernández islands must be included in future studies for genetic comparison with Australasian populations.

The taxonomy of *Rhynchostegium complanum* is still obscure. Most of the specimens reported for Chile under this name rather correspond to *R. corralense*, e.g., those reported by Herzog (1954) and Larraín (2007). The type of *R. complanum* bears no exact locality or collector, it is only labeled with a "Chile, Hb. Montagne", and it is annotated by Montagne as "*Hypnum serrulatum* Hedw." (NY01243852!). The type has complanate, ovate-lanceolate leaves, not differentiated between stem and branches, without auricles, very few differentiated basal cells forming a line at the leaf insertion, a weak costa ending at three-fourths the leaf length, and very narrow linear leaf cells, to 140 µm long and less than 5 µm wide. Further material labeled as *R. complanum* in PC was collected in Juan Fernández, although none of the descriptions provided by Robinson (1975) for the two species of *Rhynchostegium* he reports for the islands matches this morphology. Despite thorough moss collecting during the last 20 years throughout Chile made by the first author, totaling ca. 20,000 specimens, and the examination of many collections kept in major herbaria under *Rhynchostegium* or *Eurhynchium*, no voucher matching the morphology of the type has been found so far. It is possible that the type specimen was not collected in Chile, since the plants match much better with the morphology of *Rhynchostegium serrulatum* (Hedwig 1801: 238) Jaeger in Jaeger & Sauerbeck (1878: 370) as described by Buck (1998), a widely distributed taxon from eastern and tropical North America and from the tropical Andes. In case we are wrong with this supposition, we are anyway including *R. complanum* in the key provided below.

Some of the specimens reported by He (1998) as *R. complanum* from the Metropolitan Region belong to *Oxyrrhynchium hians* (Hedwig 1801: 272) Loeske (1907: 59), a taxon previously not recorded from Chile. It is immediately separated from other Chilean *Rhynchostegium* species by the much shorter laminal cells. The studied specimens (*Mahú 5034*, *6282*, *10371a*, *10618*, *12482*, *12632*, *12647*, *12682*, *12756*, *20103*, *22645*, *23358*, all at MO) were collected on garden lawns on the streets of Santiago, which indicates it could be an introduced taxon, as it is probably the case with western North American populations of this species (Ignatov 2014). The proposed introduction is the same for two other Brachytheciaceae taxa found in Chile, *Kindbergia praelonga* (Hedwig 1801: 258) Ochyra (1982: 54), and *Pseudoscleropodium purum* (Hedwig 1801: 253) Fleischer (1923: 1136), both considered introduced species by Larraín (2007) and by Allen & Crosby (1987), respectively. These three taxa are common and even sometimes invasive weeds in lawns, *Oxyrrhynchium hians* so far only reported for Santiago, *Pseudoscleropodium purum* only for Valdivia, and *Kindbergia praelonga* with a wider distribution between the Maule and Magallanes regions, even colonizing native Valdivian rainforests in recent years.

Another genus of the Brachytheciaceae reported for the flora of Chile is *Rhynchostegiella* (Schimper in Bruch *et al.* 1852: 201) Limpricht (1896: 207), with a single species, *Rhynchostegiella chilensis* Thériot (1935: 183). The type of this name, collected by Agustín Garaventa in Santiago in 1929, and sent to Thériot by Gualterio Looser (*Garaventa 1034*, PC092532!), seems to be a synonym of *Cratoneuropsis chilensis*, although this specimen deviates from typical forms in the long-lanceolate leaves with longer and narrower leaf cells. This taxon is highly variable, as it is usually a rheophytic moss and its morphology varies as often happens with aquatic mosses. The strong costa filling the leaf acumen, and the undifferentiated alar cells of the type of *R. chilensis* suggest a better placement as a synonym of *Cratoneuropsis chilensis*.

Cratoneuropsis chilensis (Lorentz) Ochyra *in* Chown & Froneman, Prince Edward Islands: 389. 2008. ≡ *Amblystegium chilense* Lorentz, Bot. Zeitung (Berlin) 24: 188. 1866. ≡ *Hygroamblystegium chilense* (Lorentz) Reimers, Hedwigia 66: 70. 1926. ≡ *Pseudoleskea chilensis* (Lorentz) Ochyra, J. Bryol. 14: 459. 1987 (Lectotype: GOET (*non vidi*); isotypes: NY01273934!, NY01273935!).

= *Rhynchostegiella chilensis* Thér., Rev. Bryol. Lichénol. 7: 183. 1935, ***syn. nov.*** Holotype: [CHILE] Herbier Thériot, 1034. *Rhynchostegiella chilensis* Thér. *sp. nov.* Chili: env. Santiago, Cordillère, leg. A. Garaventa, 1.I.1929, misit G. Looser (PC0092532!).

Rhynchostegium occultum may be confused in the field when sterile with the ubiquitous central Chile endemic taxon *Catagoniopsis berteroana* (Montagne 1845: 89) Brotherus (1909: 1162), but it is immediately recognized under the microscope by the serrulate leaf margins (entire in *C. berteroana*); when fertile, the long-rostrate operculum of *R. occultum* would readily separate it from *C. berteroana*, which has a short-conic operculum. The only other sympatric species with which the new species could be confused is *Rhynchostegium corralense* (see comments on this taxon above, and key for diagnostic characters).

With these additions and exclusions of taxa, the family Brachytheciaceae would be represented in Chile only by the members of the former broadly conceived *Brachythecium*, including 10 species of *Brachythecium,* three species of *Brachytheciastrum* Ignatov & Huttunen (2002: 259), and four species of *Sciuro-hypnum* (Müller 2009), and by members of *Rhynchostegium* (6–7 species) in the sense of Ignatov & Huttunen (2002, 2010) and Huttunen & Ignatov (2004, 2010). The rest of genera reported for the country, i.e., *Kindbergia* Ochyra (1982: 53), *Oxyrrhynchium* (Schimper in Bruch *et al.* 1854: 224) Warnstorf (1905: 781), and *Pseudoscleropodium* (Limpricht 1896: 192) Fleischer (1923: 1542) would be recent introductions to the flora.

Key for the Chilean species of *Rhynchostegium*

1. Costa stout, at the base 80 µm wide or more, often spurred distally; high Andes of northern Chile ..... *R. peruviense*
- Costa weaker, at the base less than 70 µm wide, not spurred distally; central and south Chile 2
2. Endostome segments white, longer than the exostome teeth, reaching 1 mm; capsules long-cylindric, arcuate, more than 2 mm long ..... *R. conostomum*
- Endostome segments hyaline, same length as the exostome teeth, much shorter than 1 mm; capsules ovate or urceolate, less than 1.5 mm long 3
3. Plants usually dark green to blackish, usually rheophytic; branch leaves short-acuminate, ending in a blunt acumen ..... *R. fuegianum*
- Plants usually bright green, seldom darker, not rheophytic; branch leaves long-acuminate, ending in a long terminal cell or in a subpiliferous acumen 4
4. Plants small, leaves less than 1 mm long (often less than 0.5 mm long), narrower than 300 µm wide; capsules strongly urceolate when dry ..... *R. acanthophyllum*

- Plants larger, leaves longer than 1 mm, wider than 350 µm; capsules ovate, not clearly urceolate, although sometimes strongly narrowed below the mouth when dry 5
5. Alar cells usually strongly differentiated forming a large triangular group reaching the costa, sometimes asymmetric in the most complanate leaves ..... *R. occultum*
- Alar cells slightly differentiated, reduced to a marginal group of a few alar cells only, or to a line of enlarged cells along the leaf insertion 6
6. Stem leaves wide-cordate with rounded auricles ..... *R. corralense*
- Stem leaves ovate-lanceolate without auricles ..... *R. complanum*

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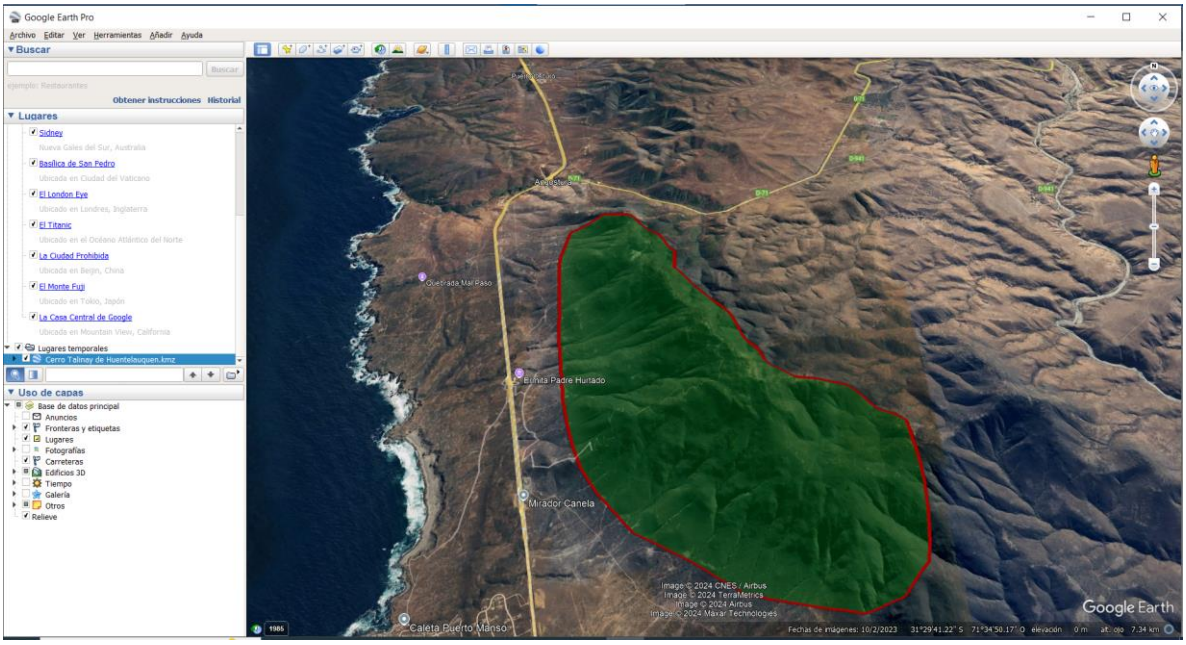
CONSTANCIA DE PIEZA EXCEPTUADA

Se deja constancia del ingreso, en calidad de pieza exceptuada del Expediente de la Macrozona Centro en el marco del artículo 8vo transitorio de la Ley 21.600 que mandata el proceso para el establecimiento de Sitios Prioritarios de la Estrategia Nacional y las Estrategias Regionales de Biodiversidad, a los siguientes archivos digitales recibidos a través de correo electrónico el 15 de junio 2024, cuyo nombre de archivo es el siguiente:

"Cerro Talinay de Huentelauquen.kmz"



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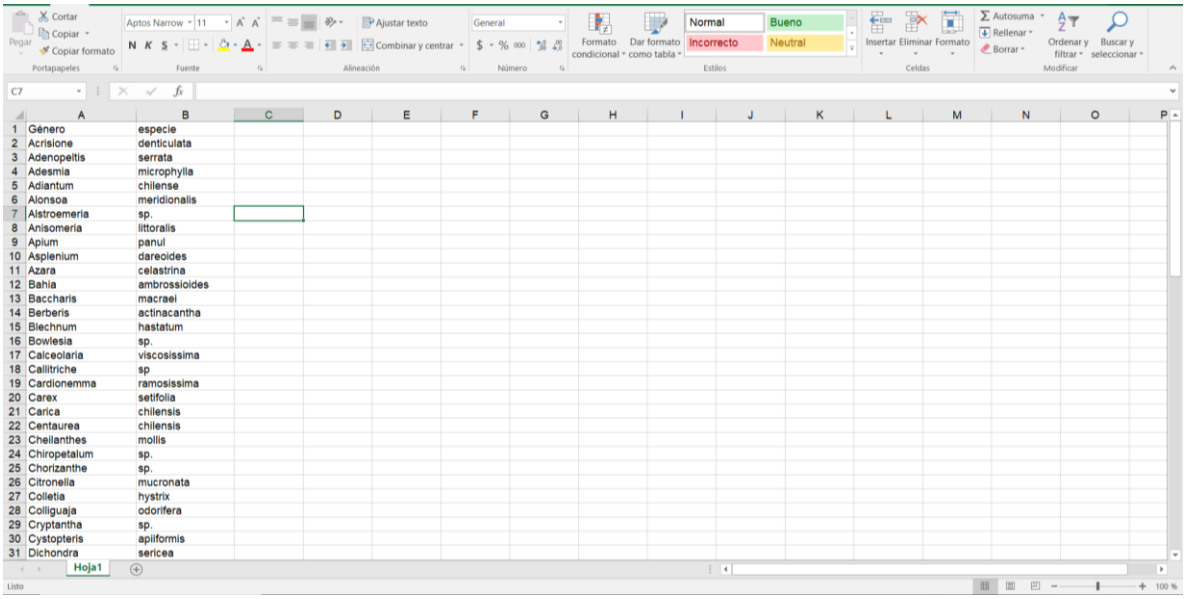
Se deja constancia del ingreso, en calidad de pieza exceptuada del Expediente de la Macrozona Centro en el marco del artículo 8vo transitorio de la Ley 21.600 que mandata el proceso para el establecimiento de Sitios Prioritarios de la Estrategia Nacional y las Estrategias Regionales de Biodiversidad, a los siguientes archivos digitales recibidos a través de correo electrónico el 15 de junio 2024, cuyo nombre de archivo es el siguiente:

“Listado Flora Vascular Talinay de Huentelauquen.xlsx”



	A	B
1	Género	especie
2	Acrisione	denticulata
3	Adenopeltis	serrata
4	Adesmia	microphylla
5	Adiantum	chilense
6	Alonsoa	meridionalis
7	Alstroemeria	sp.
8	Anisomeria	littoralis
9	Apium	panul
10	Asplenium	dareoides
11	Azara	celastrina
12	Bahia	ambrossioides
13	Baccharis	macraei
14	Berberis	actinacantha
15	Blechnum	hastatum
16	Bowlesia	sp.
17	Calceolaria	viscosissima
18	Callitriche	sp
19	Cardionemma	ramosissima
20	Carex	setifolia
21	Carica	chilensis
22	Centaurea	chilensis
23	Cheilanthes	mollis
24	Chiropetalum	sp.
25	Chorizanthe	sp.
26	Citronella	mucronata
27	Colletia	hystrix
28	Colliguaja	odorifera
29	Cryptantha	sp.
30	Cystopteris	apiformis
31	Dichondra	sericea

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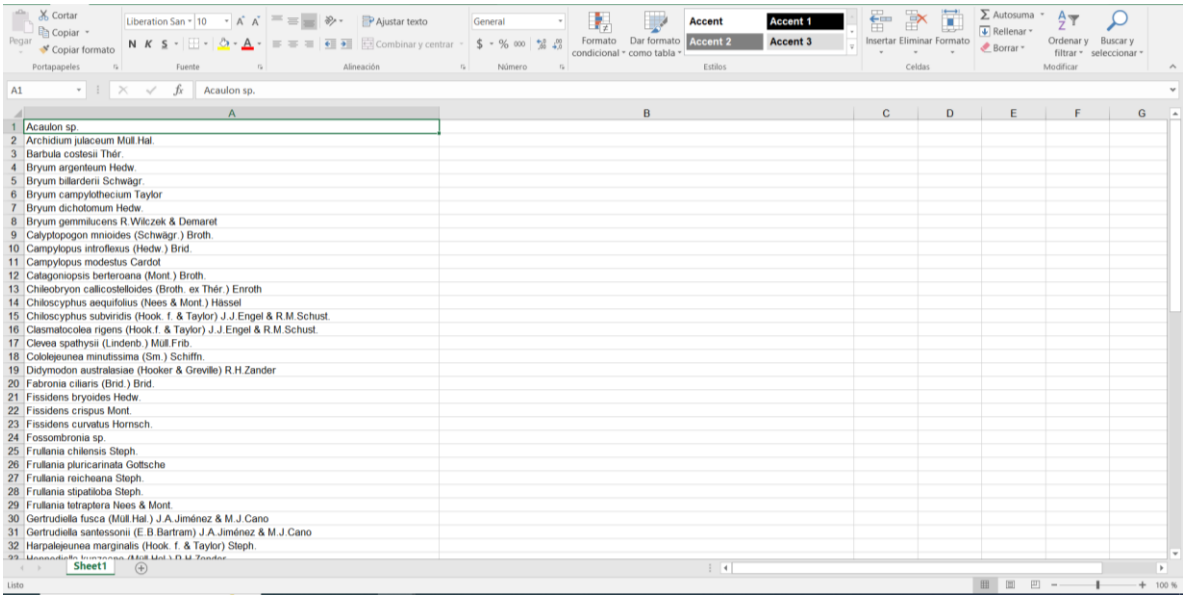
“checklist_briofitos_cerro_talinay_huentelauquén.ods”



	A
1	Acaulon sp.
2	Archidium julaceum Müll.Hal.
3	Barbula costesii Thér.
4	Bryum argenteum Hedw.
5	Bryum billarderii Schwägr.
6	Bryum campylothecium Taylor
7	Bryum dichotomum Hedw.
8	Bryum gemmilucens R.Wilczek & Demaret
9	Calyptopogon mnioides (Schwägr.) Broth.
10	Campylopus introflexus (Hedw.) Brid.
11	Campylopus modestus Cardot
12	Catagoniopsis berteroana (Mont.) Broth.
13	Chileobryon callicostelloides (Broth. ex Thér.) Enroth
14	Chiloscyphus aequifolius (Nees & Mont.) Hässel
15	Chiloscyphus subviridis (Hook. f. & Taylor) J.J.Engel & R.M.Schust.
16	Clasmatocolea rigens (Hook.f. & Taylor) J.J.Engel & R.M.Schust.
17	Clevea spathysii (Lindenb.) Müll.Frib.
18	Cololejeunea minutissima (Sm.) Schiffn.
19	Didymodon australasiae (Hooker & Greville) R.H.Zander
20	Fabronia ciliaris (Brid.) Brid.
21	Fissidens bryoides Hedw.
22	Fissidens crispus Mont.
23	Fissidens curvatus Hornsch.
24	Fossombronia sp.
25	Frullania chilensis Steph.
26	Frullania pluricarinata Gottsche
27	Frullania reicheana Steph.
28	Frullania stipatiloba Steph.
29	Frullania tetraptera Nees & Mont.
30	Gertrudiella fusca (Müll.Hal.) J.A.Jiménez & M.J.Cano
31	Gertrudiella santessonii (E.B.Bartram) J.A.Jiménez & M.J.Cano
32	Harpalejeunea marginalis (Hook. f. & Taylor) Steph.