The genus Aleurodiscus *s.l. (*Stereaceae, Russulales*) in the Patagonian Andes*

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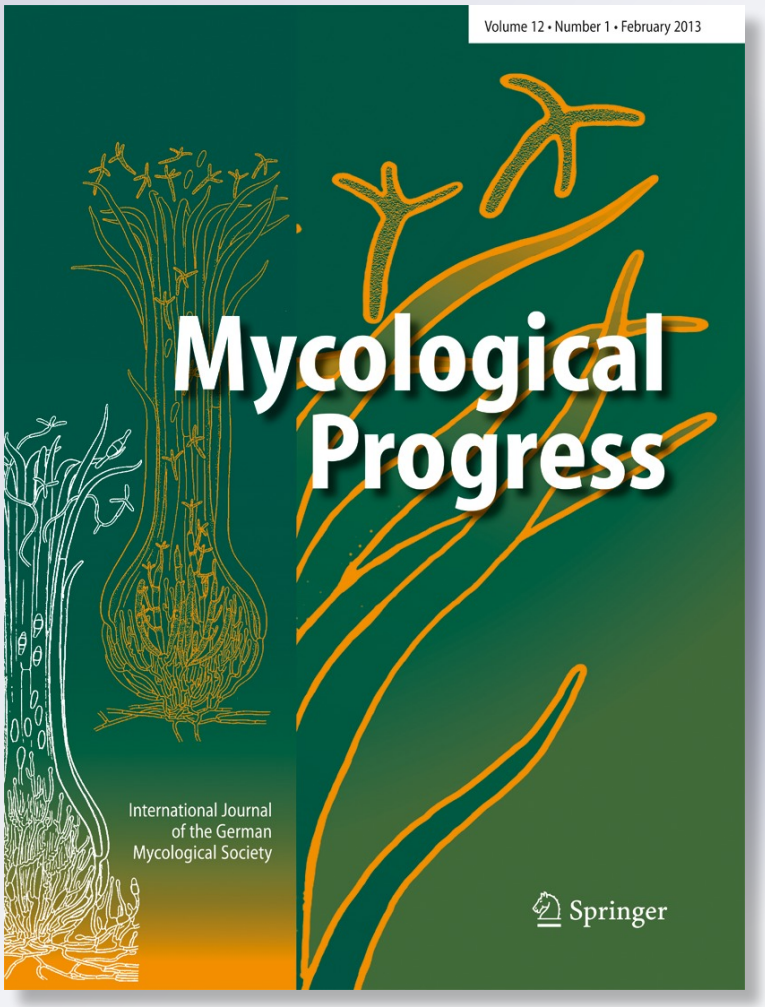
Mycological Progress

ISSN 1617-416X
Volume 12
Number 1

Mycol Progress (2013) 12:91-108
DOI 10.1007/s11557-012-0820-3



Springer

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ORIGINAL ARTICLE

The genus *Aleurodiscus* s.l. (*Stereaceae, Russulales*) in the Patagonian Andes

Sergio P. Gorjón · Alina G. Greslebin · Mario Rajchenberg

Received: 22 February 2012 / Revised: 16 April 2012 / Accepted: 18 April 2012 / Published online: 6 May 2012

Abstract The genus *Aleurodiscus s.l.* in Patagonia is revised and ten species are reported, commented on, and illustrated. *Aleurodiscus bernicchiae, A. corticola, A. hallenbergii, A. quilae,* and *A. stratosus,* are proposed as new. *Aleurodiscus parmuliformis* is recorded for the first time out of New Zealand. A key to the species of *Aleurodiscus* from Patagonia is included.

Keywords *Acanthophysellum* · *Acanthobasidium* · *Aleurocystidiellum* · Argentina · Chile · *Gloeosoma*

Introduction

Aleurodiscus Rabehn. ex J. Schröt, in a broad sense, is a large genus where about 60 species are presently accepted, and about 150 have been classified (Crous et al. 2004; Parmasto et al. 2004). It has been split into several small more or less natural genera, but phylogenetic relationships are still uncertain (Wu et al. 2001, 2010). Most of the species are still not analysed from a molecular perspective and morphological key characters usually overlap or are not clearly defined between the proposed genera. Boidin et al. (1985) proposed to group the species within *Aleurodiscus* s.l. in the following genera (type species are indicated in brackets): *Aleurodiscus* s.str. (*Peziza amorpha* Pers.); *Acanthobasidium* Oberw. (*Aleurodiscus delicatus* Wakef.); *Acanthophysium* (Pilát) G.H. Cunn. (*Aleurodiscus apricans* Bourdot); *Aleurocystidiellum* P.A. Lemke (*Stereum subcruentatum* Berk. & M.A. Curtis); and *Aleurobotrys* Boidin (*Aleurodiscus botryosus* Burt.). *Acanthophysellyum* Parmasto was considered to be a synonym of *Acanthophysium* and *Gloeosoma* Bres. (generic type *Exidia vitellina* Lév.) a possible member of *Aleurodiscus* s.str. (Boidin et al. 1985). Later, Wu et al. (2000) and Boidin and Gilles (2001) treated *Acanthophysium* as a synonym of *Xylobolus* P. Karst. (generic type *Peniophora frustulata* Pers.), but conserved *Acanthophysellum.* The last proposed genera within *Aleurodiscus* s.l. are *Acanthofungus* Sheng H. Wu, Boidin & C.Y. Chien, (generic type *Acanthofungus rimosus* Sheng H. Wu, Boidin & C.Y. Chien [Wu et al. 2000]), and *Neoaleurodiscus* Sheng H. Wu (generic type *Neoaleurodiscus fujii* Sheng H. Wu [Wu et al. 2010]). Morphological diagnostic characters of the former genera are indicated in Boidin et al. (1985) and Wu et al. (2001, 2010). To date, Wu et al. (2001) published the more complete phylogenetic study including 19 species of *Aleurodiscus* s.l., plus two species of *Stereum* Hill. ex Pers. and *Xylobolus*. In that study, only *Acanthobasidium* and *Aleurocystidiellum* were supported as monophyletic genera. Species of other apparently not closely related genera such as *Boidinia* Stalpers & Hjortstam, *Conferticium* Hallenb., *Megalocystidium* Jülich, *Gloeocystidiellum* Donk, and *Gloeocystidiopsis* Jülich, frequently appear intermingled with the sequenced *Aleurodiscus* species (Larsson and Larsson 2003; Binder et al. 2005; Miller et al. 2006; Wu et al. 2001, 2010), a fact that hinders the possibility to understand the relationships among all these taxa. All the previously mentioned genera are included in the *Stereaceae* Pilát within the russuloid lineage.

In the present study we adopted a broad concept of *Aleurodiscus* in line with Núñez and Ryvarden (1997). We are reporting ten species from the Patagonian Andes in

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southern Argentina and Chile, among them five undescribed species. The inclusion of the species present in Patagonia within any of the former proposed genera splitted from *Aleurodiscus* s.l. was evaluated, but molecular data are not yet available for most of the species and morphological features usually overlap or do not strictly correspond to any of the previously described genera. Basidiome structure, hyphae septation, spore morphology or ornamentation, and the many diverse sterile elements present, might be perfectly considered as infrageneric variation in this group of fungi. To avoid nomenclatural changes and new generic proposals until reliable molecular data is available, we decided to report all the species in *Aleurodiscus* s.l. since, in spite of being polyphyletic, it is a useful concept and an easily recognizable entity. However, when possible, placement within more restricted genera is indicated.

Materials and methods

For light microscopy, samples were mounted in 3 % potassium hydroxide (KOH), Melzer's reagent (IKI), cotton blue (CB), and sulphobenzaldehyde (SA). Line drawings were made with a camera lucida attachment. Herbarium abbreviations follow Thiers (at sciweb.nybg.org/science2/Index-Herbariorum, continuously updated). Specimens are deposited at the herbarium of the "Centro de Investigación y Extensión Forestal Andino-Patagónico" (CIEFAP, Esquel, Argentina), BAFC and SALA. Some duplicates were also deposited at DAOM, GB and HUBO.

Taxonomy

Aleurodiscus antarcticus (Speg.) Ryvarden, in Núñez & Ryvarden, Synopsis Fungorum 12: 43, 1997. Figs. 1, 13d.

≡*Corticium antarcticum* Speg., Bol. Acad. Nac. Cienc. Córdoba 11: 170, 1887.

≡*Stereum antarcticum* (Speg.) Rajchenb., Sydowia 40: 248, 1987.

=*Stereum magellanicum* Hjortstam & Ryvarden, Trans. Br. Mycol. Soc. 89: 114, 1987.

SPECIMENS EXAMINED: ARGENTINA, Chubut, Los Alerces National Park, forest close to Rivadavia lake, 42°40′01″S 71°41′04″ W, 520 m a.s.l., 6 May 2011, on bark of dead wood of *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 3313, 3316. Chubut, Los Alerces National Park, Futalaufquen lake, Pto. Limonao, leg. M. Rajchenberg s/nº, 6 Feb 1999. Tierra del Fuego, Dpto. Ushuaia, Monte Olivia, 5 Km east Ushuaia, leg. L. Ryvarden 19500, Feb 1982 (LPS, isotype of *Stereum magellanicum*). CHILE, Isla Picton, leg. C. Spegazzini, Jun 1882 (LPS 3703, holotype of *Corticium antarcticum*).

Description – Basidiome cupulate or effuse-reflexed, pileate, coriaceous, 300–800 μm thick. Pilear surface tomentose, zonate, dark brown; cortex present, buff; context very pale brown; hymenial surface smooth, very pale brown. Margin reflexed, regular or lobate, concolorous or paler than the hymenial surface. Hyphal system monomitic, hyphae simple-septate, in the context with thin to 1 μm thickened walls, hyaline, 3–5 μm in diam; hyphae in the cortex and tomentum with up to 2 μm thickened walls, yellowish to buff, 5–6 μm in diam. Skeletocystidia encrusted with minute crystals, thick-walled except in the apex, 6–12 μm in diam. Basidia clavate, 70–120×8–12 μm, with four sterigmata and simple septa at the base. Basidiospores ellipsoid, 14–17×8–11 μm, thin to slightly thick-walled, smooth, amyloid.

Habitat and distribution – Growing on dead wood and dead branches of *Nothofagus pumilio, N. betuloides,* and *Nothofagus dombeyi*. Endemic to the Patagonian Andes of Argentina and Chile.

Remarks – *Aleurodiscus antarcticus* shows features of *Aleurodiscus* and *Stereum*. The basidiome morphology and the skeletocystidia are reminiscent of the genus *Stereum*, but the size of basidia and basidiospores are in agreement with *Aleurodiscus*. Morphologically it is closely related to *Aleurodiscus triviale*, which differs by an orange hymenial surface, a white abhymenial surface, and non-encrusted skeletocystidia.

Aleurodiscus cerussatus (Bres.) Höhn. & Litsch., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 116: 808, 1907. Figs. 2, 13e.

≡*Corticium cerussatum* Bres., Fung. trident. 2(8–10): 37, 1892.

≡*Acanthophysellum cerussatum* (Bres.) Parmasto, Eesti NSV Tead. Akad. Toim., Biol. seer 16(4): 378, 1967.

SPECIMENS EXAMINED: ARGENTINA, Chubut, Los Alerces National Park, close to Verde lake, 42°43′22″S 71°44′06″ W, 550 m a.s.l., 6 May 2011, on dead wood of *Austrocedrus chilensis*, leg. S.P. Gorjón, coll. SPG 2969. Chubut, Los Alerces National Park, close to Chico lake, 42°50′04″S 71°51′21″W, 600 m a.s.l., on bark of dead *Nothofagus antarctica*, leg. S.P. Gorjón, coll. SPG 3008. Río Negro, Nahuel Huapi National Park, Puerto Blest, Frías stream path, 41°02′17″S 71°48′39″W, 800 m a.s.l., 12 Apr 2011, on dead *Chusquea culeou*, leg. S.P. Gorjón, coll. SPG 3220. For additional specimens from Patagonia see Greslebin (2002).

Description – Basidiome resupinate, effused, hymenial surface smooth to tuberculate, rimose, cream to brownish, margin abrupt. Hyphal system monomitic, hyphae agglutinated and with clamps difficult to discern, 3–4 μm wide, thin-walled. Acanthophyses abundant, with short protuberances in the apical part. Gloeocystidia more or less constricted to moniliform, thin-walled or with distinct walls, SA+. Basidia cylindrical to narrowly clavate, 40–60×7–9 μm, with four sterigmata and a basal clamp. Basidiospores subcylindrical,

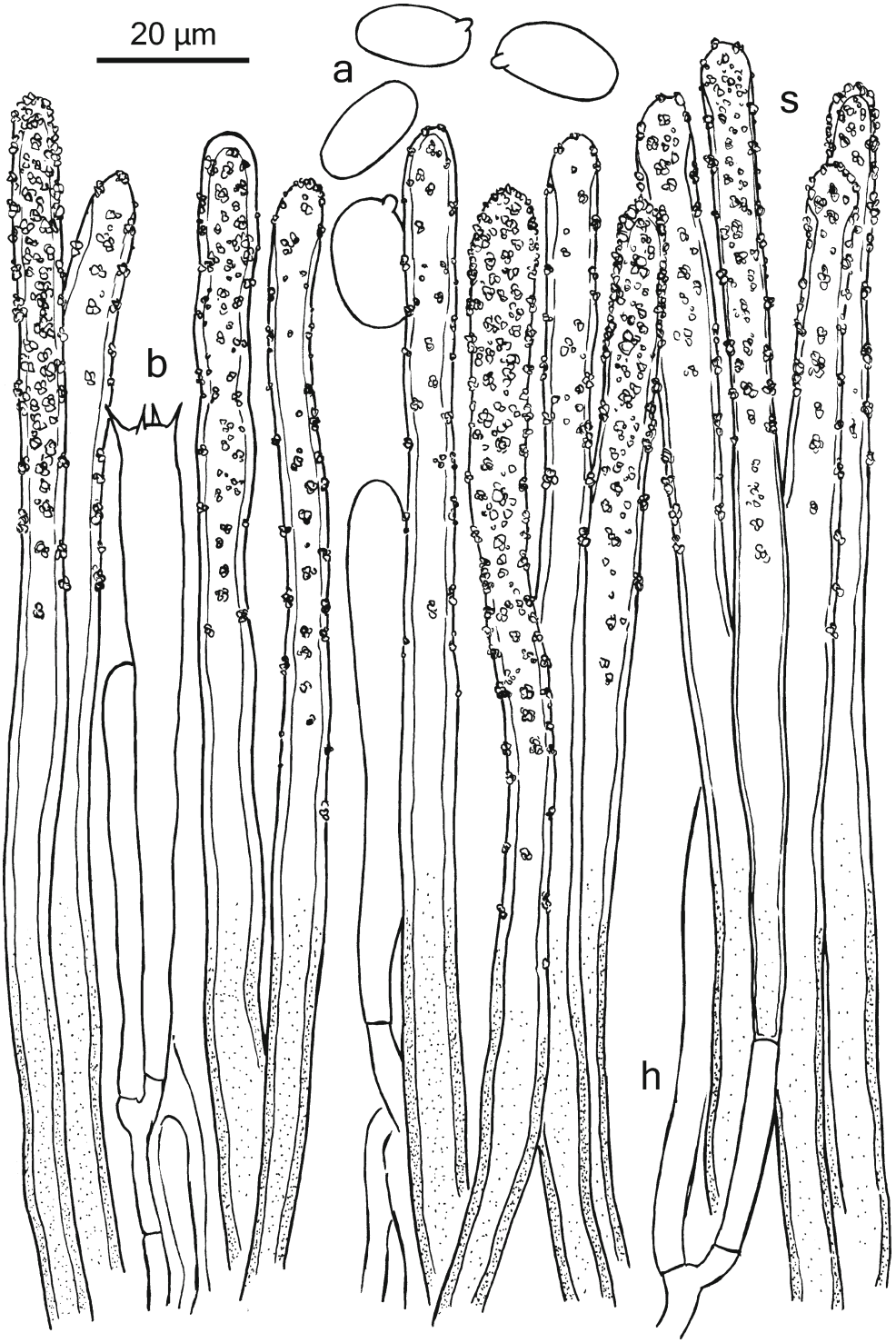

Fig. 1 *Aleurodiscus antarcticus*. a. Basidiospores. b. Basidia. h. Hyphae. s. Skeletocystidia

8–10×5–8 µm, smooth, thin-walled, strongly amyloid, often collapsed.

Habitat and distribution – A common and cosmopolitan species growing on multiple substrata.

Remarks – Easily distinguished in the field by the resupinate and conspicuously cracked cream basidiome, and microscopically by the amyloid smooth basidiospores and presence of acanthophyses and gloeocystidia.

Aleurodiscus parmuliformis G. Cunn., Trans. Roy. Soc. N.Z. 84: 244, 1956. Figs. 3, 13c.

=*Aleurodiscus pateriformis* G. Cunn., Trans. Roy. Soc. N.Z. 84: 243, 1956.

SPECIMEN EXAMINED: CHILE, X Region, Yelcho lake glacier path, 43°16′33″S 72°25′25″W, 150 m a.s.l., 4 Apr 2011, on dead branches of *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 3104.

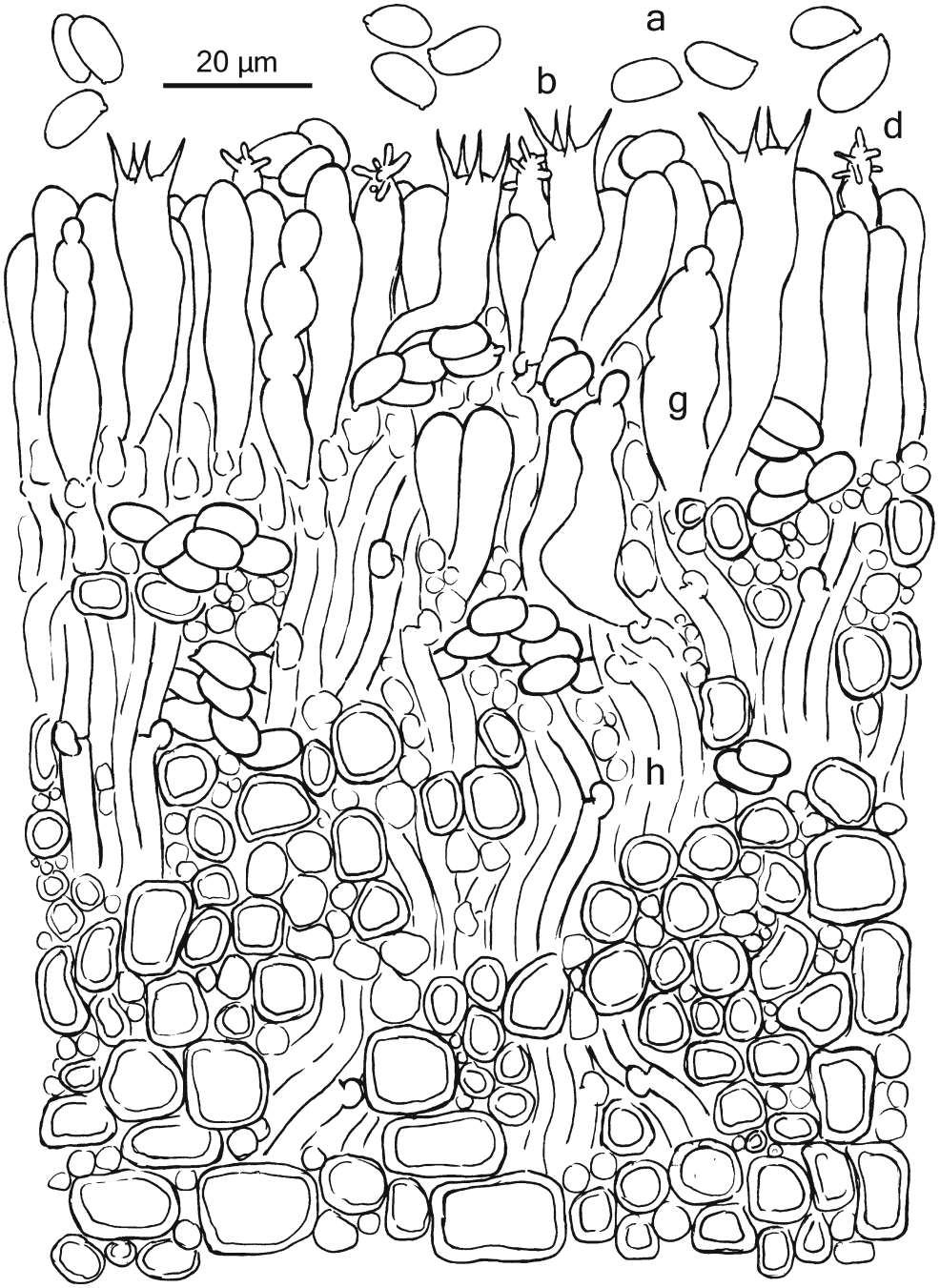

Fig. 2 *Aleurodiscus cerussatus*. a. Basidiospores. b. Basidia. d. Acanthophyses. g. Gloeocystidia. h. Hyphae

Description – Basidiome resupinate to effuse-reflexed, abhymenial surface tomentose, whitish to cream, hymenial surface orange when fresh to cream when dry, smooth to venate. Hyphal system monomitic, hyphae with simple septa, thin-walled, 2–4 µm in diam, not encrusted. Skeletocystidia tubular, sinuous, with obtuse or mucronate apex, thick-walled, not encrusted. Paraphysate hyphae usually bifurcate, some unbranched, thin-walled, not encrusted. Basidia long clavate, 50–60×14–15 µm, with four sterigmata, and simple-septate at the base. Basidiospores broadly ellipsoid, 12–18×11–13 µm, smooth, thin-walled, amyloid. with a prominent apiculus.

Habitat and distribution – Growing on dead branches of *Weinmannia racemosa* and *Nothofagus dombeyi*. Known from New Zealand and Chile.

Remarks – A species easy to identify by the stereoid basidiome, smooth broadly ellipsoid basidiospores and presence of skeletocystidia. It was previously known only from New Zealand.

Aleurodiscus triviale (Speg.) Gresl., Fl Criptog. Tierra del Fuego 4: 23, 2002. Figs. 4, 13b.

≡*Corticium triviale* Speg., Bol. Acad. Nac. Cs. Córdoba 11: 172, 1887.

Fig. 3 *Aleurodiscus parmuliformis*. a. Basidiospores. b. Basidia. e. Hyphidia or paraphysate hyphae. h. Hyphae. s. Skeletocystidia

=*Aleurodiscus fuegianus* Núñez & Ryvarden, Synopsis Fungorum 12: 81, 1997.

SPECIMENS EXAMINED: ARGENTINA, Chubut, Los Alerces National Park, forest close to Rivadavia lake, 42°40′01″S 71°41′04″ W, 520 m a.s.l., 6 May 2011, on dead branches of *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 3308. For additional specimens from Patagonia see Greslebin (2002).

Description – Basidiome first cupulate then coalescent, resupinate or effuse-reflexed, membranaceous or slightly ceraceous when fresh, coriaceous when dried, 250–500 µm thick. Hymenial surface smooth or slightly merulioid, pale orange when fresh, smooth and turning reddish in old specimens. Abhymenial surface tomentose and white. Margin usually reflexed, thinning out, concolorous or paler than the hymenial

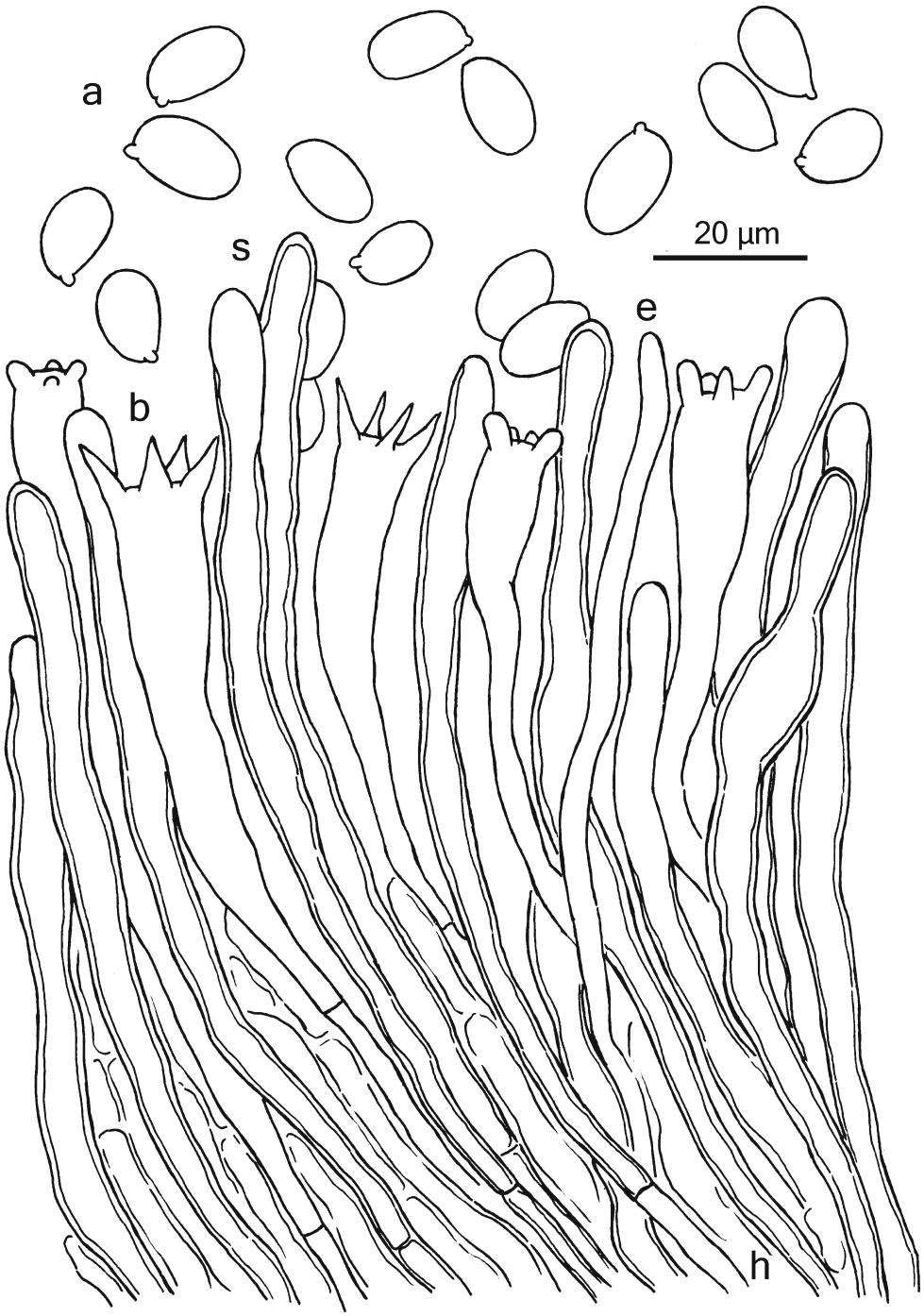

Fig. 4 *Aleurodiscus triviale*. a. Basidiospores. b. Basidia. e. Hyphidia or paraphysate hyphae. h. Hyphae. s. Skeletocystidia

surface. Hyphal system monomitic, hyphae simple-septate, (2.5–)3–5(−6) µm in diam, with up to 2 µm thickened walls, in the context hyaline, olivaceous or pale buff in the tomentum. Skeletocystidia sinuous, thick-walled except in the apex. Basidia clavate, 70–100×8–12 µm, with four sterigmata and a simple septum at the base. Basidiospores ellipsoid, 12–16 (−17)×7–8(−10) µm, slightly thick-walled, smooth, amyloid.

Habitat and distribution – Endemic to the Patagonian Andes and known growing on *Nothofagus antarctica, N. betuloides, N. dombeyi,* and *N. pumilio*.

Remarks – As *A. antarcticus, A. triviale* shows features of the genera *Aleurodiscus* and *Stereum*. The basidiome morphology and skeletocystidia are reminiscent of the genus *Stereum*, but the size of basidia and basidiospores agree with *Aleurodiscus*. It was determined as *Stereum rugosum* Pers.: Fr. *vel aff.* by Rajchenberg and Wright (1987) but the latter differs by cylindrical and narrower (3–4.5 µm in diam) spores. Morphologically it comes close to *A. antarcticus* which differs by the pale brown hymenial surface, a dark brown abhymenial surface and encrusted skeletocystidia,

and to *A. parmuliformis*, with smooth skeletocystidia but wider basidiospores.

Aleurodiscus vitellinus (Lév.) Pat., Essai Taxon. Hymen. 54, 1900. Figs. 5, 13a.

≡*Exidia vitellina* Lév., Ann. Sci. Nat. Bot. III 2: 219, 1844.

≡*Gloeosoma vitellinum* (Lév.) Bres., Ann. Mycol. 18: 51, 1920.

SPECIMENS EXAMINED: ARGENTINA, Los Alerces National Park, forests close to Rivadavia lake, 42°40′01″S 71°41′04″ W, 520 m a.s.l., 6 May 2011, on dead branches of *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 2656, 2747.

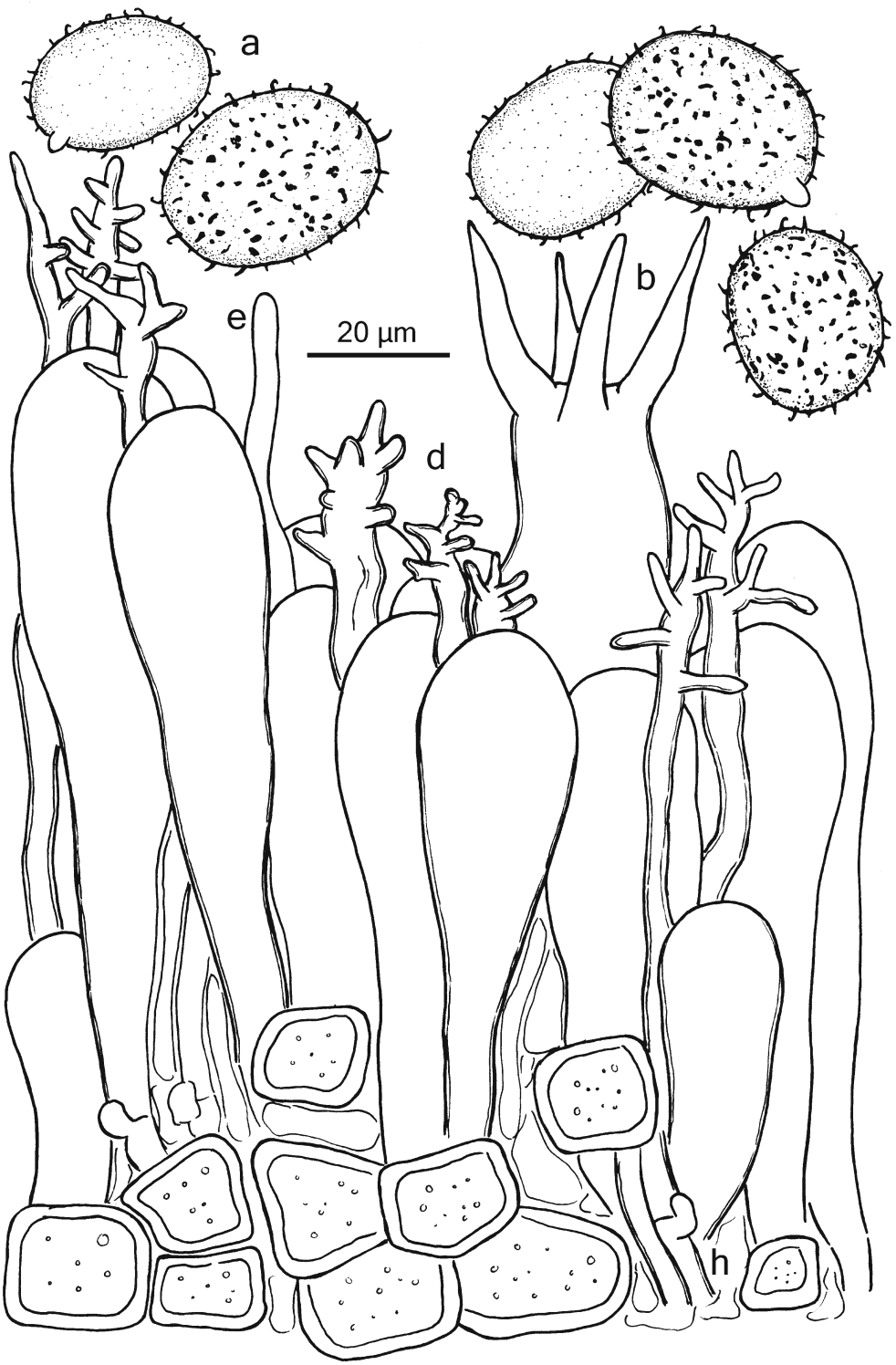

Fig. 5 *Aleurodiscus vitellinus*. a. Basidiospores. b. Basidia. c. Cystidia. d. Acanthophyses. e. Hyphidia or paraphysate hyphae. f. Basidiome. g. Gloeocystidia. h. Hyphae. p. Probasidia. s. Skeletocystidia. t. Section of the basidiome

CHILE, X Region, Pumalín National Park, Negro lake path, 42°42′43″S 72°35′16′″W, 170 m a.s.l., 5 Apr 2011, on dead branches of *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 3154.

Description – Basidiome cupuliform when young, irregularly convolute when mature, sub-stipitate, cartilaginous to gelatinous; hymenial surface smooth, orange; abhymenial surface venate, concolorous or paler than the hymenial surface; margin determinate, reflexed. Hyphal system monomitic, hyphae clamped, 3–7 μm in diam, thick-walled. Acanthophyses clavate, thick-walled, solid in the apex, 70–140×5–10 μm. Basidia clavate to subclavate, 100–180×20–25 μm, with four sterigmata and a basal clamp. Basidiospores widely ellipsoid, 24–33×19–23 μm, thick-walled, aculeate with straight or usually hooked aculei, strongly amyloid.

Habitat and distribution – Endemic to the Patagonian Andes of Argentina and Chile, and known growing on dead branches or dead wood of various *Nothofagus* species.

Remarks – It is a common and easily identified species by the fleshy and gelatinous, cupuliform basidiome with yellow to orange colors, and by growing conspicuously on attached or recently fallen branches of *Nothofagus* spp. Recorded growing on *N. dombeyi* and *N. pumilio*.

New species

***Aleurodiscus bernicchiae* sp. nov.** Figs. 6, 7, 13f–g.

Basidiomata cupulata, hymenophorum leve, cremeum. Hyphae fibulatae. Cystidia incrustata copiosa. Gloeocystidia sinuosa. Basidiosporae globosae, (9–)12–14(−17) μm, aculeatae, fortiter amyloideae. Ab Aleurodiscus hallenbergii differt basidiosporis minoribus et basidioma cupulato.

Etymology: *bernicchiae* – named in honour of Dra. Annarosa Bernicchia (Italy), in recognition of her contributions to the knowledge of corticioid fungi.

Mycobank MB 564448

HOLOTYPUS: ARGENTINA, Río Negro, Nahuel Huapi National Park, Puerto Blest, Frias stream path, 41°02′17″S 71°48′39″W, 800 m a.s.l., 12 Apr 2011, on the inferior side of low branches of living *Pilgerodendron uviferum* (*Cupressaceae*), leg. S.P. Gorjón, coll. SPG 3201 (**holotype** in BAFC, **isotypes** in SALA and CIEFAP). ADDITIONAL SPECIMENS EXAMINED: ARGENTINA, Río Negro, Nahuel Huapi National Park, Puerto Blest, Frias stream path, 41°02′17″S 71°48′39″W, 800 m a.s.l., 12 Apr 2011, on *Pilgerodendron uviferum*, leg. S.P. Gorjón, coll. SPG 3200, 3202; *ibid.*, on *Fitzroya cupressoides* (*Cupressaceae*), leg. S.P. Gorjón, coll. SPG 3204; *ibid.*, on *Saxegothaea conspicua* (*Podocarpaceae*), leg. S.P. Gorjón, coll. SPG 3217. Neuquén, Nahuel Huapi National Park, Puerto Blest, Cántaros lake, 41°00′05″S 71°49′42″W, 870 m a.s.l., on *Fitzroya cupressoides*, leg. S.P. Gorjón, coll. SPG 2913. Neuquén, Nahuel Huapi National Park, Puerto Blest, Ortiz Basualdo lake path, 40°59′45″S 71°50′34″W, 900 m a.s.l., on *Fitzroya cupressoides*, leg. S.P. Gorjón, coll. SPG 3222. Chubut, Lago Puelo, Motoco path, 41°58′24″S 71°44′25″W, 1000 m a.s.l., on branches of living *Fitzroya cupressoides,* 23 Apr 2011, leg. S.P. Gorjón, coll. SPG 3255, 3256.

Description – Basidiome cupulate, abhymenial surface tomentose with brownish to grayish projecting hyphae, with a dark line under the tomentum, hymenial surface smooth to sulcate, cream to pale grayish, margin lobulate. Hyphal system monomitic, hyphae with clamps, 2–4 μm in diam, thin- to thick-walled, not encrusted. Cystidia of two kinds: 1) apically encrusted, arising from the subhymenial or the hymenial layer, bearing large pyramidal crystals, encrusted part ab. 60–100×8–15 μm, thick-walled, with a basal clamp, arising from a thick-walled hypha; 2) gloeocystidia, tubular, sinuous or slightly constricted, some projecting above the hymenial layer and with an apical round constriction, with oily contents in KOH (distinct from the contents of basidia), thick-walled, SA+ reacting dark brown. Paraphysoid hyphae also present, smooth, unbranched. Basidia long tubular, 60–100×10–15 μm, with thin or slightly thickened walls, with four sterigmata ab. 15–20 μm long, with a basal clamp. Basidiospores globose or subglobose, variable in size, usually (9–)12–14(−17) μm in diam, ornamented with usually bi-forked aculei, spore wall seemingly double layered (a feature that may be due to colapsed spores seen in a particular position), strongly amyloid.

Habitat and distribution – Known from the Patagonian Andes of Argentina growing on bark of low branches of the conifers *Fitzroya cupressoides, Pilgerodendron uviferum,* and *Saxegothaea conspicua.*

Remarks – A characteristical species by the cupuliform basidiome with cream to brownish colors. Microscopically it is characterized by the subglobose ornamented basidiospores and above all by the encrusted cystidia. To our knowledge, this kind of encrusted cystidia is an earlier unknown feature within *Aleurodiscus* s.l. Some species may present more or less encrusted cystidial elements, but they are not comparable. *Aleurodiscus hallenbergii* (see below) is microscopically similar but differs in the whitish basidiome, larger basidiospores and lack of gloeocystidia.

***Aleurodiscus corticola* sp. nov.** Figs. 8, 13j.

Basidioma resupinatum, pulvinatum, leve, albidum vel cremeum, margine abrupto. Hyphae fibulatae. Cystidia copiosa, moniliformia, crassitunicata. Basidiosporae ellipsoideae, (16–)18–20(−25)×(10–)12–15(−17) μm, leviter aculeatae, fortiter amyloideae. Ab Aleurodiscus occidentalis et A. tsugae differt basidiosporis dissimilibus et minus insignis ornatis.

Etymology: *corticolous* – Latin, referred to the grow on bark of living trees.

Mycobank MB 564449

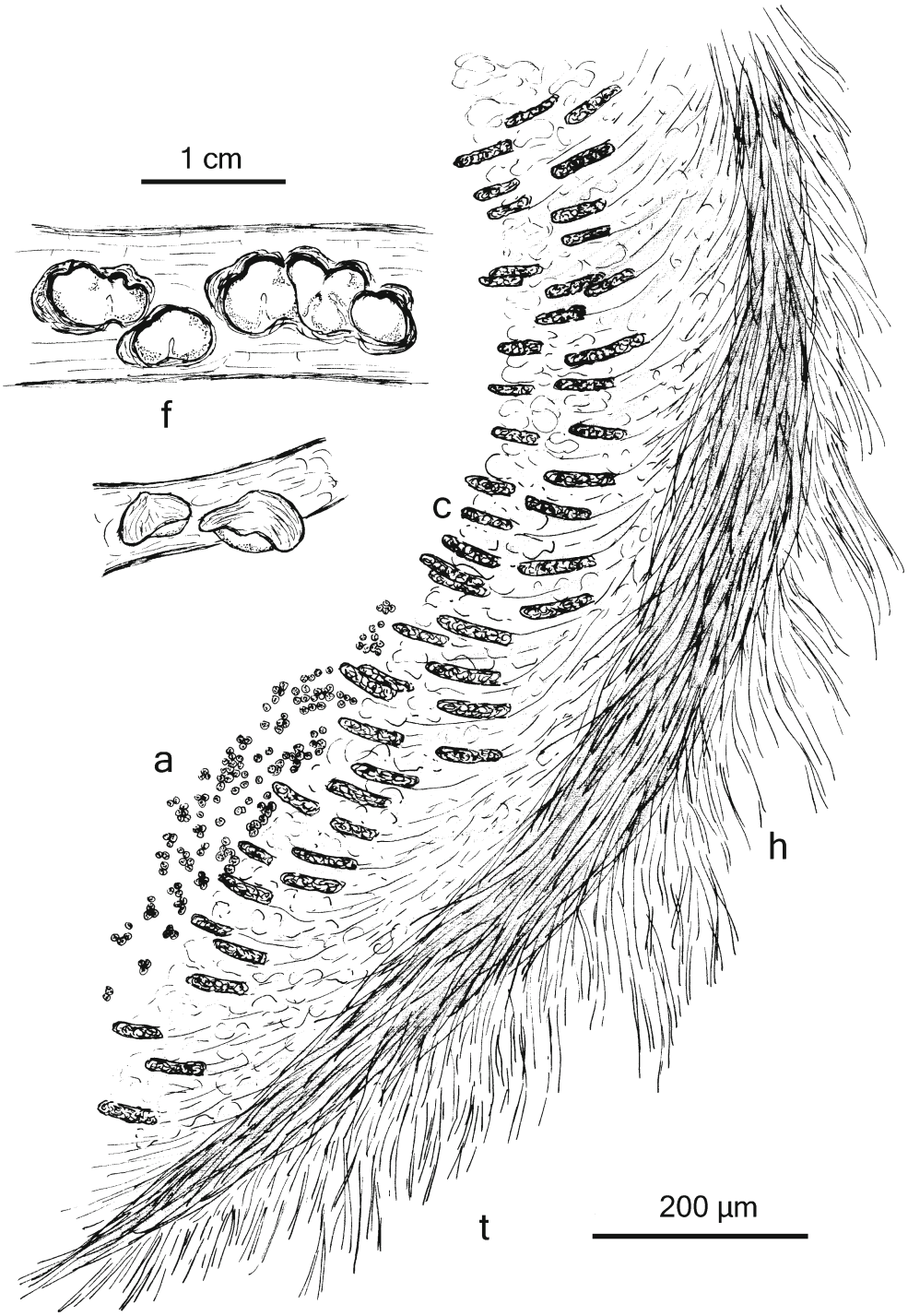

Fig. 6 *Aleurodiscus bernicchiae*. a. Basidiospores. c. Cystidia. f. Basidiome. h. Hyphae. t. Section of the basidiome

HOLOTYPUS: ARGENTINA, Río Negro, Nahuel Huapi National Park, Puerto Blest, Blest stream path, 41°01′23″S 71°49′42″W, 850 m a.s.l., 15 Apr 2011, on bark of living *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 3251 (**holotype** in BAFC, **isotypes** in SALA and CIEFAP). ADDITIONAL SPECIMENS EXAMINED: *Aleurodiscus corticola*– ARGENTINA, Neuquén, Nahuel Huapi National Park, Puerto Blest area, Cántaros lake path, 41°00′05″S 71°49′42″W, 830 m a.s.l., 30 May 2010, on bark of living *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 2937, 2946, 2959. Chubut, Lago Puelo, Motoco path, 41°58′24″S 71°44′25″W, 1000 m a.s.l., 23 Apr 2011, on bark of living *Nothofagus dombeyi,* leg. S.P. Gorjón, coll. SPG 3257. Chubut, Los Alerces National Park, Krügger lake, 42°53′16″S 71°43′38″W, 600 m a.s.l., 26 Mar 2011, on bark of living *Nothofagus dombeyi*, leg. S.P. Gorjón, coll. SPG 3037. *Aleurodiscus occidentalis* – CANADA, British Columbia, Saanichton, King's Road, on dead branch of large living *Thuja plicata*, 6 Jun 1939, leg. I.

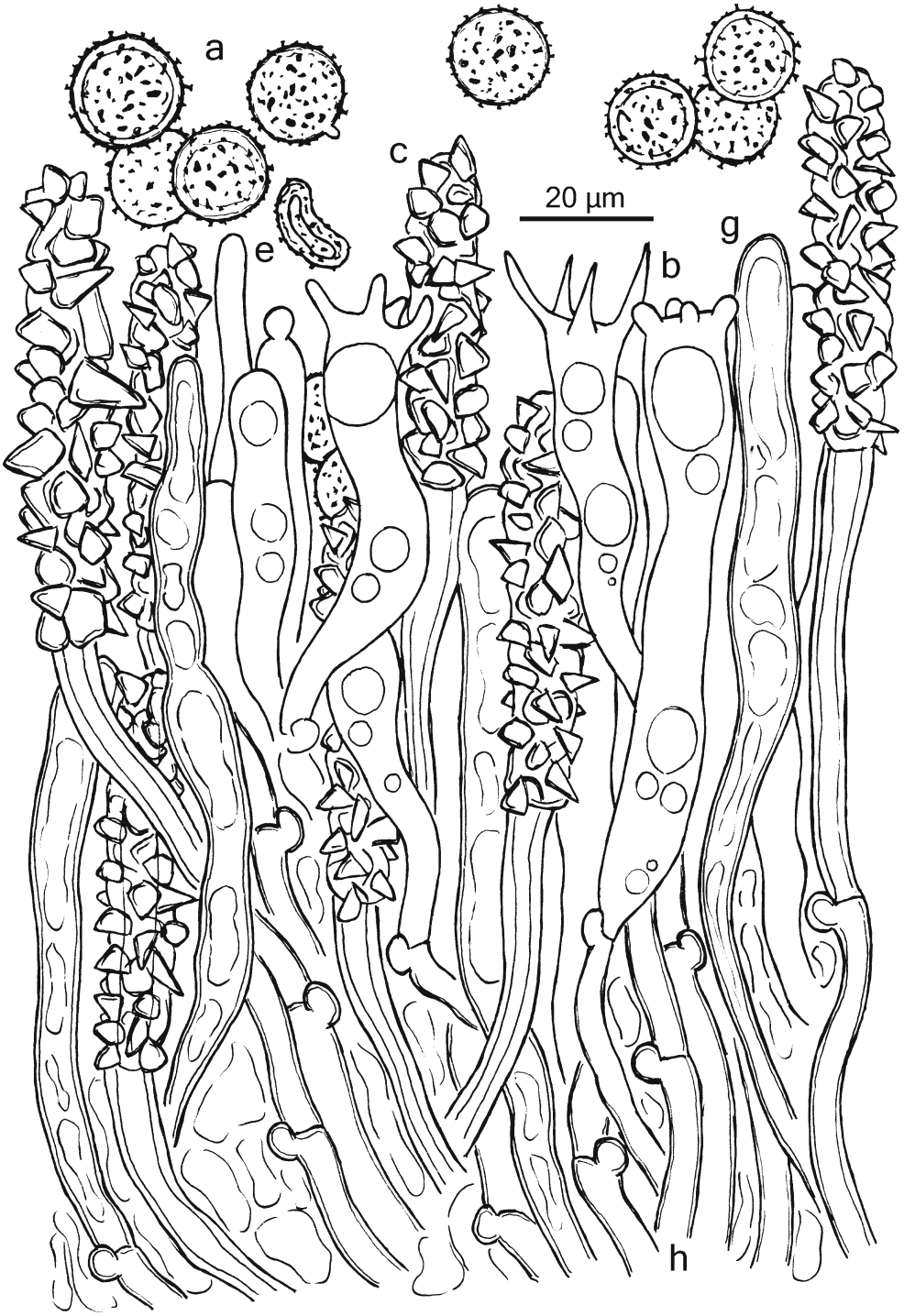

Fig. 7 *Aleurodiscus bernicchiae*, hymenium. a. Basidiospores. b. Basidia. c. Cystidia. e. Hyphidia or paraphysate hyphae. g. Gloeocystidia. h. Hyphae

Mounce et al. (DAOM 9406). British Columbia, Saanichton woods, on *Thuja plicata*, 12 July 1940, leg. I. Mounce (DAOM 10001). *Aleurodiscus thujae* – CANADA, Québec,Ste. Catherine, on *Thuja occidentalis*, 25 Aug 1938, leg. H.S. Jackson (DAOM 73332, isotype). Ontario, Haliburton Dist., Univ. Forest, Hindon twp., on *Thuja occidentalis*, 14 Sep 1961, leg. R.F.C. et al. (DAOM 73331). *Aleurodiscus tsugae* – JAPAN, Sendai, 9 Jul 1919, leg. A. Yasuda (DAOM 210575, isotype).

Description – Basidiome resupinate, crustose, distinctly pulvinate, tuberculate, whitish to pale cream, margin abrupt. Hyphal system monomitic, hyphae with clamps. Cystidia moniliform, about 5–8(−10) µm wide, some with encrustations. Paraphysoid and sinuous hyphae also present. Basidia variable in lenght, 60–80(−100) µm, and 10–12 µm wide, with four sterigmata and a basal clamp. Basidiospores ellipsoid, (16–)18–20(−25)×(10–)12–15(−17) µm, finely echinulate in Melzer's reagent, with slightly projecting small

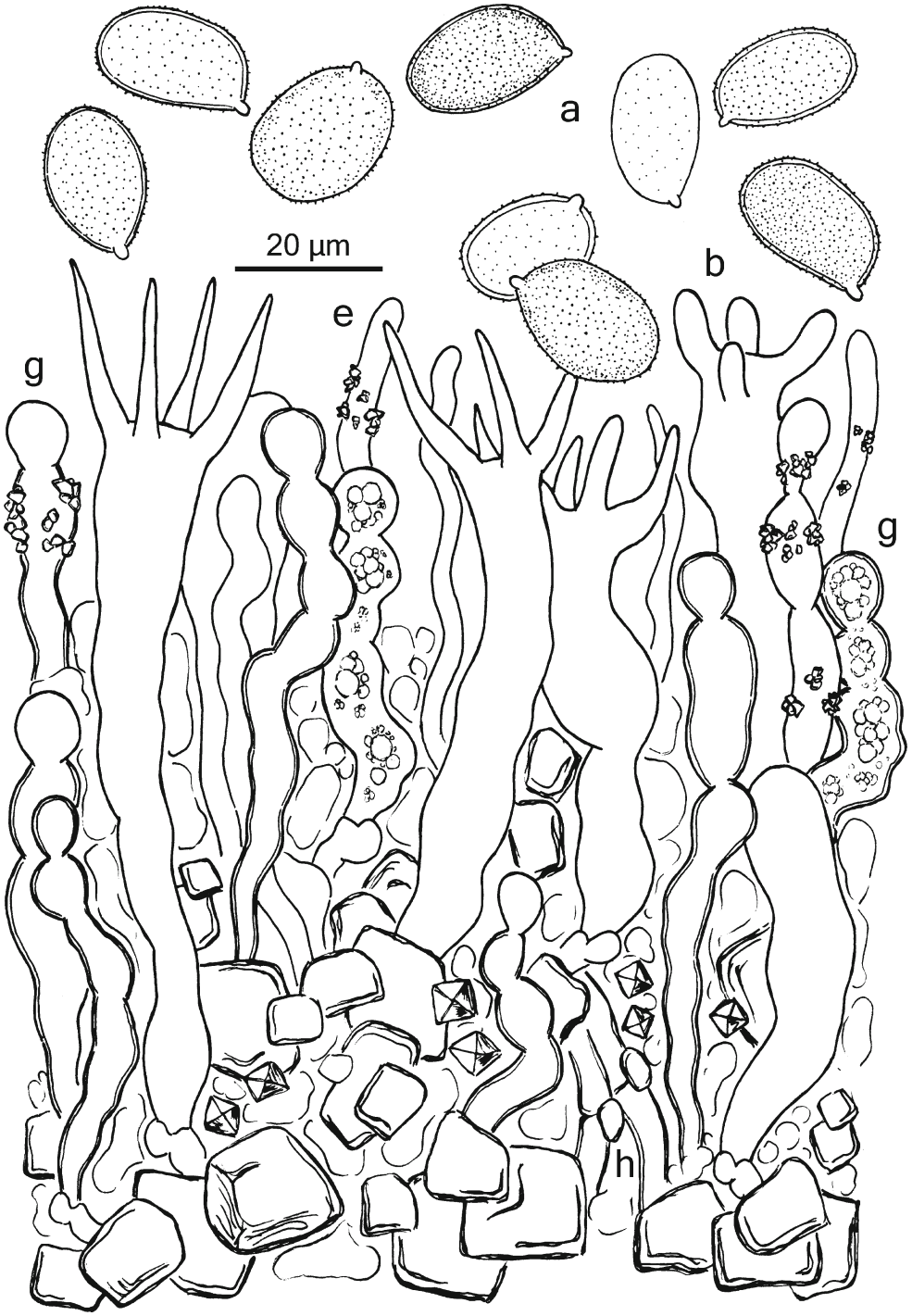

Fig. 8 *Aleurodiscus corticola*. a. Basidiospores. b. Basidia. e. Hyphidia or paraphysate hyphae. g. Gloeocystidia. h. Hyphae

aculei, smooth in KOH, thick-walled, amyloid, with a prominent apiculus.

Habitat and distribution – Known from the Patagonian Andes of Argentina growing on bark of living *Nothofagus betuloides, N. dombeyi,* and *N. pumilio*.

Remarks – A characteristic species that grows on bark of living *Nothofagus* reminding the habit and macromorphology of *Dendrothele*. Microscopically it is distinguished by the ornamented basidiospores and the abundant moniliform gloeocystidia. It seems morphologically close to *Aleurodiscus occidentalis* Ginns and *Aleurodiscus tsugae* Yasuda, which differ by their basidiospore ornamentation with distinct long aculei, and thinner pruinose to rimose basidiomes with grayish to brownish colors. *Aleurodiscus thujae* Ginns is another species with aculeate basidiospores and moniliform gloeocystidia, closely related to the previous species, but differs by simple-septate hyphae (Ginns 1990). This new species was previously reported as *Aleurocystidiellum* aff. *disciformis* (Vill.:Fr.)

Boidin, Terra & Lanq. by Greslebin (2002). *Aleurocystidiellum disciformis*, though, is a North Hemisphere, temperate species that grows mainly on *Quercus*, and that differs by discoid, grayish basidiomes, and by smaller (15–18×10–12 μm) basidiospores ornamented with irregular warts.

***Aleurodiscus hallenbergii* sp. nov.** Figs. 9, 13h–i.

Basidioma resupinatum, leve, albidum. Hyphae fibulatae. Cystidia incrustata et copiosa. Basidiosporae globosae, (15–)17–20(−24) μm, aculeatae, fortiter amyloideae. Ab Aleurodiscus bernicchiae differt basidiosporis grandioribus, et basidioma resupinatum albidum.

Etymology: *hallenbergii* – named in honour of Dr. Nils Hallenberg (Sweden), in recognition of his contributions to the taxonomy of corticioid fungi.

Mycobank MB 564450

HOLOTYPUS: ARGENTINA, Neuquén, Nahuel Huapi National Park, Puerto Blest, Cántaros lake, 41°00′05″S 71°49′42″W, 830 m a.s.l., 30 May 2010, on branches of living *Fitzroya*

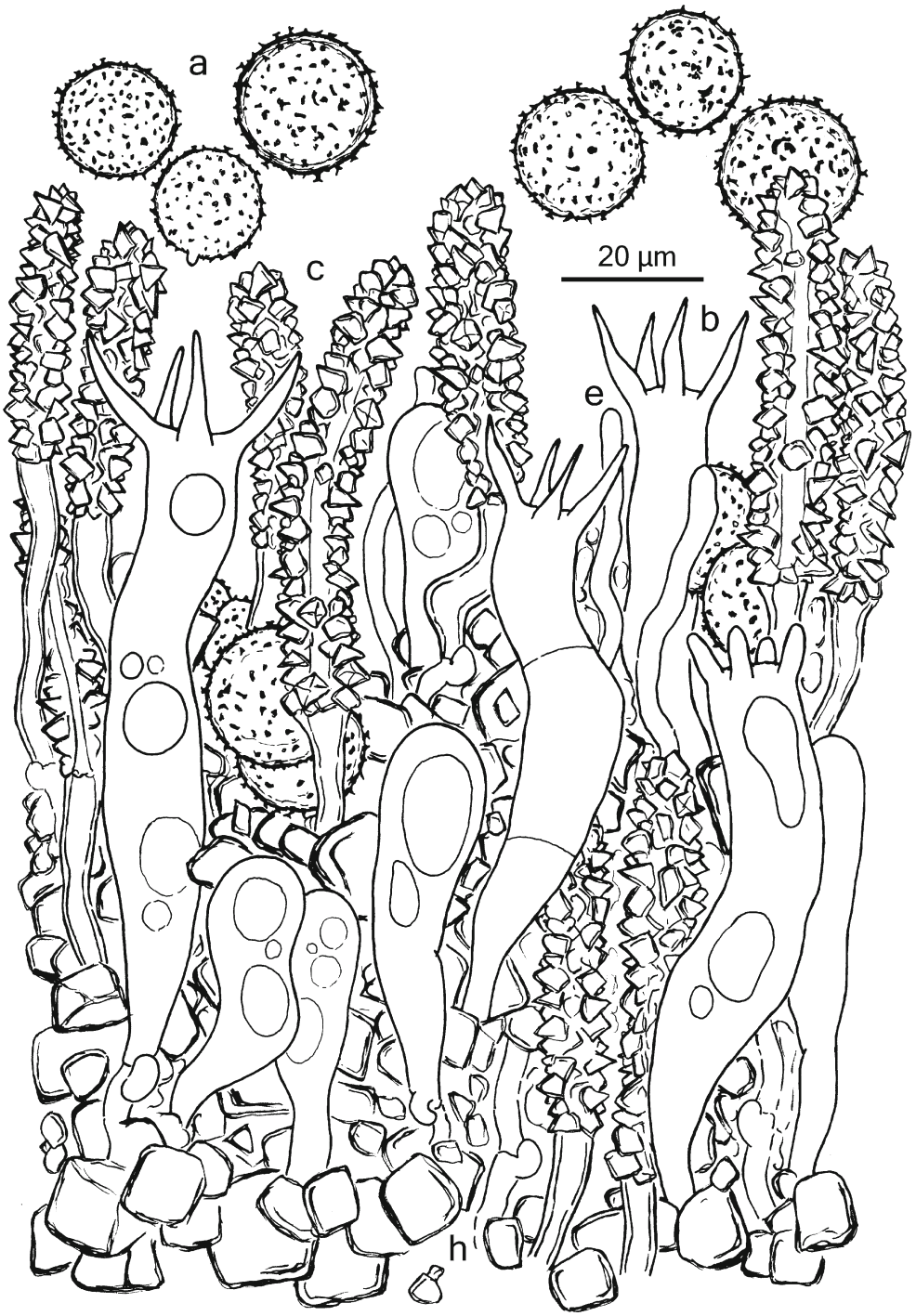

Fig. 9 *Aleurodiscus hallenbergii*. a. Basidiospores. b. Basidia. c. Cystidia. e. Hyphidia or paraphysate hyphae. h. Hyphae

cupressoides, leg. S.P. Gorjón, coll. SPG 2944 (**holotype** in BAFC, **isotypes** in SALA and CIEFAP). ADDITIONAL SPECIMENS EXAMINED: ARGENTINA, Neuquén, Nahuel Huapi National Park, Puerto Blest, Cántaros lake, 41°00′05″S 71°49′42″W, 830 m a.s.l., 30 May 2010, on branches of living *Fitzroya cupressoides*, leg. S.P. Gorjón, coll. SPG 2909, 2945. Chubut, Lago Puelo, Motoco path, 41°58′24″S 71°44′25″W, 1000 m a.s.l., on branches of living *Fitzroya cupressoides,* 23 Apr 2011, leg. S.P. Gorjón, coll. SPG 3258, 3259, 3263. Chubut, Los Alerces National Park, southern arm of Menéndez lake, 42°44′03″S 71° 59′12″S, 530 m a.s.l., on branches of living *Fitzroya cupressoides,* 3 May 2010, leg. S.P. Gorjón, coll. SPG 2717. Chubut, Los Alerces National Park, path between Arrayanes river and Menéndez lake, 30 Mar 2000, on *Austrocedrus chilensis* (*Cupressaceae*), leg. M. Rajchenberg, coll. MR 11948.

Description – Basidiome resupinate, adnate, whitish, hymenial surface smooth, margin abrupt. Hyphal system monomitic, hyphae with clamps, 2–4 μm in diam, thin- to thick-walled, not encrusted. Cystidia covered by pyramidal crystals, encrusted part ab. 70–90×8–15 μm, thick-walled, with a basal clamp. Paraphysoid hyphae also present, smooth, clamped or with adventitious simple septa, not branched. Basidia long tubular, 60–110×10–15 μm, with thin- to slightly thickened walls, with four sterigmata ab. 20–30 μm long, and a basal clamp difficult to discern. Basidiospores globose to subglobose, variable in size, usually (15–)17–20(−24) μm in diam, ornamented with usually bi-forked aculei, thick-walled, spore wall seemingly double layered, strongly amyloid.

Habitat and distribution – Known from the Patagonian Andes of Argentina growing on dead or living branches of the conifers *Austrocedrus chilensis*, *Fitzroya cupressoides,* and *Pilgerodendron uviferum.*

Remarks – Microscopically very similar and obviously closely related to *Aleurodiscus bernicchiae* by the encrusted cystidia and basidiospore ornamentation, but differing in the large basidiospores and absence of gloeocystidia. Macroscopically it is easily distinguishable by the resupinate, white basidiome. The species was reported as *Aleurocystidiellum subcruentatum* (Berk. & M.A. Curtis) P.A. Lemke by Rajchenberg (2002), which differs by discoid, effuse-reflexed to subpileate basidiomes with grayish hymenial surface, ellipsoid, verrucose basidiospores 15–20×10–15 μm, and different cystidial elements.

***Aleurodiscus quilae* sp. nov.** Figs. 10, 13k.

Basidioma resupinatum, leve, albidum. Hyphae fibulatae. Cystidia in apicale parte moniliformia. Basidiosporae ellipsoideae, 12–14× 9–11 μm, aculeatae, fortiter amyloideae. Ab Aleurodiscus spiniger differt basidiosporis et gloeocystidiis dissimiles.

Etymology: refers to the vernacular name and specific epithet of the substrate, an endemic bambusa.

Mycobank MB 564451

HOLOTYPUS: CHILE, X Region (Los Lagos), Yelcho lake glacier path, 43°16′33″S 72°25′25″W, 150 m a.s.l., 4 Apr 2011, on dead steams of *Chusquea quila* (*Poaceae, Bambuseae*), leg. S.P. Gorjón, coll. SPG 3088 (**holotype** in BAFC, **isotype** in SALA).

Description – Basidiome resupinate, adnate, cream, hymenial surface smooth, margin indistinct. Hyphal system monomitic, hyphae thin-walled, with clamps. Gloeocystidia with a moniliform apex, thin-walled, 40–50×8–10 μm, apex about 12–15 μm long, with 5–10 constrictions. Acanthophyses with few apical protuberances, thin-walled. Dendrophyses with one or two ramifications, paraphysoid hyphae, and acanthophyses also present but not remarkable. Basidia (acanthobasidia) at first as thin-walled globose probasidia, mostly distinctly pleurobasidiate, usually 15–20 μm wide, with distinct apical protuberances, then elongated and with a tubular aspect, up to 100–120 μm long, the protuberances remaining in the basal part, with four sterigmata, and a basal clamp. Basidiospores ellipsoid, 12–14×9–11 μm, distinctly aculeate with projecting conical aculei, strongly amyloid, with a prominent round apiculus.

Habitat and distribution – Known from the the Valdivian rainforest in the Patagonian Andes of Chile, growing on dead stems of *Chusquea quila.*

Remarks – It is close to *Aleurodiscus spiniger* D.P. Rogers & P.A. Lemke (Lemke 1964) with which it shares the metabasidial elongation and echinulate basidiospores, but *A. quilae* differs by the acanthobasidia, gloeocystidia with a moniliform apex, and ellipsoid basidiospores (subglobose to ellipsoid in *A. spiniger*). *Aleurodiscus laurentianus* H.S. Jacks. & P.A. Lemke and *Aleurodiscus weirii* Burt differ in smaller, subglobose basidiospores, smooth basidia, and lack of globose probasidia (Núñez and Ryvarden 1997).

***Aleurodiscus stratosus* sp. nov.** Figs. 11, 12, 13l.

Basidioma cupulatum, stratosum, hymenophorum leve, cremeum. Hyphae fibulatae. Gloeocystidia copiosa, sinuosa vel moniliformia. Basidiosporae subglobosae, 18–20× 15–18 μm, leviter verrucosae, fortiter amyloideae. Ab Aleurodiscus subglobosporus differt basidioma stratoso, basidiosporis minus insignis ornatibus.

Etymology: *stratosus* – Latin, referred to the stratose configuration, with hymenial elements arranged in distinct layers.

Mycobank MB 564452

HOLOTYPUS: ARGENTINA, Río Negro, Nahuel Huapi National Park, Puerto Blest, Frías stream path, 41°02′17″S 71°48′39″W, 800 m a.s.l., 12 Apr 2011, on the lower side of branches of living *Saxegothaea conspicua*, leg. S.P. Gorjón, coll. SPG 3219 (**holotype** in BAFC, **isotypes** in SALA and CIEFAP). ADDITIONAL SPECIMENS EXAMINED: *Aleurodiscus subglobosporus* – DAOM 210586 (isotype).

Description – Basidiome cupuliform, hymenial surface dirty white to cream, with a crustose brownish abhymenial layer, margin more or less undulate. Hyphal system monomitic, hyphae with clamps, thin- to thick-walled. Hymenium composed of a palisade of basidia, gloeocystidia, and acanthophyses developed over strata of old hymenial layers separated by darker

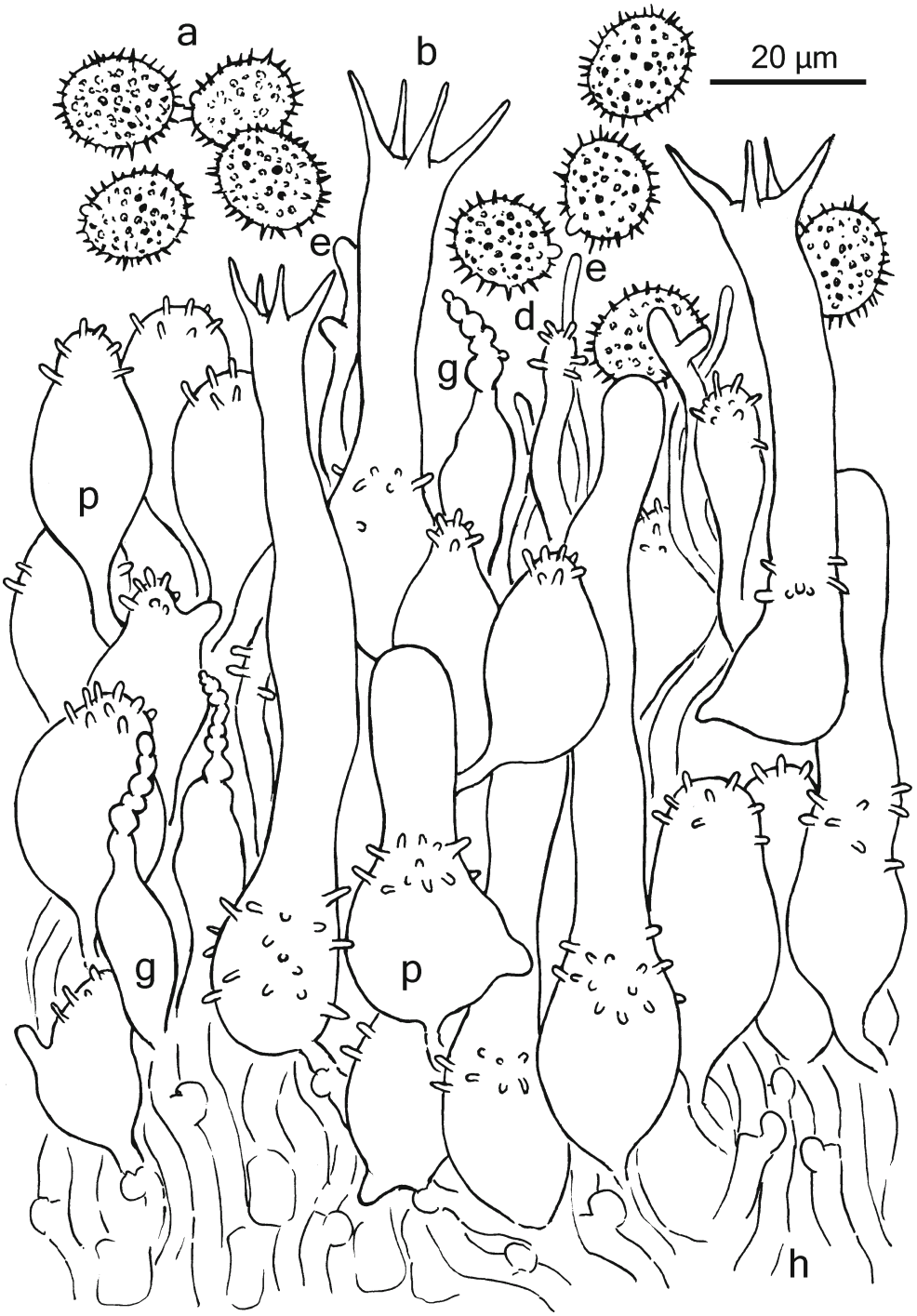

Fig. 10 *Aleurodiscus quilae*. a. Basidiospores. b. Basidia. d. Acanthophyses. e. Hyphidia or paraphysate hyphae. g. Gloeocystidia. h. Hyphae. p. Probasidia

zones. Gloeocystidia moniliform to cylindrical, variably in length, 80–100×8–10 μm long, with firm to thickened walls, with oily contents easily distinguished in KOH, yellowish in Melzer's reagent, SA+, some with digitiform protuberances in the basal part. Acanthophyses numerous, thin-walled, with a variable number of apical protuberances, variable in length, about 5 μm wide. Basidia (acanthobasidia) at first cylindrical to clavate, about 15–20 μm wide, with conspicuous protuberances, then enlarged up to 60–80 μm, with four sterigmata, and a basal clamp. Basidiospores globose to subglobose, 18–20× 15–18 μm, verrucose with distinct but not protruding small round verrucae, not aculeate, thick-walled, strongly amyloid, with a prominent round apiculus.

Habitat and distribution – Known from the Patagonian Andes of Argentina growing on branches of the conifer *Saxegothaea conspicua*.

Remarks – It seems morphologically close to *Aleurodiscus subglobosporus* Ginns & Bandoni from Japan (Ginns and Bandoni 1991), but the latter species differs by the distinctly aculeate basidiospores, acanthophyses with longer

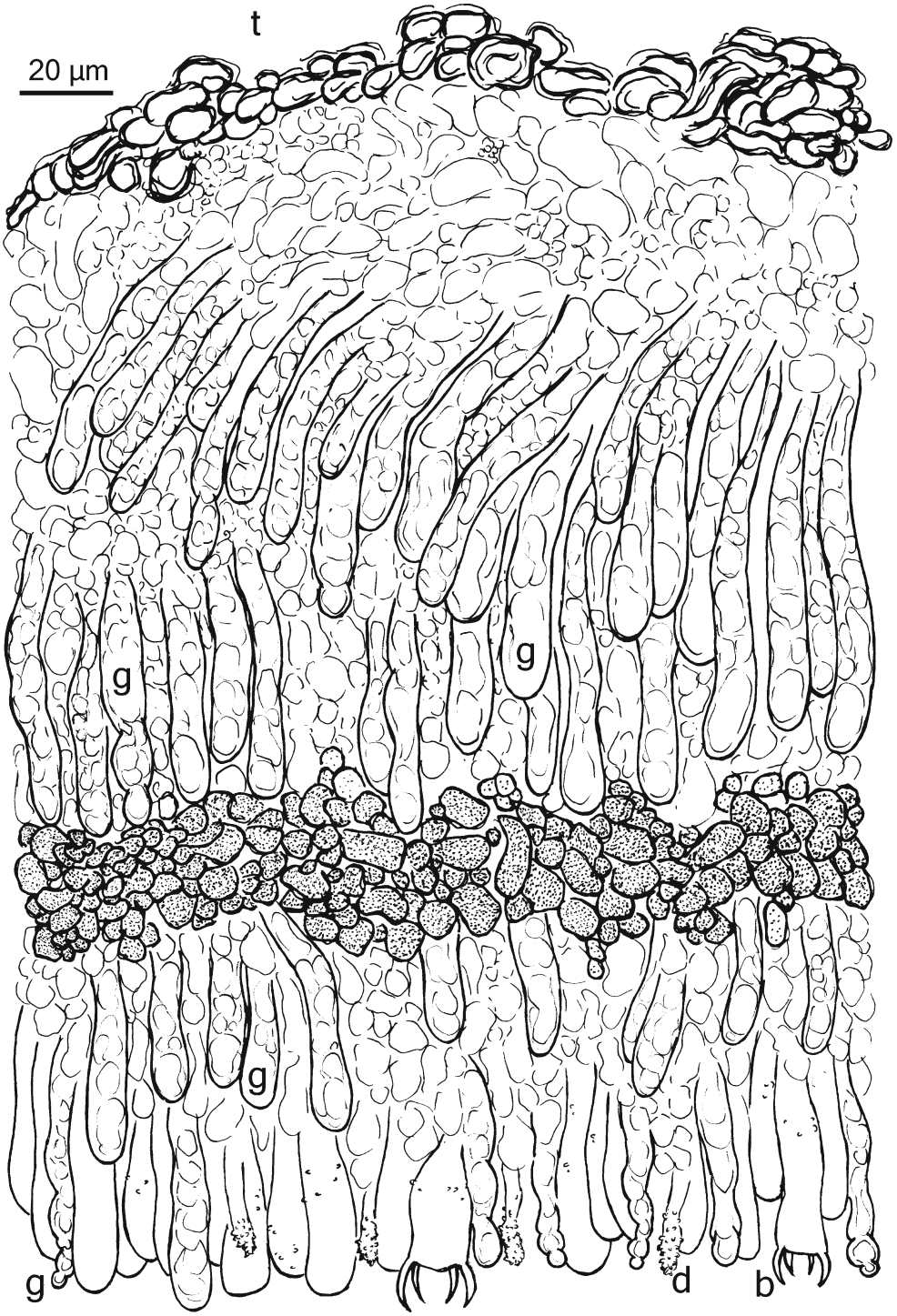

Fig. 11 *Aleurodiscus stratosus*. b. Basidia. d. Acanthophyses. g. Gloeocystidia. t. Section of the basidiome

protuberances, SA– gloeocystidia, no stratose configuration, and a membranous basidiome with diffuse margin.

Key to *Aleurodiscus* s.l. species in Patagonia

1a. Basidiome fleshy to gelatinous.....***A. vitellinus***
1b. Not as above, basidiome crustose to coriaceous.....2
2a. Basidiospores smooth.....3
2b. Basidiospores ornamented.....6
3a. Acanthophyses present.....***A. cerussatus***
3b. Acanthophyses absent.....4
4a. Skeletocystida encrusted.....***A. antarcticus***
4b. Skeletocystidia not encrusted.....5
5a. Basidiospores narrowly ellipsoid, 12–16(−17)×7–10 µm.....***A.triviale***
5b. Basidiospores broadly ellipsoid, 12–18×11–13 µm.....***A. parmuliformis***
6a. Acanthophyses and acanthobasidia absent.....7
6b. Acanthophyses and acanthobasidia present.....9

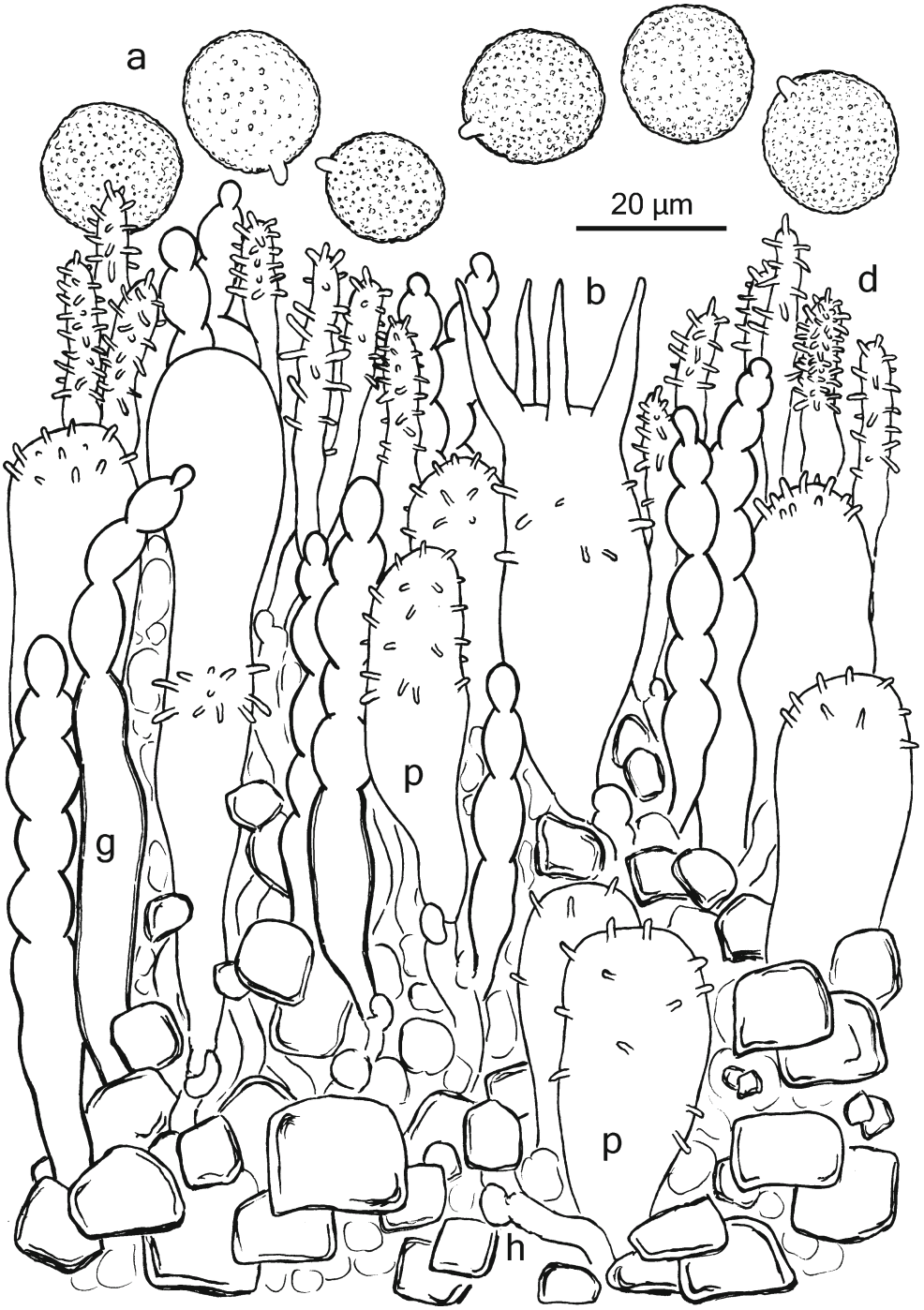

Fig. 12 *Aleurodiscus stratosus*, hymenium. a. Basidiospores. b. Basidia. d. Acanthophyses. g. Gloeocystidia. h. Hyphae. p. Probasidia

7a. Cystidia moniliform to torulose, encrusted cystidia absent.....***A. corticola***

7b. Moniliform cystidia absent, encrusted cystidia present.....8

8a. 8a. Basidiome cupuliform, basidiospores usually 12–14 μm in diam.....***A. bernicchiae***

8b. Basidiome resupinate, basidiospores usually 17–20 μm in diam.....***A. hallenbergii***

9a. Basidiospores ellipsoid, 12–14×9–11 μm, aculeate.....***A. quilae***

9b. Basidiospores subglobose, 18–20×15–18 μm, verrucose.....***A. stratosus***

Discussion

Four species of *Aleurodiscus* s.l. were previously reported from the Patagonian Andes of Argentina (Greslebin and Rajchenberg 2003). Presently, and including the Chilean Patagonia, ten species are recognized. *Aleurodiscus antarcticus, A. cerussatus,*

Fig. 13 Basidiomes. **a**. *Aleurodiscus vitellinus*. **b**. *A. triviale*. **c**. *A. parmuliformis*. **d**. *A. antarcticus*. **e**. *A. cerussatus*. **f**–**g**. *A. bernicchiae*. **h**–**i**. *A. hallenbergii*. **j**. *A. corticola*. **k**. *A. quilae*. **l**. *A. stratosus.* Bar=1 cm

A. triviale, and *A. vitellinus* are widespread species while the rest have a more restricted distribution or host specificity.

Aleurodiscus cerussatus is a widespread and common cosmopolitan species. By the presence of acanthophyses and smooth basidiospores it is usually accepted in *Acanthophysellum*. *Aleurodiscus antarcticus, A. parmuliformis*, and *A. triviale* belong to the group of smooth-spored species with skeletocystidia. They seem morphologically closely related to

Stereum, but differ clearly by large and robust basidia and basidiospores. The generic possition of these three species is still unsolved. It is likely that this group of *Aleurodiscus* species only found in Southern Hemisphere countries, with simple-septate hyphae and skeletocystidia may deserve a genus of its own, phylogenetically presumably related to *Stereum*. *Aleurodiscus vitellinus*, the type species of *Gloeosoma*, is a common and widely distributed species in Patagonia. Because of the fleshy and aromatic basidiome it is considered a good edible fungus and it can be regarded as a potential economical resource to local economy.

Aleurodiscus corticola, previously reported by Greslebin and Rajchenberg (2003) as *Aleurodiscus* aff. *disciformis* is a conspicuous species growing on bark of living *Nothofagus*. *Aleurodiscus bernicchiae* and *A. hallenbergii* show striking and distinct encrusted cystidia with coarse crystals, a feature not previously known in any species of *Aleurodiscus,* excepting those with more or less encrusted, but not comparable, skeletocystidia. A more restricted generic placement is unclear, and future molecular studies are neccesary to clarify phylogenetic relationships. *Aleurodiscus stratosus* and *A. quilae* are characterized by the presence of acanthobasidia, acanthophyses, and gloeocystidia with more or less moniliform apex. Of them, only *A. quilae* also shows distinct pleurobasidia that points towards its inclusion in *Acanthobasidium*.

Acknowledgments Jennifer Wilkinson, assistant curator of DAOM is thanked for the loan of specimens. Andrés de Errasti assisted us in laboratory work and joined in several field trips. Annarosa Bernicchia and two anonymous reviewers revised an early draft of the manuscript and provided useful taxonomical comments and corrections to the text. The "Consejo Nacional de Investigaciones Científicas y Técnicas" (CONICET, Argentina) supported this research by PIP 80101000. Sergio P. Gorjón is a postdoctoral research fellow of the "Agencia Española de Cooperación Internacional" (MAEC-AECID). Alina G. Greslebin and Mario Rajchenberg are researchers of CONICET.

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