Subantarctic Geoglossaceae. II. *)

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When this study began it was intended to revise all collections of Geoglossaceae from subantarctic areas which are kept both at Kew (K) and at the Instituto Spegazzini, La Plata (LPS). At present, Mr. Brian Spooner, from the former Institution is carrying out a comprehensive study of Australasian Helotiales. Therefore, observations on material from Australia, Tasmania and New Zealand will not be included here and the investigation only concentrates on collections of South American origin.

This work was done at the Instituto Spegazzini and at the Herbarium of the Royal Botanic Gardens, Kew (autumn 1978). My stay there was very profitable to me, since I had the chance to discuss with Dr. R. W. G. Dennis and Mr. B. Spooner, some of the problems that arose in the course of my research. I wish to express to them my gratitude as well as to the Staff of the Mycological Section, for assistance.

Descriptions

Pseudomitrula gen. nov.

Ascomata erecta, capitata vel clavata. Pars ascigera plerumque acute limitata, laete colorata, carnoso-gelatinosa, gymnocarpica. Asci cylindrico-clavati, poro jodo coerulescentes, vel non coerulescentes. Paraphyses praesentes. Ascosporae hyalinae, perpetuo continuae, fusoideae, cylindricae vel allantoideae. Excipulum stipitis multiplex: cortex textura porrecta agglutinata et medulla textura intrincata lacunosa. Geoglossaceae est.

Typus: *Pseudomitrula horakii* Gamundi

Ascocarps erect, capitate to clavate, with the fertile portion usually sharply delimited, stipitate, bright colored, fleshy-gelatinous, gymnocarpic. Stipe cylindric. Asci cylindric to cylindric-clavate, iodine-negative varying from one apothecium to another. Paraphyses present. Ascospores hyaline, permanently unicellular, fusoid, cilindric to allantoid. Excipulum complex consisting of a cortex of

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"textura porrecta" formed by agglutinated hyphae and a lacunose *medulla*, formed by hyaline, thinner hyphae ("textura intricata"). (Fig. 1).

The genus belongs to the *Geoglossaceae* SCHROET. Differs from *Heyderia* (FR.) LINK (MASS GEESTERANUS, 1964: 87), by: asci iodine-negative or positive, ascospores permanently unicellular and stipe with lacunose medulla, in the latter solid and consisting of agglutinated medullar hyphae. From *Spragueola* MASSEE (NANNFELDT, 1942: 57) by the prescence of paraphyses and shape of ascospores. Iodine reaction of the asci is usually J— in the typical variety and usually positive in var. *microglossoidea*. In the first case the reaction apparently depends on the grade of maturity of asci (showing a gradation from the inmature (J—) to mature (J+) asci).

1. *Pseudomitrula horakii* GAMUNDI sp. n.

Ascomata erecta, capitata, spathulata vel clavata, carnoso-gelatinosa, 5—50 mm. Pars ascigera sulco horizontale a stipite distincto separato, ochracea vel ferruginea, cerea, glabra, teretes vel depressa, vetusta interne fistulosa, 4—30 mm longa × 1—3 mm crassa. Stipes cylindricus, 6—32 mm longus × 0,5—1 mm diam., melleus vel olivaceus, superne glaber, ad basim pubescens. Asci 8-spori, cylindrico-clavati, ad basim bifurcati, poro iodo haud coerulescentes, 38—57 × 3,4—5,8 µm. Paraphyses simplices vel ramosae, filiformes, ochraceae, 1—2 mm diam. Ascosporae 2-seriatae, continuae, hyalinae, allantoideae, 4.8—9.6 × 0.8—2.4 µm. Subhymenium ex textura intricata. Cortex stipitis hyphis ochraceis agglutinatis pigmento incrustante compositus. Medulla stipitis hyphis hyalinis 1.4—2.4 µm laxe intertexis efformante. Saprophytica.

Typus: LPS 38412.

Illustrations: Fig. 1, 1—9.

Ascocarps erect, capitate, spathulate or clavate, fleshy-gelatinous, (5)10—37(50) mm, with distinct fertile portion, glabrous, separated from the stipe by a conspicuous groove, terete to flattened, always shorter than the stipe, "beige", "ochraceous", "luteous", "orange" to "rust" when fresh, drying "umber" to "dark brick", waxy, glabrous, ageing hollow inside, 4—20 (30) mm long. × 1—3 mm with; stipe cylindric, very variable in length according to the position on the substrate, 6—32 × 0.5—1 mm, glabrous to finely pubescent at the base, colour different from the pileus, ochraceous with an olivaceus tinge, "honey", "hazel" to "olivaceous", drying "fawn" (RAYNER's). In KOH diffusing an ochraceous pigment from the pileus. Asci 8-spored, cylindric, bifurcate at the base, iodine negative or positive, 38—57 × 3.4—5.8 µm. Paraphyses rarely septate, simple or branched, usually containing ochraceous to pale brownish pigment, filiform, 1—2 µm diam. at the apex. Ascospores 2-seriate, hyaline, unicellular, allantoid, 4.8—8.2 (9.6) × 0.8—2.4 µm. Subhymenium of compact

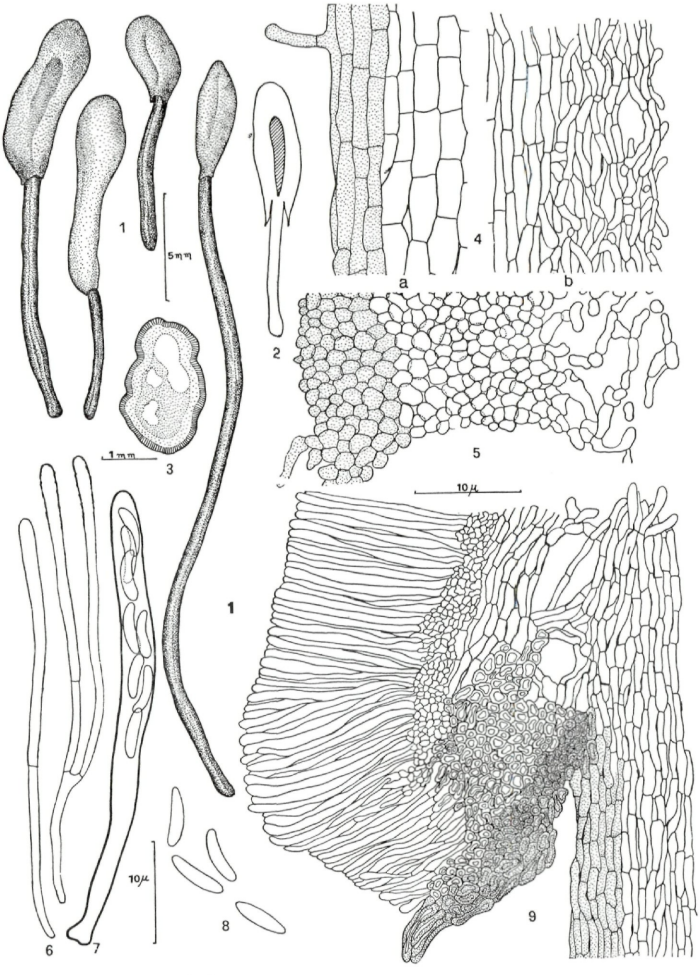

Fig. 1. *Pseudomitrula horakii* Gamundi. 1. Ascocarps. 2. Longitudinal section of an ascocarp. 3. Transversal section of the fertile portion. 4. Longitudinal section of the stipe: a) cortex; b) medulla. 5. Transversal section of the stipe. 6. Paraphyses. 7. Ascus. 8. Ascospores. 9. Longitudinal section of the fertile portion (detail). From holotype

"textura intricata". Fertile portion with a lacunose medulla, towards margin "textura angularis" to "textura oblita", yellowish, cell-walls gelatinized. Stipe consisting of: 1) cortex of "textura porrecta", the external hyphae ochraceous and agglutinated, with incrusting pigment, 1—3 μm diam., ending freely to form short hairs, the inner ones hyaline, short-celled, up to 9.6 μm diam., decreasing in thickness from outward to inward and 2) lacunose medulla ("textura intricata") formed by hyaline hyphae 1.4—2.4 μm diam. Saprophytic, growing on plant debris.

HOLOTYPE: ARGENTINA: Tierra del Fuego, Tierra Mayor, leg. E. HORAK, 12-III-1974, on fallen twigs of *Chiliotrichum*, LPS 38412.

Material examined: ARGENTINA: Tierra del Fuego, Torre de Tierra Mayor, leg. I. GAMUNDI, 13-III-1975, LPS 39521 and leg. A. GIAIOTTI & J. KIKUCHI, 13-III-1975, LPS 39526, on fallen twigs, *Nothofagus pumilio* forest; id. 21-III-1975, LPS 39524 y 39525, on *N. pumilio* litter; Ensenada, Punto Panorámico, leg. I. GAMUNDI & A. GIAIOTTI, 16-III-1975, on litter of *N. betuloides*, *Chiliotrichum* and *Berberis*, LPS 39527; Martial Glacier Valley, leg. HORAK, 7-III-1963, between *Marchantia* and mosses, LPS 38409: Neuquén, Cerro Cortinario, SINGER (M-3480), 24-IV-1964, on twigs under *Nothofagus pumilio*. — CHILE: Osorno, Volcán Antillanca, leg. E. HORAK, 13-IV-1973, on rotten twigs of *Ribes*, LPS 38414.

The fertile portion varies very much in shape, and can be curved to spathulate. Asci and ascospores remind of *Mitrula morchelloides* MAINS (1955: 874), but, according with its description, the stipe is concolorous with the pileus, the asci are iodine positive and the microstructure is also different (REDHEAD 1977: 323); this author transferred the above species to *Verpatinia*.

I have also examined European material of *Heyderia abietis* (FR.) LINK [RABENHORST, Fungi Europeaei N° 1233, (L)] which is somewhat similar in morphological features, but its microstructure is different, and the ascospores are here fusoid, 13.6—16 (20) × 2.4—3.2 μm *).

1a. *Pseudomitrula horakii* var. *microglossoidea* GAMUNDI var. nov.

Ascomata robusta, 30—65 mm. Pars ascigera vix limitata, microglossoidea. Stipes ad basim conspicue pubescens. Asci 72—76 × 1.4—2 μm. Ascosporae 9.6—14.4 × 1.4—2.4 μm. Typus: LPS 39522.

Illustrations: Fig. 2,8—10.

Ascocarps more robust than in the type variety, 30—65 mm long, fertile portion not always sharply delimited from the stipe, 10—40 × 1—5 mm, but instead uneven, reminding *Microglossum rufum*; stipe conspicuously pubescent at the base, 20—40 × 1—2 μm. Asci 72—76 × 1.4—2 μm, iodine positive or negative; ascospores

*) In all description measures correspond to my own observation.

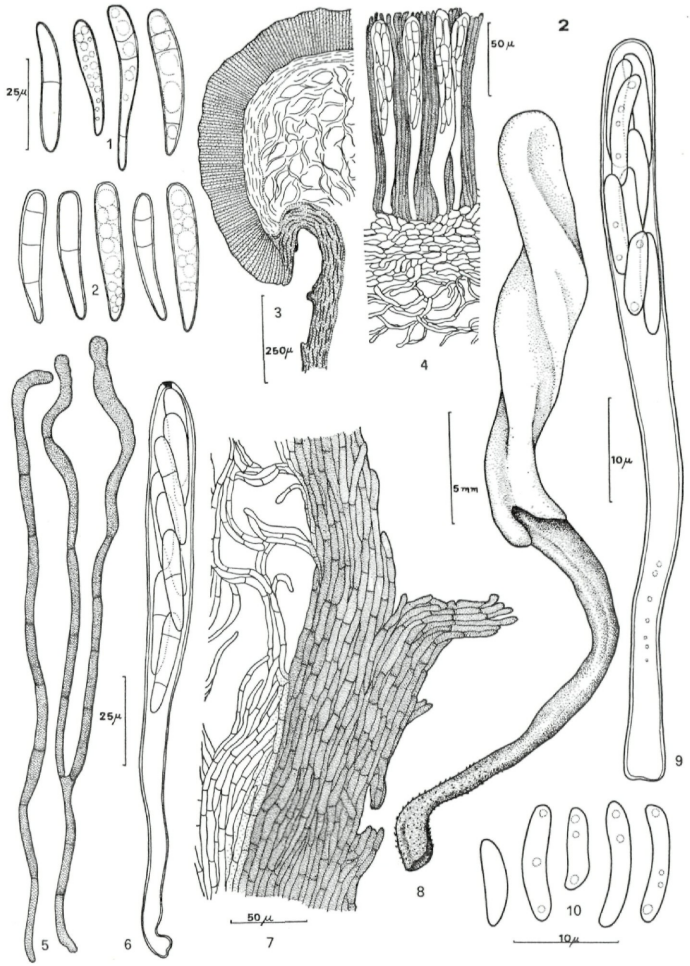

Fig. 2. *Sarcoleotia nigra* IMAI. 1. Ascospores (from type). 2—7. From LPS 39530: 2. Ascospores. 3. Longitudinal section of the fertile portion. 4. Detail of the hymenium. 5. Paraphyses. 6. Ascus. 7. Detail of longitudinal section of the stipe. — *Pseudomitrula horakii* var. *microglassoidea* GAMUNDI. (From type). 8. Ascocarp. 9. Ascus. 10. Ascospores

9.6—14.4×1.4—2.4 µm. Microstructure identical to type variety, but with thicker, more gelatinized hyphae. Saprophytic, on the same substrate as *P. horakii*.

HOLOTYPE: ARGENTINA: Tierra del Fuego, Ensenada, leg. I. GAMUNDI & A. GIAIOTTI, 22-III-1975, on wood between leaf litter, in a wet, dark place, mixed forest of *N. betuloides* and *Drymis winteri*, LPS 39522.

Material examined: ARGENTINA: Tierra del Fuego, N. de Ushuaia, leg. A. GIAIOTTI, 12-III-1973, on fallen twigs, LPS 39523.

At first sight the collection LPS 39522 looks so different from the type of *P. horakii* that I was inclined to consider it as a different species. However, on specimens collected in Neuquén (SINGER M-3480) I found a considerable variation regarding size of ascocarps, ascospores and asci. In robust ascocarps are the asci larger and the ascospores measure 6.4—10.5×0.7—1.4 µm. In delicate ascocarps are the ascospores 6.4—8.2×0.7—1 µm. In both cases the asci are iodine negative.

2. *Sarcoleotia nigra* S. ITO & IMAI in IMAI 1934. — Trans. Sapporo Nat. Hist. Soc., 13: 182, tab. 7, figs. 23—27

= *Leotia nigra* S. ITO & IMAI in IMAI 1932. — Proc. Jap. As Adv. Sci., 7: 184. (Nomen nudum).

Illustrations: Fig. 2, 1—7.

Ascocarps pileate, fleshy, black-brown, 5—12 mm; stipe solid, cylindric, squamulose. Asci 8-spored, clavate-cylindric, iodine positive 105—138×9—13 µm. Paraphyses filiform, brownish, 1.6—2.4 µm diam. at the apex. Ascospores clavate, 0—3 septate, (mostly 1—3 septate), hyaline, with guttules, 23—31.5×3—5.2 µm. Stipe of "textura porrecta", consisting of hyphae of 4.2—6.3 µm diam.; the scales are formed by tearing-off of the cortical hyphae.

Material examined: JAPAN: Mt. Meakan, Prov. Kushiro, Hokkaido, leg. S. Imai, 15-IX-1933, on soil, in montane-alpine forest, in autumn. (K, Isotypus). — ARGENTINA: Tierra del Fuego, Valley of Martial Glacier, leg. E. HORAK, 10-III-1975, on soil among mosses in mixed forest of *Nothofagus pumilio* and *N. betuloides*, LPS 39529.

In IMAI's description of *S. nigra* the asci are iodine negative; however, KORF (1973: 305) states that the asci are iodine positive. Examining the isotype (K), I treated the specimen with KOH before mounting in Melzer (as I do as a routine) and found that the asci here also are slightly iodine positive.

Hence the differences between the Fuegian collection and the isotype are: stronger iodine reaction of the asci, and stipe more squamulose than furfuraceous. I think this dissimilarities are not enough important to segregate a new species based on our material. This is, though, the first record of *S. nigra* in the Southern Hemisphere.

3. *Leotia lubrica* PERS. 1822. — Mycol. Europ. 1: 201
= *Leotia lubrica* f. *typica* IMAI 1936. — Bot. Mag. Tokyo 50 (589): 12.
Illustrations: Fig. 3, 1—4

Ascocarps pileate, gelatinous, 25—45 mm; fertile portion convex 10—15 mm diam., incurved, pale dull olivaceous green when moist, dark olive-green drying; stipe central or slightly eccentric, furfuraceous, hollow, yellow, drying more or less ferrugineous, thicker above,

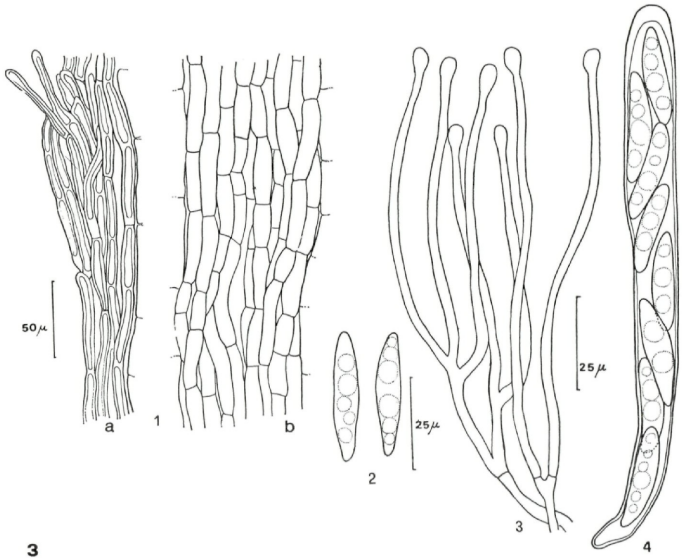

Fig. 3. *Leotia lubrica* PERS. 1. Longitudinal section of the stipe: a) cortex; b) medulla. 2. Ascospores. 3. Paraphyses. 4. Ascus. From Singer M-6859 (SGO)

25—45 × 1.5—3 mm. Asci 8-spored, cylindric-clavate, iodine negative, 120—158 × 9.5—11.5 μm. Paraphyses capitate, 4.3—5 × 5.2 μm diam. at apex, containing greenish pigment. Ascospores 2-seriate, hyaline, fusoid, asymmetrical, 1-cellular, with guttules, 21—25 (26.2) × 5.3—5.6 μm. Stipe consisting of a cortex of gelatinized, agglutinated hyphae, 4.2—5.2 μm diam. on the surface and of internal, non gelatinized, short-celled hyphae, 5.2 × 8.4 μm; medulla of lacunose "textura intricata".

Material examined: CHILE: Osorno, Pilmayquen, leg. SINGER, M-6859, 13-V-1967, on soil, in *Nothofagus obliqua* forest (SGO).

Geographic distribution: USA (DURAND, 1908); Europe (DENNIS, 1968; NANNFELDT, 1942); Japan (IMAI, 1936); Australia and Tasmania (COOKE, 1892); Chile.

Gross morphology and micromorphology of the Chilean collection agree with descriptions and figures given by DURAND (1908: 446). IMAI (1941: 237—239) and DENNIS (1968: 88) for this species, which here is recorded for the first time from South America.

4. *Geoglossum nigritum* (FR.) COOKE var. *heterosporum* MAINS 1954. — Mycologia 46 (5): 59

Described and illustrated for Chile (Colchagua) by GAMUNDI (1971: 285, pl. IX).

5. *Trichoglossum octopartitum* MAINS 1940. — Am. Journ. Bot. 27: 325

Illustrations: Fig. 4, 5—8.

Ascocarps clavate, 13—20 mm long, black, fleshy, hairy, brittle when dry, in KOH diffusing an ochraceous pigment; fertile portion glossoid to spoon-shaped, 4—7×2.5—4 mm; stipe terete, 10—15× 1—1.5 mm. Asci clavate, iodine positive, 176—210×13—17 µm. Paraphyses coiled, black-brown, 3.2—4.2 µm at the apex. Ascospores multiseriate, cylindric, flexuous, gray-brown "sub lente", usually 7-septate but varying from 6 to 13 septae, sometimes slightly constricted at the septae, guttulated, (78) 105—130 (148)×4—5.2 µm. Hymenial setae dark brown to fuliginous, opaque, longer than the asci, with a few septa, flexuous and bulbous at the base where the colour is fading, 277—366×3.6—6.3 µm. Stipe setae more abundant, similar to the previous ones but intermixed with a few pale brown flexuose and hyphae-like hairs. Stipe: cortex ("textura porrecta") formed by agglutinated, pale brown hyphae, 2—3 µm diam.; medulla ("textura intricata") formed by pale brown to hyaline thin-walled hyphae.

Material examined: ARGENTINA: Tierra del Fuego, Puerto Harberton, near Harberton falls, leg. A. GOODALL, 1-III-1975, on burnt soil among hepatics, in a hilly, open field (LPS 39563).

According to MAINS (1954: 613): "there is a greater variation in the septation of the ascospores in *Trichoglossum* than in *Geoglossum*. As has already been discussed there appear to be two different methods of septation. The species are basically 7- or 15- septate or they may be very variable in septation, possibly basically 5- or 11-septate".

I found that basically the ascospores in the Fuegian collection are 7-septate, but septation varies mainly between 7—10-septate as the following table shows:

100 ascospores	number of septa	in % of ascospores
	7	47
	8	20
	9	12
	10	10
	11	5
	5	2
	6	3
	12	1

In our specimen all features agree with the original description. *T. octopartitum* MAINS is close to *T. walteri* (BERK.) DURAND from which I have examined the type collection (Australia, Apollo Bay, Wild dog Green, leg. WALTER, VIII-1874, on *Dicksonia antarctica*; K), but here, the ascospores (although mainly 7-septate) differ in length (88—109×3.8—4.2 μm) according with my measures. *T. octopartitum* is widely distributed and has been collected in USA (MAINS, 1954), Europe (NANNFELDT, 1942); China (TAI, 1944); British Honduras, Central America; Jamaica, Trinidad and Brazil (DENNIS, 1954, 1970); India (MAAS GEESTERANUS, 1964). The species in now for the first time recorded from Argentina.

6. *Trichoglossum variabile* (DURAND) NANNFELDT 1942. — Ark. Bot. 30 A (4): 64

= *Trichoglossum hirsutum* var. *variabile* DURAND 1908. — Ann. Myc., 6: 437.

Illustrations: Fig. 4, 1—4.

Ascocarps capitate, blackish, hairy, 13—14 mm long, fertile portion 3.5—5×2—3 mm; stipe cylindric, solid, 0.5—0.8 mm diam. Asci cylindric-clavate, iodine positive, 186—243×15—23 μm. Paraphyses coiled, flexuous, brownish black, robust, 6.3—12.6 μm diam. at the apex. Ascospores cylindric, flexuous, brownish, usually with 10—15 septae, but ranging from 5 to 15-septate, 115—135× 4.2—5.7 μm. Hymenial setae chestnut brown, acute, with few septae, sometimes flexuous and bulbous at the base 63—126×4.2—6.3 μm. Stipe setae similar, forming tufts together with pale brown, flexuous, hairs. Stipe cortex (45—65 μm thick, "textura porrecta") formed by brown hyphae, 3—4.2 μm diam. and medulla lacunose ("textura intricata") formed by pale hyphae, 4.2—6.3 μm diam.

Material examined: CHILE: Llanquihue, Salto de Petrohué, leg. SINGER, M-7589, 17-IX-1967, on soil (SGO).

The Chilean material agrees well with the description given both by DURAND (l. c.) and by MAAS GEESTERANUS (1965: 44).

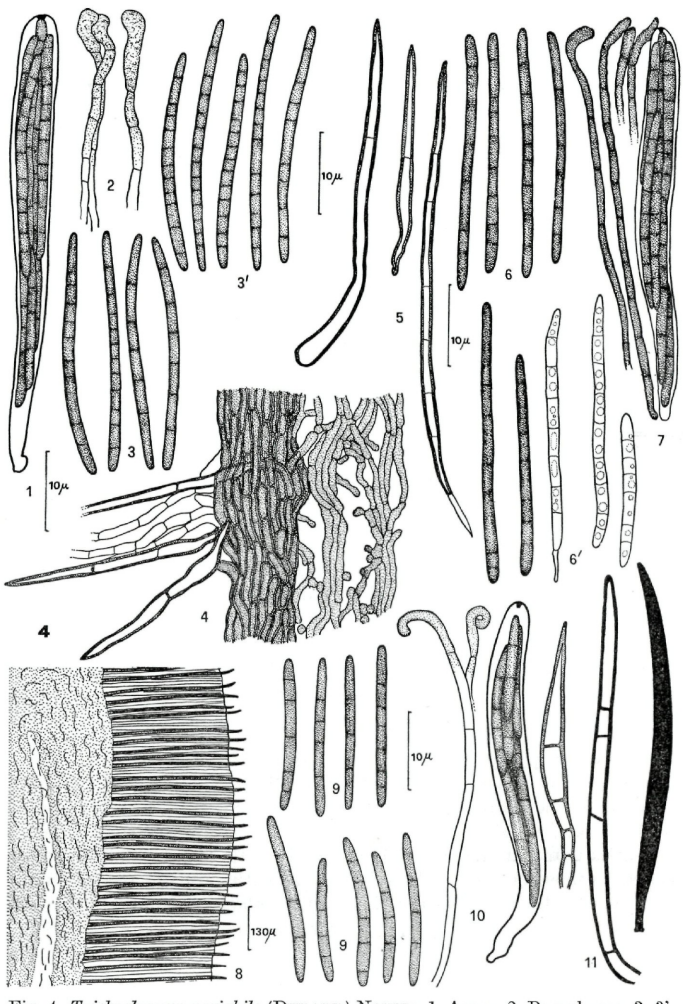

Fig. 4. *Trichoglossum variabile* (Durand) Nannf. 1. Ascus. 2. Paraphyses. 3, 3'. Ascospores. 4. Longitudinal section of the stipe. From Singer M-7589 (SGO). *Trichoglossum octopartitum* Mains. 5. Setae. 6, 6'. Ascospores. 7. Ascus and paraphyses. 8. Transversal section of the fertile portion. From LPS 39563. *Trichoglossum farlowii* (Cooke) Durand. 9. Ascospores from Horak 66/317, (ZT). 9'. Ascospores from the Type. 10. Ascus and paraphyses. 11. Setae.

In the ascospores the number of septa vary considerably as the following table shows.

100 ascospores	number of septa	in % of ascospores
	11	15
	13	14
	14	12
	12	12
	15	11
	10	9
	7	8
	9	7
	3	5
	6	3
	8	2
	4	2

This species differs from *T. octopartitum* mainly in: septation of ascospores, capitate fertile portion and stipe with a looser medulla and shorter setae.

It has been found in USA (DURAND, 1908), China and Japan (MAINS, 1954), Europe (NANNFELDT, 1942), India (MAAS GEESTERANUS, 1965), Venezuela, Trinidad and Jamaica (DENNIS, 1970) and is here recorded for the first time from Chile.

7. *Trichoglossum farlowii* (COOKE) DURAND 1908. — Ann. Myc. 6: 438
= *Geoglossum farlowii* COOKE 1883. — Grevillea 11: 107.

Illustrations: Fig. 4, 9—11.

Ascocarps spathulate, black, hairy, soft-fleshy, flesh brown to olivaceous, 47—57 × 3—6 mm. Stipe cylindric, solic. Asci cylindric-clavate, iodine positive, 153—190 × 15—19 µm. Paraphyses curved at the apex, fuliginous-brown, 3.2—5.4 µm. Ascospores, cylindric but attenuated at the blunt apex, mostly with 3 septa and unequally celled, sometimes curved, fuligineous with an olivaceous tinge, 60—79 × 4—4.8 µm. Hymenial setae black, opaque, the young ones with a few septa, 1/3 to 1/4 longer than the asci, 126—231 × 8.5—10.5 µm Structure of the stipe as in the previous species, but softer.

Material examined: USA: Massachusetts, Newton, leg. FARLOW, Typus (K). — CHILE: Osorno, Pucatrihué, leg. HORAK, 66/317 (ZT), on soil under *Chusquea* sp., 24. IV. 1963.

The Chilean material consists of one ascocarp only and not many ascospores have been observed. Thus the data in the following table are based on much less than 100 ascospores.

35 ascospores	number of septa	in % of ascospores
	4	34
	3	26
	6	20
	5	14
	7	6

In the type material, however, the following numbers of septa occur:

100 ascospores	number of septa	in % of ascospores
	3	61
	4	21
	2	9
	1	1
	5	4
	0	1

Based upon the relatively few counts the ascospores on the Chilean fungus are mostly 3-septate. In all other essential characters the Chilean material agrees well with the type.

T. farlowii is widely distributed: USA (DURAND, 1908), Canada, Jamaica (MAINS, 1954), India (MAAS GEESTERANUS, 1965), Japan (IMAI, 1941), Java (RIFAI, 1965), Trinidad (DENNIS, 1970).

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