

The Geoglossaceae of Sweden  
(with Regard also to the Surrounding Countries).

By

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With 5 plates and 6 figures in the text.

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There are hardly any Discomycetes that have been the subject of so many monographs as the *Geoglossaceae*. Already in 1875, COOKE (1875 a, 1875 b) published two monographic studies, and some years later he described and illustrated in his *Mycographia* (COOKE 1879) the majority of the species known at that time. In 1897, MASSEE published a world monograph of the family, though this paper — as so many other publications by the same author — is mainly a compilation. DURAND's monograph (1908, with a supplement in 1921) of the North American species is a model of accuracy and thoroughness, and indispensable also for other parts of the world. This monograph was the base for a pamphlet by LLOYD (1916) on the *Geoglossaceae* of the world. If we add v. LUYK's revision (1919) of the *Geoglossaceae* in the Rijks-herbarium at Leiden, with all PERSOON's specimens, SINDEN & FITZPATRICK's paper (1930) on a new species of *Trichoglossum*, IMAI's studies (1934, 1936 a, 1936 b, 1938) on Japanese species of certain genera, his list of the Norwegian *Geoglossaceae* (IMAI 1940), and MAIN's papers (1936, 1940) with descriptions of several new American species, the most important contributions of recent date to the taxonomy of the family have been mentioned. The species described by VELENOVSKY (1934) had better be left out of account.

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I have been collecting specimens of this family for more than ten years, and have also consulted the collections of the Botanical Museums of Göteborg (abbreviated in the ensuing as G), Lund (L), Stockholm (S), and Uppsala (U), of which especially the Stockholm herbarium (»Naturhistoriska Riksmuseum») is very rich in material of the fungi concerned, thanks to the collections of H. v. POST, H. REHM, L. ROMELL, K. STARBÄCK a. o. The herbarium of Dr. ERIC HAGLUND (HN), now the property of »Högre Allmänna Läroverket» in Norrköping, has, furthermore, been placed at my disposal, as well as the collections of »Växtbiologiska Institutionen» in Uppsala (VU). Several botanical friends have also handed me specimens for study and incorporation in the Uppsala herbarium. The richest contributions were those from Mr. SETH LUNDELL. Amongst other contributors may be mentioned Messrs H. G. BRUUN, N. HYLANDER, D. LIHNELL, G. LINDBERG, S. v. MALMBORG, E. MELIN, H. OSVALD, K. G. RIDÉLIUS, H. SMITH, and ERIC ÅBERG. Mr. T. NATHORST-WINDAHL, Göteborg, has kindly sent me material from his herbarium (W) for examination, and Dr. H. G. SVENSSON, Karlstad, has in letters given me information about the occurrence of *Geoglossaceae* in Värmland.

My original intention was to include also Norway in this paper, but when, some years ago, I applied to the Oslo herbarium for getting their material on loan, parts of most of their collections had been sent to Prof. S. IMAI, Sapporo. On their being returned, Dr. I. JØRSTAD kindly forwarded them to me. He has also sent some further recent Norwegian gatherings. The publication of my paper has for several reasons been delayed, and Prof. IMAI had in the meantime had a list of the Norwegian *Geoglossaceae* printed. As our determinations agree in most cases, I restrict myself to indicating those cases where our opinions differ, and to listing additional Norwegian gatherings.

Some Danish species described by ROSTRUP have been received on loan from the København museum.

It is my pleasant duty to convey my sincerest thanks to the officials of the said museums and to all other contributors of material, as well as to Prof. IMAI, to whom I am greatly indebted for supplying important material of Japanese species and for valuable discussions. Mr. W. SAVAGE has with his usual skill undertaken the linguistic revision.

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My belief was that it would be a relatively easy task to determine the Scandinavian material of *Geoglossaceae*, as this

material had not been revised critically after the publication of DURAND's fundamental paper. It was soon found, however, that many taxonomical problems were left. In the Swedish material I have found no fewer than 4 species of *Geoglossum* that could not be identified with any already known; and a *Trichoglossum*, described by DURAND as *Tr. hirsutum* f. *variabile*, has been raised to specific rank as *Tr. variabile* (DUR.) NANNF.

In this paper 26 species are listed from Sweden, which means that our country is rather rich in *Geoglossaceae*. By way of comparison it may be mentioned that — with the same scope of the family and the same specific delimitations — only 17 species are known from Norway and about 15 from Denmark. The number of species known from North America amounts to about 45, and — according to Prof. IMAI — the Japanese flora counts 37 species, 3 varieties and 13 forms, but both North America and Japan harbour a good many isolated types totally unknown from Europe. — Some additions to the Swedish flora remain certainly to be made. Some few species occurring in the adjoining countries may be expected to grow with us as well, e. g. *Corynetes arenarius* (known from Denmark and from Norway), *C. globosus* (known from Norway), and *Geoglossum littorale* (known from Denmark). As most *Geoglossaceae* seem to be more or less circumpolar, and many are very rare or appear only in seasons when the weather conditions are exceptionally favourable, it is impossible to predict what further species may be discovered here. In the keys to *Geoglossum* and *Trichoglossum* I have thus included all northern-temperate species. — We have reason to believe, however, that most of our common and wide-spread species have already been collected. H. v. Posr's large and important collections, which I received at a time when this study was almost finished, meant the addition to the Swedish flora of only one species. But on the other hand there are not a few species known only from one or very few gatherings. — It is also possible that continued studies of richer material may go to prove that I have given to some species or other too wide a scope. The aim of this paper is thus mainly to serve as a base for future work and to stimulate botanists — not only mycologists — into collecting material of this interesting family.

The ecology and distribution within Sweden of the species is still very imperfectly known. Some general remarks may, however, not be amiss. Some species of *Mitrula* deviate most markedly from the rest of the family in being parasitical, their fruitbodies arising from sclerotia in flowering plants. Two such species have up to the present been recorded from

our country, viz. *M. Brassicae* (on *Brassica*) and *M. sclerotiorum* (on *Trifolium*, *Medicago*, *Lotus*). The former is known only from the type gathering, but as to the latter, Dr. H. EKSTRAND informs me that — as a result of his extensive studies — it has been found from Skåne in the south to Luleå in the north.

The rest of the species are saprophytic, and grow mostly in damp or moist situations. Some species of *Mitrule* are very hydrophytic, developing from vegetable matter wholly or partly submerged in water. The fruitbodies of *M. paludosa*, which is common all over the country, and of *M. multiformis*, which seems to be a very rare montane species, adhere to twigs, leaves, needles, mosses etc., but those of *M. gracilis*, another montane, but as it seems rather common, species, develop invariably from live mosses, especially *Paludella squarrosa*. But as the mosses look absolutely healthy, there is no reason to believe that this species is parasitical. — The remaining species of *Mitrule*, *M. Abietis*, is less hygrophilous, and develops from dead needles decaying on the ground. This species is known only from a small number of localities, but as it is very inconspicuous, it is, to be sure, very much overlooked.

Some further species grow in coniferous woods (especially spruce-woods) in needle-mould, often forming  $\pm$  distinct fairy-rings, viz. *Cudonia circinans*, *C. confusa*, and *Spathularia flavida*. They are evidently wide-spread with us, and *C. confusa* is the most commonly occurring.

*Leotia lubrica*, which occurs at least in South and Middle Sweden and is not rare, has evidently a very wide ecological amplitude. Its most typical habitat is under trees (coniferous or frondose) on rich soil covered by decaying leaves or needles, amongst mosses and grasses etc., but I have found it once in a very wet spot in a peat-bog.

The species of *Geoglossum*, *Trichoglossum*, and *Microglossum* as well as *Corynetes atropurpureus* form ecologically a very homogeneous group, inhabiting more or less damp lawns, pasture-land etc., with or without trees. *Microglossum olivaceum* and *M. viride* have evidently a southern distribution, they prefer, as it seems, frondose woods, and are very rare with us. *Corynetes atropurpureus* seems also to be southern, but is less rare. — Two of our three *Trichoglossa* are very rare too, viz. *Tr. variabile* known from only one locality, a moist, rather trivial grazing-ground, and *Tr. Walteri* known from two localities. The latter species has a world-wide distribution, and is common at least in North America, but very rare in Europe on the whole. The third species, *Tr. hirsutum*, on the other hand, is common in most parts of Sweden; but

whether in the north it reaches the mountains, must be left undecided. The ecological amplitude is also unusually wide; it may sometimes grow in moist sand and even in wet peat-bogs. — The distribution and relative frequency of the different *Geoglossa* is still very imperfectly known. The relatively large number of species has not been clear to Swedish botanists, and so the collecting of specimens has been neglected. The ecological concordance of the majority of the species manifests itself clearly in the frequent co-existence of two or more species in the same spots. *G. glutinosum* seems thus as a rule to occur in single individuals in groups of other *Geoglossa*. — *G. fallax* and *G. nigratum* are both fairly common in grassy spots of at least South and Middle Sweden, as they are in large parts of the northern-temperate zone. *G. Starbaeckii* is a third common species, whose Scandinavian distribution is decidedly more northern, and which, strangely enough, has not been found outside the Scandinavian peninsula. — *G. Cookeianum*, which is known only from five Swedish gatherings, is one of the commonest *Geoglossa* in the rest of Europe. The very characteristic *G. Peckianum* is evidently extremely rare with us, as it is in Europe on the whole, but is in North America perhaps the commonest of all *Geoglossa*. — The new species *G. elongatum*, *G. montanum*, and *G. Vleugelianum* are all rare, and their distributions cannot be discussed as yet. I consider it probable, however, that *G. montanum* will be found to be a northern-montane species.

*G. glabrum* forms an interesting exception from the ecological uniformity of the genus, being restricted to wet *Sphagnum*-carpets, where it is the only *Geoglossum* to occur.

As to the season for the development of the fruitbodies, all *Geoglossaceae* (some species of *Mitrula* excepted) agree closely with each other in appearing late in summer and in autumn, after heavy rains. In unusually rainy autumns, rare species appear that are not seen in more ordinary years.

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There is no need here to discuss the delimitation and possible heterogeneity of this family, as no important data have accumulated after my review in 1932 (NANNFELDT 1932).<sup>1</sup> In the taxonomical treatment I follow DURAND as closely as possible. From reasons set out in my paper already cited the genera *Vibrissea* and *Apostemidium* are excluded from the

<sup>1</sup> *Spathularia flavida* and *Trichoglossum hirsutum* have been studied cytologically (EFTIMIU 1929 a, 1929 b) but show no cytological peculiarities.

family, as is also *Cudoniella*. Some changes in the generic delimitations have also been made.

The main characters of the European genera are given in the following key:

- I. Ascomata clavate, black or brownish-black, stem not or only slightly differentiated from the hymenium. Asci large, pore blue with iodine. Spores clavate, finally septate, usually brown-walled when mature. Paraphyses stout, apically with brown walls or/and conglutinated by brown amorphous matter.
  - A. At least some spores at maturity fuliginous or brown.
    - a. Hymenium beset with spines or setae . . . *Trichoglossum* BOUD.
    - b. Hymenium without spines or setae . *Geoglossum* PERS. ex FR.
  - B. Spores persistently hyaline . . . . . *Corynetes* HAZSL.
- II. Ascomata bright-coloured (whitish, yellow, brown, olive, green). Spores always hyaline. Paraphyses present, never conglutinated, their walls always hyaline.
  - A. Ascomata fleshy, yellow, brown, olive or green. Asci clavate, pore blue with iodine.
    - a. Spores ellipsoidal, fusiform or cylindrical, finally 3-many-septate. . . . . *Microglossum* GILL.
    - b. Spores small, narrowly ellipsoidal, clavate or fusiform, continuous or finally 1-septate . . . . . *Mitruia* PERS. ex FR.
  - B. Ascomata fleshy-leathery, whitish, yellow or brown, stem sharply delimited from the hymenium. Asci clavate, not blue with iodine. Spores filiform-clavate, multiguttulate and finally multiseptate. Paraphyses filiform, much curled and coiled above.
    - a. Ascomata pileate . . . . . *Cudonia* FR.
    - b. Ascomata laterally compressed, spatulate or fan-shaped, hymenium decurrent on opposite sides of the stem. . . . . *Spathularia* PERS. ex FR.
  - C. Ascomata pileate, gelatinous, yellow, olive or green. Asci narrowly clavate, not blue with iodine, Spores oblong-fusiform, finally septate. . . . . *Leotia* PERS. ex FR.
- III. Ascomata clavate, fleshy, yellow. Asci almost cylindrical, not blue with iodine. Spores hyaline, small, broadly ellipsoidal. Paraphyses absent. . . . . *Spragueola* MASSEE.

The following genera, unrepresented in Europe, are not included in the key, viz. *Hemiglossum* PAT. (with flattened, branched ascomata and unilateral hymenium) and *Sarcoleotia* IMAI (with pileate, black ascomata, asci without iodine reaction, hyaline, finally 1-septate spores, and brown filiform paraphyses).

The first three genera, *Trichoglossum*, *Geoglossum*, and *Corynetes*, are very close to each other, and had perhaps better be united. Some species of *Geoglossum* get their spores coloured only very tardily and slightly, e. g. *G. alveolatum*. The difference from *Corynetes* is then very slight if any. The genus *Trichoglossum* forms a very natural group, and is marked by the presence of characteristic, dark spines in the hymenium, but in other points it is so near to certain species of *Geoglossum* that it might be regarded as a section of the said genus. — DURAND recognized a fourth, closely related genus,

*Gloeoglossum*, distinguished from *Geoglossum* by the viscid consistency of the ascomata and the presence of »paraphyses» down the whole stem, but its species show no special affinity to each other, but approach evidently different species of *Geoglossum*, and can therefore not be kept distinct from that genus.

*Microglossum* comes evidently close to the above genera. The shape and structure of the ascomata, as well as the asci and the spores are about the same as in the preceding genera. It differs by the brighter colours. And, moreover, the development of the ascomata is — at least in *M. viride* — hemiangiocarpous, not gymnocarpous (DUFF 1920, 1922, CORNER 1930).

The genus *Mitrella* — after the exclusion of *Spragueola* — seems to be rather closely allied to the preceding genera, but the developmental studies by DITTRICH (1902) and CORNER (1930) indicate some important differences. The young ascomata have a distinct stem and a distinct plane, or only slightly convex, hymenium, thus approaching the shape of usual stipitate discomycetes. Later on, the upper part becomes ± globose and hollow, with the cavity confluent with that in the stem. The hymenium is separated from the slender smooth stem by a distinct groove. In *M. Abietis* the hymenium is described as naked from the beginning (CORNER 1930), but the development of *M. paludosa* is said to be hemiangiocarpous (DITTRICH 1902, DURAND 1908).

The genus *Spragueola* seems to take a very isolated position within the family, and differs most markedly from the discomycetes in general by the lack of paraphyses.

The two genera *Spathularia* and *Cudonia* are closely akin, but show no affinity to the rest of the family. Their development is hemiangiocarpous, as demonstrated by DURAND (1908) and DUFF (1922) for *Cudonia lutea* and by DURAND (1908) for *Spathularia velutipes*. Their asci are characteristically clavate, sometimes constricted at the middle, hyaline, multiguttulate, and finally multiseptate, and surrounded by a hyaline gelatinous sheath; the paraphyses are filiform, branched and strongly circinate at the tips. Their hymenial characters are thus very similar to those of *Phacidiaceae* (sensu meo). As in that family, the hymenium is not naked from the beginning but covered by a stromatic layer.

The genus *Leotia* is also very isolated within the family through its gelatinous pileate ascomata, the narrowly clavate asci not taking any blue colour with iodine, and oblong-fusiform spores.

The genera are treated below in alphabetical order:

*Corynetes* HAZSL., Mag. Tud. Akad. Ért. A Termés.-tud. Kör. 11: 19 p. 8 (1881).

A small genus, in which DURAND (1908) recognized four North American species, of which one, *C. robusus* DUR., was described as new and has so far not been found outside North America. Two other species, *C. purpurascens* (PERS.) DUR. and *C. atropurpureus* (PERS.) DUR., which were both cited from Sweden, are according to the descriptions very close to each other, and I have failed to find any difference between them. It is in any case incorrect to attribute the names of both to PERSOON, for — as already LLOYD (1916 p. 21) pointed out — *Geoglossum atropurpureum* and *G. purpurascens* were never intended to be different, *G. purpurascens* being only a gratuitous renaming of *G. atropurpureum*. — The Norwegian *Mitrule globosa* SOMMERF. was considered as only doubtfully distinct from *C. arenarius* (ROSTR.) DUR.

According to the description, ROSTRUP's *Leptoglossum littorale* would seem to belong to this genus, but an examination of the type-material revealed some few slightly coloured spores. It belongs thus to *Geoglossum* (*g. v.*). It would certainly be most logical to give up *Corynetes* altogether and to place its species under *Geoglossum*, but this should be done in connection with monographic and developmental studies.

The three European species may be distinguished in the following way:

- I. Paraphyses hyaline, conglutinated apically by amorphous matter into a conspicuous vinous-brown epithecium. . . . . *C. atropurpureus* (BATSCH ex FR.) DUR.
- II. Paraphyses coloured at least apically, not agglutinated.
  - A. Paraphyses dark brown, apically almost opaque. Asci 120—140 × 12—18  $\mu$ . Fruitbodies very stout with the short stipe only slightly narrower than the clavula. . . . . *C. arenarius* (ROSTR.) DUR.
  - B. Paraphyses apically pale fuliginous. Asci 70—100 × 7—10  $\mu$ . Fruitbodies composed of a subglobose, slightly compressed head and an almost filiform, long stipe. . . . . *C. globosus* (SOMMERF.) DUR.

*Corynetes arenarius* (ROSTR.) DUR., Ann. myc. 6 p. 417 (1908).

Syn.: *Microglossum arenarium* ROSTR., Medd. om Grønl. 3 p. 606 (1892); Bot. Tidsskr. 18 p. 76 (1892). — *Mitrule arenaria* MASSEE, Ann. Bot. 11 p. 283 (1897). — *Leptoglossum latum* PECK, Bull. Torr. Bot. Cl. 22 p. 210 (1895).

Distrib.: Denmark (several localities: ROSTRUP 1892 b, LIND 1913), Norway (Vest-Agder: ROSTRUP 1904 p. 5; IMAI 1940 p. 274), Netherlands (COOL 1911; v. LUYK 1919 p. 2), Greenland (ROSTRUP 1892 a p. 606), Labrador (PECK 1895 p. 210; DURAND 1908 p. 417), and Newfoundland (DUBAND l. c.).

This species, confined — as it seems — to sand-dunes along the coasts, has so far not been found in Sweden but should be sought for, as it occurs in the neighbouring countries.



1. *Corynetes atropurpureus* (BATSCH ex FR.) DUR., Ann. myc. 6 p. 414 (1908).

Syn.: *C. purpurascens* (PERS.) DUR., ibid. p. 413. — Vide etiam DURAND 1908 p. 413—414 et IMAI 1940 p. 273.

Sweden:

Skåne: E. FRIES (1849 p. 347).

Halland: E. FRIES (1821 p. 490).

Östergötland: Norrköping, Lindö, 18. IX. 1903, ERIK HAGLUND (HN!). — Kvillinge, Norrviken, 12. X. 1896, KERSTIN HAGLUND-[STARBÄCK] (S!). — Skedevi, Reijmyre, »Stora Hagen», 22. IX. 1853, H. v. POST (S!).

Uppland: Gustavsberg, Värmdön, between Betsede and Gustavsberg, 22. IX. 1895, L. ROMELL (n. 16359 a; S!). [This is evidently the gathering »from near Stockholm», referred to by DURAND (1908 p. 414 under *C. purpurascens*).] — Skokloster, Källbo, autumn 1898, K. STARBÄCK (S!). — Alsike, Fredrikslund, 10. IX. 1866, TH. M. FRIES (U!). — Bondkyrka, Ultuna, 1854 (?), H. v. POST (S!); Eklundshof, 2. IX. 1866, TH. M. FRIES (U!; DURAND ibid. p. 415 as *C. atropurpureus*); »Malma gårde», pasture-land, 3. X. 1879, H. v. POST (S!). — Ärentuna, Störvreta, amongst mosses and grasses, margin of coniferous wood, 12. IX. 1920, S. LUNDELL (Hb. ROMELL n. 16365; S!); 7. X. 1927, S. LUNDELL (U!, VU!).

Hälsingland: Norrbo, Tjärnvallen, 18. VIII 1895, MARIA ROMELL (Hb. ROMELL n. 16361; S!).

Norway: vide IMAI 1940 p. 273.

*Corynetes globosus* (SOMMERF.) DUR., Ann. myc. 6 p. 417 (1908).

Syn.: *Mitrella globosa* SOMMERF., Suppl. Fl. Lapp. p. 287 (1826). — *Geoglossum globosum* FR., Elench. fung. I p. 234 (1828).

The original description of this most interesting fungus runs as follows: »*Mitrella globosa*: major, clavula globosa laevi spadicea, stipite solida, deorsum attenuata concolore. Tab. nostra III.

Hab. in terra arenosa inferalpinorum Saltidalen Nordlandiae parissime [sic!]. Uno loco sed per plures annos Octobri lecta.

Ad subgenus: *Heyderia* FR. proprie pertinet, nam stipes clavulam percurrit, margine ad basin connexo. *Leotiae Clavo Pers. myc. eur.*<sup>1</sup> simillima, sed abunde diversa stipite longiori 1—2 unc. alto concoloriqve et loco habitationis. Nec Clavulam unquam adeo latam legi. Disperse crescit.»

DURAND after the examination of the cotype material in Hb. FRIES found that it was a species of *Corynetes*, which he was inclined to identify with *C. arenarius*. IMAI studied the type material at Oslo, confirmed DURAND'S description, but found at least the Oslo material specifically distinct from the said species. I have had an opportunity to compare the specimens in Uppsala with those in Oslo, and find them to be absolutely identical in all details.

<sup>1</sup> = *Vibrissia truncorum* FR.

There can, in my opinion, not be the slightest doubt that they belong to *Corynetes* but are distinct from *C. arenarius*. Already the gross features are widely different, as clearly seen from IMAI's illustrations. The asci are decidedly smaller than in *C. arenarius*. The spores are very similar, but perhaps a trifle smaller in *C. globosus*. The paraphyses of the two forms resemble each other in shape, though those of *C. globosus* are slightly more gracile, less thickened apically, and have thinner walls, but their colours are widely different, the paraphyses of *C. arenarius* being very dark, almost opaque, those of *C. globosus* only pale fuliginous.

This most characteristic species has not been refound since the days of SOMMERFELT. Botanists travelling in northern Scandinavia should be on the look-out for it.

### *Cudonia* FR., Summa veg. Scand. p. 438 (1849).

This clearly circumscribed genus was considered to possess only one European species, *C. circinans* (PERS. ex FR.) FR., until BRESADOLA (1892 p. 67) described *C. confusa* BRES. DURAND (1908) admitted three North American species, and two more have been described by MAINS (1940). In late years a number of species have been described from Japan by YASUDA (1915), LLOYD (1916), and IMAI (1934, 1936 b) (comp. also MAINS 1940).

IMAI (1936 b) divided the genus into two sections: *Eucudonia* IMAI (»Pileus depresso-convexus, substratoformis [sic!], helvelloideus vel irregulariter formis, subtenuis vel tenuis») and *Pachycudonia* IMAI (»Pileus convexo-hemiglobosus vel depresso-convexus, crassus»). The latter section comprises one species only, viz. *C. constrictospora* S. ITO & IMAI ap. IMAI; all the other species belong thus to *Eucudonia*. Through the generosity of Prof. IMAI I have been able to study co-type material of *C. constrictospora*. I cannot consider its shape and texture sufficiently different for regarding it as a section of its own, but in some other characters it deviates most markedly from the other species of the genus. The shape of its spores, with the distinct constriction in the middle part, is thus in my opinion a much more important character, isolating it from the rest of the genus. Its spores lack also the capacity of budding, so characteristic of the other species studied by me [*C. circinans*, *C. confusa*, and *C. lutea* (PECK) SACC.]. It is rather astonishing that this budding has almost totally escaped the notice of previous students. I have found it described and depicted only by BOUDIER (1910 pp. 246—247, tab. 430—431), who recorded the septating of ripe deliberated spores in *C. circinans* and *C. confusa* and their formig small, broadly ovoid conidia. But the spores often bud already at a much earlier stage. In every microscopical slide of the said species and of *C. lutea* a large number of asci are seen that are filled by such conidia and in which the true spores have

totally disappeared. They agree thus in this point with several species of *Tympanis*, in which this phenomenon has been known of old.

The two European species were described and illustrated by BRESADOLA (l. c. and 1932) and by BOUDIER (1910 tab. 430—431). I had for many years been very doubtful as to the possibility of keeping them apart, though BRESADOLA's view was strongly supported by the circumstance that such a keen-eyed observer as H. v. Post had independently recognized the same two types of *Cudonia*, labelling them ever since 1843 and until his death (in 1911) as *C. circinans* resp. *C. circinans* var. *pallida*. The latter name was not published until 1899, when STARBÄCK distributed specimens of it in REHM, Ascom. n. 1254. — In the autumn of 1936, I was so fortunate as to find both types abundantly in one and the same locality, and was thus enabled to compare them in the fresh state (Pl. I). I was able to establish the fact that no intermediates occur, and became convinced of their specific value. — BRESADOLA described the spores as being slightly different in the two species, those of *C. circinans* being clavate and those of *C. confusa* somewhat narrower and attenuated towards both ends. On examining a very rich material I have found this difference to hold good in general, but as the spores change their shape considerably, e. g. before budding or germinating, it is impossible to rely in every case on the spore-shape alone. As further differences between them it may be noted that the spores of *C. circinans* become as a rule septated earlier than those of *C. confusa*, and that the paraphyses of *C. circinans* have decidedly more swollen tips. The safest characters are offered by the colour, however.

*C. confusa* seems to be by far the most common species both in Scandinavia and in Europe on the whole. What DURAND described from North America as *C. circinans* is apparently *C. confusa* too; and Prof. S. IMAI, to whom I have sent material of both species, informs me (in litt.) that he has never found the true *C. circinans* and that the Japanese fungus, treated by him under that name, closely resembles *C. confusa*.

The two species may be distinguished in the following way:

- I. Hymenium cream-coloured or watery-white, after drying yellow or isabellinous. Stem dark grey with a purplish or lilaceous tinge, as a rule rather stout. . . . . *C. circinans* (PERS. ex FR.) FR.
- II. Hymenium pale-cinnamon or brownish flesh-coloured. Stem concolorous with the hymenium, only often somewhat darker than the latter, greyish only towards the base, slender. . . . . *C. confusa* BRES.

2. *Cudonia circinans* (PERS. ex FR.) FR., Summa veg. Scand. p. 348 (1849); emend. Bres., F. trident. II p. 66 (1892).

Syn: *Leotia circinans* PERS. ex FR., Syst. myc. II p. 27 (1822). — *Vibrissea circinans* HAZSL., Mag. Tud. Acad. Ért. A Termés-tud. Kör. 11: 19 p. 9 (1881).

Sweden:<sup>1</sup>

Småland: Åby, »Åby n. 7», under spruces, 25. IX. 1930, H. G. BRUUN (U!). — Ryssby, Gårdsholmen, in coniferous wood, 6. IX. 1930, H. G. BRUUN (U!).

Södermanland: St Nikolai, Oxelösund, IX. 1900, J. VLEUGEL (S!).

Västmanland: Malma, »Malmaås-skogen», 3. X. 1843, H. v. POST (S!).

Uppland: Stockholm, 1904, L. ROMELL (n. 16945; S!); Uggleviksskogen, 28. VIII. 1888, L. ROMELL (n. 16341; S!); Djurgården, 15. X. 1893, L. ROMELL (n. 16344; S!). — Danderyd, Enebyberg, 23. X. 1912, L. ROMELL (n. 16991; S!). — Skokloster, K. STARBÄCK (REHM, ASCOM. n. 1252 as *C. circinans* f. *typica*; S!, U!). — Alsike, »Alsike-skogen», close to Flottsund, IX. 1936, S. LUNDELL (U!). — Uppsala-Näs, »Stabby skog», 27. IX. 1938, H. SMITH (U!). — Läby, »Läby vad», 26. X. 1890, K. A. TH. SETH (U! in alc.). — Vänge, »Fiby urskog», 15. VIII. 1927, J. A. NANNFELDT (n. 5193; U!). — Bondkyrka, »Malma skog», 17. VIII. 1872, H. v. POST (S!); Ultuna, IX. 1881 & 7. IX. 1881, H. v. POST (S!); on meadow along the River Fyris, XI. 1874, H. v. POST (S!); Kungsparken, 1871, 10. IX. 1873, 12. IX. 1874, 26. X. 1874, VIII. 1881, 7. IX. 1882, X. 1885 & 20. VII. 1892, H. v. POST (S!). — Uppsala, Käbo, 12. IX. 1895, H. v. POST (S!); Grindstuguskogen, 12. IX. 1895, H. v. POST (S!). — Vaksala, Skölsta, 12. IX. 1937, E. MELIN (U!). — Funbo, Selknä, 13. IX. 1936, ERIC ÅBERG (U!). — Gäla Uppsala, E. of Hemringe, under spruces, 8. X. 1938, G. SANDBERG (U!). — Ärentuna, the wood W. of the church, on heaped-up spruce-needles, 3. IX. 1936, H. G. BRUUN, S. LUNDELL & J. A. NANNFELDT (n. 5301—5303; U!).

Dalarna: Avesta, 1880, C. INDEBETOU (S!).

Hälsingland: Norrbo, X. 1893, MINA WERELIUS (Hb. ROMELL n. 16343; S!).

[Norway: All records (IMAI 1940 p. 278) refer to the following species.]

When describing *C. circinans*, most of the older authors have undoubtedly had the following, more common species

<sup>1</sup> The records from Femsjö (»passim»; FRIES 1827 p. 67), Stockholm (»vulgaris, Kaknässkogen, Traneberg et cet.»; LUND 1846 p. 116), Älvkarleö [Sv. Bot. Tidskr. 4 p. (99)], Umeå (VLEUGEL 1908 p. 374) a. o. refer at least mainly to the following species.

in mind, either mainly or exclusively, but as there is no type specimen in the FRIES herbarium, we must accept BRESADOLA's interpretation. It is most disagreeable, however, that he restricted the old, well-known name to the rarer species and gave a new name to the commoner one.

### 3. *Cudonia confusa* BRES., F. trident. II p. 67 (1892).

Syn.: [*Phallus marcidus* MÜLL., Fl. dan. (Vol. 4) Fasc. 11 p. 7, tab. 654:1 (1775).] — ? *Leotia marcida* PERS. ex. FR., Syst. myc. II p. 28 (1822). — *Cudonia circinans* var. *pallida* H. v. POST ex STARB. ap. REHM, Hedw. 38 p. (242) (1899); Bot. Not. 1899 p. 260.

#### Sweden:

Gotland: Hangvar, 1902, MARIA ROMELL (Hb. ROMELL n. 16944; S!).

Småland: Ryssby, Gårdsholmen, in coniferous wood, 6., 17. & 26. IX. 1930, H. G. BRUUN (U!). — Femsjö, »Dröplastigen» (between Långebrolid and Flahult), amongst mosses in coniferous wood, 6. IX. 1939, S. LUNDELL (U!); close to »Dröplastigen», 15. IX. 1939, T. NATHORST-WINDAHL (n. 1707; W!).

Östergötland: Simonstorp, Rodga, in sylvia acerosa, VIII. 1887, ERIK HAGLUND (G!, HN!, S!, U!, VU!). — Ske devi, Reijmyre, »Gunnar-Damm», 28. VIII. 1866, H. v. POST (S!).

Västmanland: Malma, »Malmaås-skogen», 3. X. 1843, H. v. POST (S!). — Västerås-Barkarö, Almö-Lindö, spruce wood, 4. VIII. 1924, J. A. NANNFELDT (n. 5194; U!).

Uppland: Stockholm, IX. 1893, L. ROMELL (n. 16342; S!). — Djursholm, 1. IX. 1895, L. ROMELL (n. 16345; S!). — Munsö, Sjöängen, 30. VIII. 1936, B. CORTIN (S!). — Skokloster, Bagarbo, amongst mosses in wood, VIII.—IX. 1890, K. STARBÄCK (U!, and in REHM, Ascom. n. 1254 as *C. circinans* var. *pallida*; S!, U!). — Lagga, close to »Mora stenar», 27. VIII. 1930, S. LUNDELL (U!). — Alsike, »Alsike-skogen», close to Flottsund, IX. 1936, S. LUNDELL (U!). — Uppsala-Näs, Stabby Parsonage, X. 1932, S. JUNELL (U!). — Läby, the wood N. of the church, 28. VIII. 1927, H. SMITH (U!). — Vänge, »Fiby urskog», 8. IX. 1930, J. A. NANNFELDT (n. 4133; U!). — Bondkyrka, between Graneberg and Flottsund, 10. IX. 1927, J. A. NANNFELDT (n. 5195; U!); Gottsunda, 17. X. 1858, C. J. EMIL HAGLUND (HN!); between S. Norby and St. Djurgården, 28. VIII. 1927, J. A. NANNFELDT (n. 5196; U!); Nosten, S. of Läbyvad Railway Station, 16. IX. 1932, M. A. DONK, S. LUNDELL & J. A. NANNFELDT (n. 4449; U!); Kvarnbo, under spruces, 30. IX. 1934, H. G. BRUUN (U!); Ultuna, 7. IX. 1882, IX. 1887, H. v. POST (S!); Kungsparken, towards Ultuna, under spruces, 22. X. 1819, G. WAHLENBERG (U! as *Helvella revoluta*);

Kungsparken, 8. X. 1820, G. WAHLENBERG (U! as *H. revoluta*); Kungsparken, 9. VIII. 1892, 5. VIII. 1895 & 16. IX. 1903, H. v. POST (S!); Eklundshof, 11. VIII. 1862, J. E. ZETTERSTEDT (U!). — Uppsala, 1853, E. P. FRIES (U!); X. 1859, C. P. LÆSTADIUS (S!, U!); 8. X. 1859, A. W. TAMM (S!, U!); »in pinetis frequens», X. 1860, O. ROB. FRIES (RABENH., F. eur. n. 312; S!, U!); Grindstuguskogen, 4. VIII. 1898. H. v. POST (S!). — Börje, Ströby, 27. VIII. 1930, J. A. NANNFELDT (n. 4079; U!). — Ärentuna, »Storvreta skog», 17. IX. 1928, J. A. NANNFELDT (n. 5197; U!); the wood just W. of the church, on heaped-up spruce-needles, 3. IX. 1936, H. G. BRUUN, S. LUNDELL & J. A. NANNFELDT (n. 5305—5309; U!). — Bälinge, Löten, just W. of the River Björklingeån, 3. IX. 1936, H. G. BRUUN, S. LUNDELL & J. A. NANNFELDT (n. 5304; U!). — Lena, »Årby skog», amongst *Hylocomia* in spruce wood, 5. IX. 1937, D. LIHNELL & S. v. MALMBORG (LUNDELL & NANNF., F. exs. suec. n. 597).

Dalarna: Avesta, Grytnässkogen, IX. 1879, C. INDEBETOU (S!). — Rättvik, 1891, P. G. THEORIN (L!).

Hälsingland: Norrbo, Tjärnvallen, 14. VIII. 1895, MARIA ROMELL (Hb. ROMELL n. 16346; S!).

Jämtland: Åre, »ad truncum *Piceae Abietis*», 4. IX. 1885, E. HENNING (U! in alc.).

#### Norway:

Oslo: (O!).

Akershus: Aker, Merradalen, IX. 1840, N. G. MOË (O!; IMAI 1940 p. 278 as *C. circinans*). — V. Aker, Skøien, VIII. 1840 (O!). — Ulleren, Aggern, »in terra sylvae», IX. 1826, S. CHR. SOMMERFELT (O!).

Telemark: Heddal [= Hitterdal], in coniferous wood, 29. VIII. 1879, A. BLYTT (O!; IMAI l. c. as *C. circinans*). — Fyresdal, 23. IX. 1927, I. JØRSTAD (O!; IMAI l. c. as *C. circinans*).

Opland: Nord-Aurdal, N. of Skøn, Sørskogen, X. 1932, A. HAGEN (O!). — Ringebu, »inter muscos pinetorum», IX. 1832, S. CHR. SOMMERFELT (O!; IMAI l. c. as *C. circinans*); »in pinetis», IX. 1833, S. CHR. SOMMERFELT (O!).

Nordland: Saltdalen, »in pinetis», X. 1818, S. CHR. SOMMERFELT (O!).

The *Phallus marcidus* MÜLL., described from North Norway (Nordland), is generally considered to belong to *Leotia* (*q. v.*), but in my opinion the original description and illustration point rather to *C. confusa*. This agrees also with the interpretation given by SOMMERFELT (1826 p. 288), who described the latter species under MÜLLER's name, noting: »Optime

iconi *Fl. dan.* convenit, modo stipitem ultra 2 unc. longam non legi, et optimum illius nomen, nam tota substantia re vera ut marcida, corio praeparato similis, imprimis in pagina inferiori, ubi nullae venae, sed tomentositas quaedam adest.»

**Geoglossum** PERS. ex FR., *Syst. myc.* I p. 487 (1821).

This genus was originally defined so as to comprise the main part of what is nowadays known as the family *Geoglossaceae*. The limits were by and by drawn narrower, and to DURAND (1908 p. 423) »the salient features of this genus are the clavate, black ascomata, not viscid but fleshy, the elongated dark spores, and the fact that the paraphyses do not form a thick coating over the stem. While scattered or fasciculate hairs similar to the paraphyses may be found on the stem in many species of this genus they never form the dense, conspicuous layer so characteristic of *Gloeoglossum*.» DURAND admitted a third dark-spored genus, *viz. Trichoglossum*, differing from *Geoglossum* by the thick-walled setae with which both hymenium and stem are beset. The species of *Trichoglossum* form a very homogeneous group, but differ from some species of *Geoglossum* only by the presence of those setae. Nevertheless, it may be practical to treat *Trichoglossum* as generically distinct. But I cannot agree with DURAND in separating *Gloeoglossum* from *Geoglossum*. *Gloeoglossum* was to him a small genus of only three species, *viz. Gl. glutinosum, Gl. affine, and Gl. difforme (= G. Peckianum)*. The deciding characters are the viscid-gelatinous consistency of the fruitbodies when fresh, and the fact that the paraphyses are not confined to the hymenium but continue with unchanged form down the whole stem, thus forming a thick gelatinous ectal layer or coating over it. As DURAND has pointed out, the very young fruitbodies of *Geoglossum* and *Trichoglossum* are completely covered by hairs, homologous to the paraphyses and projecting at right angles to the surface, but in those genera the expanding, inner tissues soon cause them to become isolated or grouped in separate squamules. This difference is thus only gradual, as is the difference in consistency. If only the species of *Gloeoglossum* were close to each other also in other characters, it would, nevertheless, be possible to keep them together as a genus of their own. But they are not! *Gl. glutinosum* takes a very isolated position. It is highly viscid when fresh and almost horny when dry; its paraphyses stick together so steadily that it is rather difficult to get good microscopical preparations; their length and slenderness with the globose tips, as well as the narrow asci, are other unique characters. — Though

I know *Gl. difforme* (= *G. Peckianum*) from dried specimens only, it seems to me to be much less viscid, and its hymenial elements are easily discernible. The spores are very similar to those of *Geoglossa* and *Trichoglossa* with 15-septate spores, and the paraphyses resemble closely those of the genus *Trichoglossum*. This species is evidently much more akin to certain species of *Geoglossum* sensu DUR. than to *Gl. glutinosum*. — These facts give together sufficient reason to reduce *Gloeoglossum* to synonymy. Its species cannot even be kept together as a separate section.

As mentioned above, DURAND recognized 3 North American species of *Gloeoglossum*; the genus *Geoglossum* (s. str.) is in the same paper represented by 7 species, and in 1921 he added an eighth. During my study it was soon found that his key — at least when applied to European material — did not work well, for numerous specimens matched both opposites equally well (or badly). A continued study showed that certain of his species were very polymorphous, comprising so different forms that it was almost impossible to grasp the specific characters. This applied especially to *G. glabrum*, which he considered as a cosmopolitan species and as the most common of the genus, its characters being »quite variable as is to be expected in such a common, widely distributed species» (l. c. p. 426). In my opinion he had united three sharply different forms under that name, viz. *G. simile* PECK, *G. glabrum* s. str. and *G. Cookeianum* NANNF. (= *G. difforme* sensu CKE), of which only the first is known from North America. Prof. IMAI (in a letter of 23. VI. 1941) agrees in separating these forms, and declares his intention to describe a fourth species of the group, *G. japonicum* IMAI, close to *G. Cookeianum*.

Those species whose spores become coloured and septated only tardily, and are variable in the number of septa, are more critical. DURAND recognized two species with 7—12 septa, viz. *G. fallax* and *G. intermedium*, the first with free, the second with agglutinated paraphyses, but the number of gatherings seen by him was rather small. Subsequently, two more species have been described from Japan (IMAI 1934). Such forms are, as it seems, much more common in Scandinavia than elsewhere, and they display at first sight a perplexing polymorphy as to hymenial characters. The formation of septa is not so regular as in the 11-septate species of *Trichoglossum* (*g. v.*). It was impossible for me to find the Ariadne thread through this labyrinth of puzzling forms as long as I believed in DURAND's distinction between species with paraphyses agglutinated by amorphous brown matter,



and such with free paraphyses and lacking this matter. But on repeated examination it became clear that amorphous matter was present in all specimens, though the quantity was in some cases very trifling. It could then be established for *G. fallax* that in specimens rich in such matter the paraphyses were hyaline, strongly adherent and very difficult to observe; in such deficient in the matter, the paraphyses were, on the contrary, faintly coloured and easily discernible. Even if it be possible to select extremes that look so different that their specific difference seems beyond doubt, they are connected by a continuous series of intermediates. There are reasons to believe that they represent only different developmental stages. — This fact being established, the Scandinavian material of this group arranged itself into only two species, viz. *G. fallax* and a second, new species, *G. Starbaeckii*. Prof. IMAI has evidently arrived at the same conclusions about the variability within this group, as he announces that in his monograph of the Japanese *Geoglossaceae* (in the press) *G. proximum* and *G. subpumilum* are reduced to varieties of *G. fallax*.

The group marked by tardily septated spores with seven or fewer septa presented still greater taxonomical difficulties. DURAND recognized only two such North American species, viz. the well-marked *G. glutinosum* and *G. cohaerens*, but two imperfectly described European forms fall according to the descriptions into the same group, viz. *G. Heuflerianum* BAIL ex SACC. and *G. glutinosum* f. *minus* SACC. An examination of the type-material of *Leptoglossum littorale* ROSTK. revealed some coloured spores, proving that this species too belongs here.

My study of the Scandinavian forms of *Geoglossum* has thus gradually grown out into a revision of all northern-temperate species. It is to be hoped that these forms will be searched for more eagerly in the future, for much richer — and better collected and preserved! — material is needed for a definite revision. Though I have not had an opportunity of examining type or other material of all species described, I venture to publish the following tentative key, which is in part compiled from descriptions only and may in several points be in need of amendments:

- I. Spores at maturity normally 15-septate. Asci 8-spored.
  - A. Spores early and almost simultaneously taking the brown colour. Paraphyses not agglutinated.
    - a. Viscid. Paraphyses apically slightly dilated, brownish, much coiled and twisted, continuing down the stem to form a compact palisade. . . . . *G. Peckianum* CKE.
    - b. Not viscid. Paraphyses not, or only occasionally, curved, not continuing down the stem.

1. Spores 120—180  $\mu$  long. Paraphyses terminating in 1—3 pyriform or ellipsoidal cells, constricted at the septa. . . . .  
 . . . . . *G. pygmaeum* GER. ex DUR.
  2. Spores (104—)110—115(—125)  $\mu$  long. Paraphyses remotely septate. . . . .  
 . . . . . *G. pumilum* WINT.
  - B. Spores hyaline until very late, narrowly cylindrical, 60—95  $\mu$  long. Not viscid. Paraphyses agglutinated into a brown epithecium, straight. . . . .  
 . . . . . *G. alveolatum* (DUR. ex REHM) DUR.
- II. Spores only tardily coloured and septated, number of septa very variable, generally less than 15 but more than 7. Asci 8-spored, but spores often of very different sizes.
- A. Spores gracile, clavate-cylindrical, distinctly narrowed towards the ends, especially towards the lower one.
    - a. Paraphyses hyaline or faintly coloured, strongly adherent and interspersed with  $\pm$  copious amorphous brown matter, sparingly septated, often somewhat constricted at the septa, strongly curved or circinate above,  $\pm$  abruptly dilated (to 10  $\mu$ ) apically. Spores as a rule 80—100  $\mu$  long. . . . .  
 . . . . . *G. fallax* DUR. (incl. *G. proximum* IMAI & MINAKATA and *G. subpumilum* IMAI).
    - b. Paraphyses distinctly coloured, very numerous and slender, discrete though interspersed with scanty brown matter, remotely septate, curved, not or only slightly constricted at the septa (in shape strongly resembling those of *Corynetes arenarius*). Spores as a rule 65—85  $\mu$  long. . . . .  
 . . . . . *G. Starbaeckii* NANNF. n. sp.
  - B. Spores short and stout, almost cylindrical with rounded ends, 55—75  $\mu$  long. Paraphyses (nearly) hyaline, straight, with pyriform or globose apices, agglutinated into a conspicuous brown epithecium. . . . .  
 . . . . . *G. intermedium* DUR.
- III. Spores early and almost simultaneously coloured and 7-septated, distinctly clavate.
- A. Viscid gelatinous. Paraphyses continuing down the stem to form a persistent compact palisade. Spores 43—65  $\mu$  long. . . . .  
 . . . . . *G. affine* (DUR.) LLOYD.
  - B. Not viscid. No compact palisade down the stem. Spores longer as a rule.
    - a. Paraphyses not adherent, remotely septate, strongly curved or coiled.
      1. Asci 8-spored.
        - AA. Paraphyses only slightly dilated apically, not constricted at the septa. . . . .  
 . . . . . *G. nigratum* CKE.
        - BB. Paraphyses strongly dilated apically and torulose, crozier-like or hooked. . . . .  
 . . . . . *G. Barlae* BOUD.
      2. Asci 4—6-spored. . . . .  
 . . . . . *G. montanum* NANNF. n. sp.
    - b. Paraphyses straight or only slightly curved, densely septate and constricted at the uppermost septa. Asci 8-spored.
      1. Paraphyses with very dark (almost opaque) tips strongly adherent to each other, apical cells globose, rapidly increasing in size towards the tips. Spores (55—)65—80(—90)  $\mu$  long. . . . .  
 . . . . . *G. glabrum* PERS. ex FR.
      2. Paraphyses faintly or distinctly coloured (but neither dark nor opaque), not, or only slightly, adherent, the apical cell hardly broader than the rest.
        - AA. Paraphyses much longer than the asci, cells barrel-shaped or united into barrel-shaped pairs with constrictions only between the pairs. Spores (70—)75—85(—100)  $\mu$  long. Stem gracile with acute tufts or squamules. . . . .  
 . . . . . *G. simile* PECK.

BB. Paraphyses only slightly longer than the asci, cells ellipsoidal, obovate or pyriform. Spores (50—)60—75 (—90)  $\mu$  long. Stem short and robust, smooth or minutely squamulose. . *G. Cookeianum* NANNF. n. nom.

IV. Spores only tardily coloured and septated, at maturity with 7 or fewer septa. Paraphyses  $\pm$  agglutinated by amorphous brown matter. Asci 8-spored. (Obs. Care must be taken not to confuse this group with depauperate or juvenile fruitbodies of species belonging to II or III. — *G. Heufferianum* BAIL ex SACC. and *G. glutinosum* f. *minus* SACC. seem to fall under this heading, but the descriptions are too imperfect for safe identification.)

- A. Viscid. Paraphyses forming a persistent compact palisade down the stem, very thin, much longer than the asci, the apices pale-brown and abruptly pyriform or globose. Spores cylindrical, 55—110  $\mu$  long, often only 3-septate. Asci very long and slender, 175—250  $\times$  12—15  $\mu$ . . . . . *G. glutinosum* PERS. ex FR.
- B. Not viscid, no palisade on the stem. Spores cylindrical—clavate, 40—60  $\mu$  long. Asci broader and shorter.
  - a. Paraphyses strongly coloured (as dark as in *Corynetes arena-rius*) and adherent. Spores pale-brown. . . . . *G. littorale* (ROSTR.) NANNF. n. comb. and *G. cohaerens* DUR.
  - b. Paraphyses hyaline or subhyaline, apically very irregularly dilated, straight or curved, somewhat resembling those of *G. fallax*. . . . . *G. elongatum* STARB. ex NANNF. n. sp.
  - c. Paraphyses stout, distinctly coloured, straight, apically globose or pyriform. . . . . *G. Vleugelianum* NANNF. n. sp.

**Geoglossum affine** (DUR.) LLOYD, Geogl. p. 9 (1916).

Syn.: *Gloeoglossum affine* DUR., Ann. myc. 6 p. 420 (1908).

Typus: U. S. A., N. Y., Oneida Co., Knoxboro, 20. VIII. 1904, H. S. JACKSON in Hb. Cornell Univ.

Ill.: DURAND, Ann. myc. 6 tab. 8 fig. 73—74; tab. 16 fig. 165—167. Distrib.: U. S. A. (N. Y.).

**Geoglossum alveolatum** (DUR. ex REHM) DUR., Ann. myc. 6 p. 432 (1908).

Syn.: *Mitrula alveolata* DUR. in sched. — *Leptoglossum alveolatum* DUR. ex REHM, Ann. myc. 2 p. 32 (1904). — *L. microsporum* (CKE & PK) SACC. var. *ohiense* REHM, l. c. ut syn.

Typus: U. S. A., N. Y., Canandaigua, Tichenor's Glen, E. J. DURAND n. 1686 in Hb. REHM (Naturhistoriska Riksmuseum, Stockholm).

Ill.: DURAND, Ann. myc. 6 tab. 8 fig. 68—69; tab. 14 fig. 145—148. Distrib.: U. S. A. (N. Y., Virg.), Asia (Japan, ITO & IMAI 1932).

**Geoglossum Barlae** BOUD., Bull. Soc. Myc. Fr. 4 p. 76 (1888).

Syn.: *G. Peckianum* CKE f. *Barlae* MASSEE, Ann. Bot. 11 p. 251 (1897).

Typus: France, Nice, BARLA in Hb. BOUDIER (Museum d'Histoire Naturelle, Paris).

Ill.: BOUDIER, Bull. Soc. Myc. Fr. 4 pl. 16 fig. 1; Icon. mycol. tab. 424. — Tab. (*nostra*) III a. Fig. (*nostra*) 1 c. Distrib.: France (Nice, Blois), Portugal (Setubal).<sup>1</sup>

<sup>1</sup> A specimen (TORREND n. 649) in Hb. BRESADOLA (S!) agrees so perfectly with the descriptions and illustrations that I have not the slightest doubt about the identification. My opinion of *G. Barlae* is based exclusively on the literature and this single specimen.

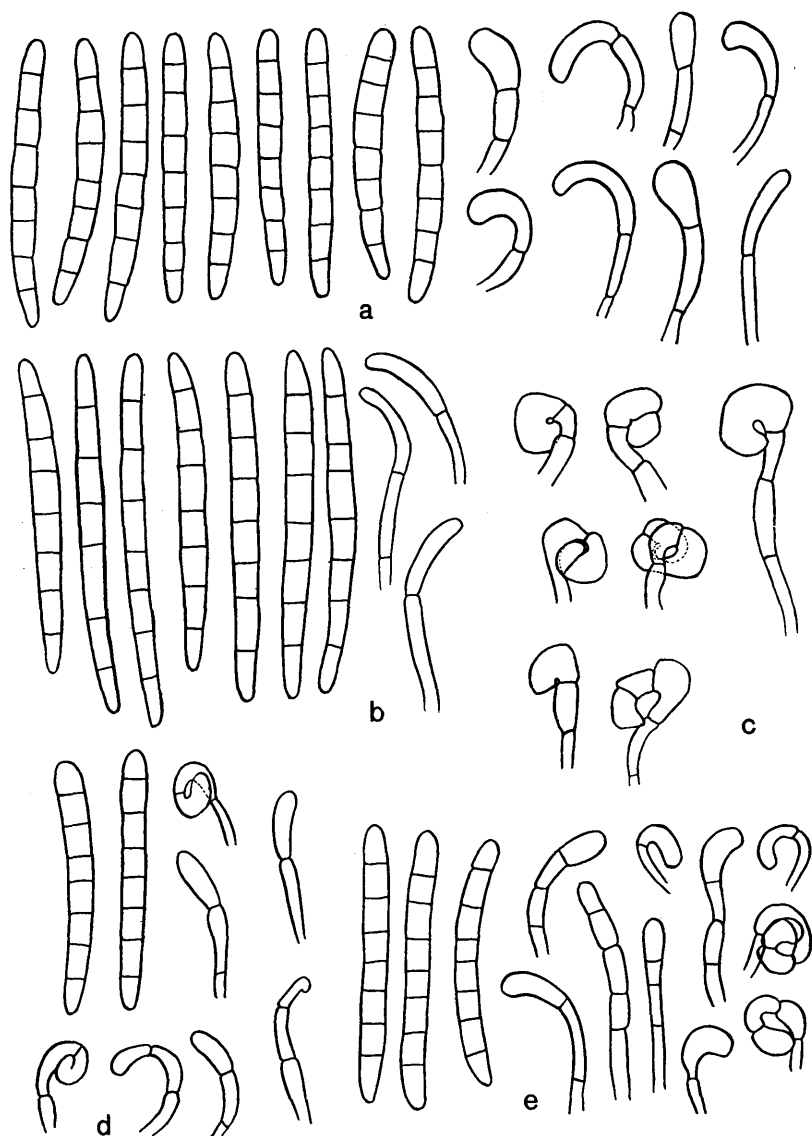


Fig. 1. Paraphyses and spores of a. *Geoglossum nigratum* (Cotyplus: Halmbyboda, E. P. FRIES). b. *G. nigratum* (LUNDELL & NANNF., F. exs. succ. n. 399). c. *G. Barlae* (TORREND n. 649). d. *G. montanum* (Storsjö, RIDELIUS). e. *G. montanum* (Typus: NANNFELDT n. 5189). — About 600 ×.

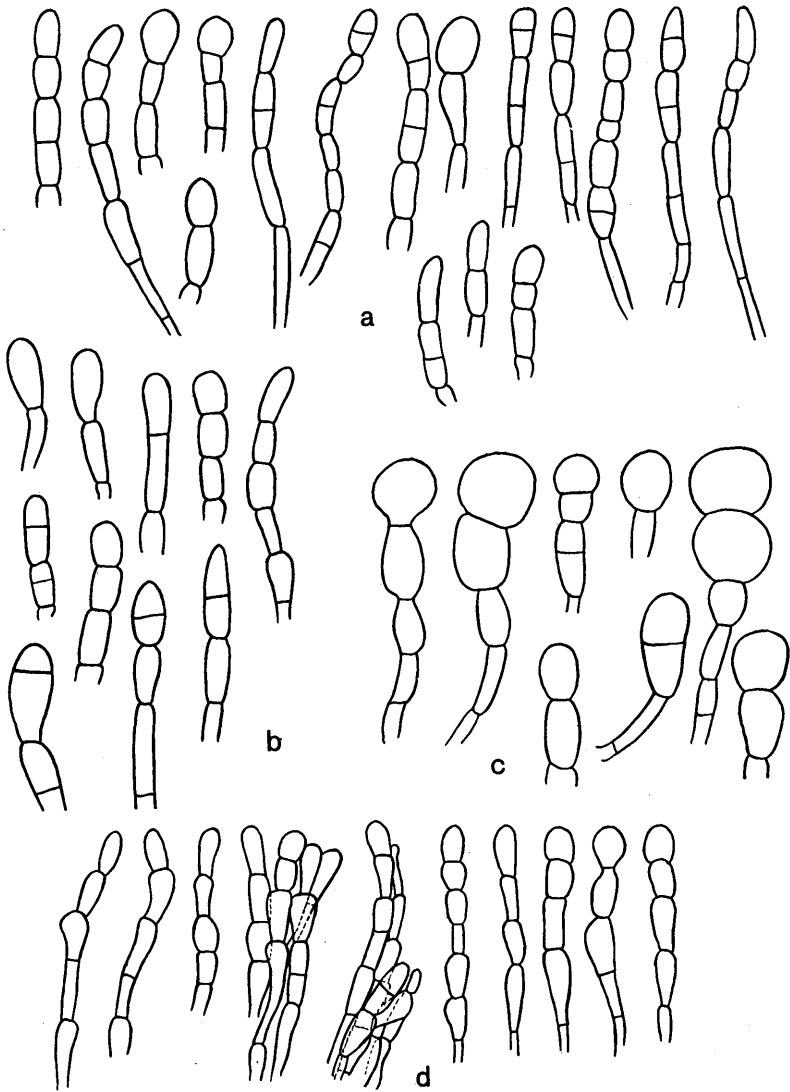


Fig. 2. Paraphyses of a. *Geoglossum simile* (Shelbourne, FARLOW). b. *G. simile* (WEHMEYER n. 1130 e). c. *G. glabrum* (REHM, Asc. n. 503 b). d. *G. Cookeianum* (Adelöv, HAGLUND). — About 600 ×.

This species is evidently very closely related to *G. nigratum* and *G. montanum*. In the latter species, which differs *i. a.* by the reduced number of spores in the ascus, the paraphyses show a tendency to assuming that curious shape so characteristic of *G. Barlae*, which BOUDIER described as corkshrew-like but which in my opinion had been more adequately designated as crozier-like.

**Geoglossum cohaerens** DUR., Ann. myc. 6 p. 430 (1908).

Typus: U. S. A., N. J., Newfield, J. B. ELLIS in Hb. New York Botanical Garden.

Ill.: DURAND, Ann. myc. 6 tab. 8 fig. 65; tab. 13 fig. 138—139.

Distrib.: U. S. A. (N. J.).

This species is evidently very close to *G. littorale* and perhaps even not distinct.

#### 4. **Geoglossum Cookeianum** NANNF. n. nom.

Syn.: *G. difforme* »FR.» sensu BERK., CKE and auctt. plur. — *G. glabrum* f. *difforme* MASSEE, Ann. Bot. 11 p. 248 (p. p.). — *G. glabrum* sensu DUR., p. p.

Typus: CKE, F. brit. n. 481 in Hb. Uppsala (selected by NANNFELDT).

Exs.: BERK., Brit. f. n. 256 (s. n. *G. difforme*). — CKE, F. brit. n. 481 (s. n. *G. difforme*). — PHILL., Elv. brit. n. 55 (s. n. *G. glabrum*). — RABENH., Herb. myc., ed. II, n. 238 (s. n. *G. glabrum*). — REHM, Asc. n. 503 (s. n. *G. glabrum*); n. 503 c (s. n. *G. ophioglossoides*). — SYD., Myc. germ. n. 1007 (s. n. *G. glabrum*). — SYD., Myc. march. n. 3958 (s. n. *G. ophioglossoides*).

Ill.: BOUDIER, Icon. mycol. tab. 423 (s. n. *G. ophioglossoides*). — COOKE, Mycol. fig. 7 (s. n. *G. difforme*; paraphyses incorrectly drawn). — DURAND, Ann. myc. 6 tab. 7 fig. 56. — *Tab. (nostra) II a—b. Fig. (nostra) 2 d, 3 a—b.*

Distrib.: Europe (Great Britain, France, Italy, Germany, Denmark, Sweden).

#### Sweden:

Gotland: Fårö, »Fårö fyr», in pine forest on sandy soil, 17. X. 1932, K. G. RIDELIUS (U!).

Småland: Adelöv, Brahälla, 19. X. 1897, KERSTIN HAGLUND[-STARBÄCK] (S!).

Östergötland: Skedevi, Reijmyre, on the ose near Långbron, 16. IX. 1866, H. v. POST (S!).

Uppland: Skokloster, Bagarbo, IX. 1890, K. STARBÄCK (S!). — Bondkyrka, »Sunnersta grindstuga», 26. IX. 1883, H. v. POST (S!).

This species seems to be rather rare in Scandinavia, but is evidently one of the commonest in Central Europe.

*G. Cookeianum* was relatively clear to BERKELEY and COOKE, who — without sufficient reasons — considered it to be the *G. difforme* of FRIES, but MASSEE (1897) united it with *G. nigratum* as *G. glabrum* f. *difforme* and DURAND (1908) with *G. glabrum*. As I have set out in detail under *G. glabrum*, it is clearly distinct from that species, and likewise from *G.*

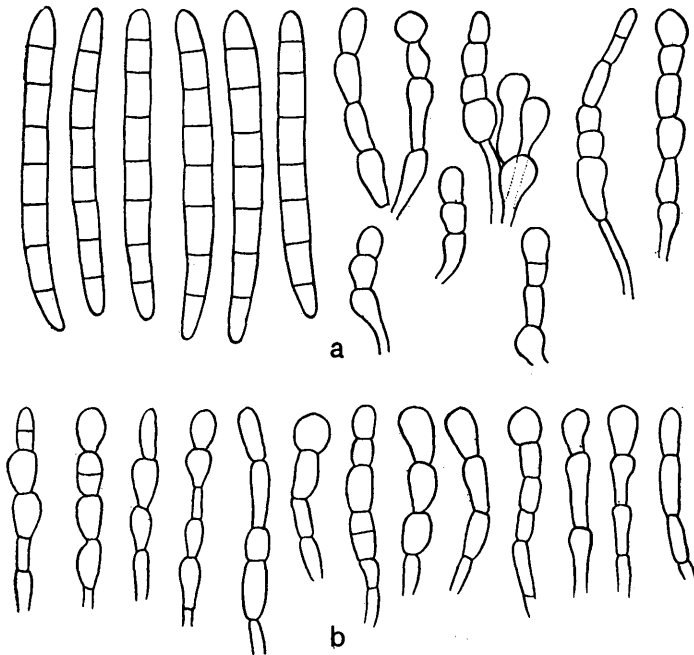


Fig. 3. Paraphyses and spores of a. *G. Cookeianum* (Fårö, RIDELIUS). b. Paraphyses of *G. Cookeianum* (REHM, Ascom. n. 503 c). — About 600  $\times$ .

*nigratum*. It seems to have no valid name, and so I am forced to give it a new name. As such I have chosen *G. Cookeianum*, in memory of M. C. COOKE, who was one of the first to recognize it.

An amended description of it may be given here:

Fruitbodies 3—7 cm high, robust. — Ascigerous portion black, occupying about one-half or more of the total length of the fruitbody, lanceolate, compressed, obtuse or acute, not sharply delimited from the stem. — Stem terete or slightly compressed, black or brownish-black, robust, often rather short, almost smooth, furfuraceous or minutely squamulose, covered by short, septate, brown hairs, which for the most part are obliterated in full-grown specimens. — Asci rather stout, clavate-lanceolate, apex narrowed but rounded, 150—180  $\times$  18—20  $\mu$ . — Spores 8, in parallel fascicle in the ascus, clavate, dark fuliginous, 7-septate, usually slightly curved, (50—)60—75(—90)  $\times$  5—7  $\mu$ . — Paraphyses slightly longer than the asci, adherent in distinct clusters, basally hyaline, filiform (2—3  $\mu$  in diam.), remotely septate, but in the upper  $\frac{1}{4}$ th— $\frac{1}{3}$ rd pale-brown, thicker and closely septated into chains of cells, rarely more than twice as long as broad, usually strongly constricted at the septa and swollen between them, barrel-shaped or obovate; the chains 4—6  $\mu$  in diam., often interspersed with narrow, almost cylindrical cells, the apical cells not exceeding 8  $\mu$  in breadth.

Prof. IMAI has kindly sent me two fragments of a closely related new species, *G. japonicum* IMAI, to be published in his

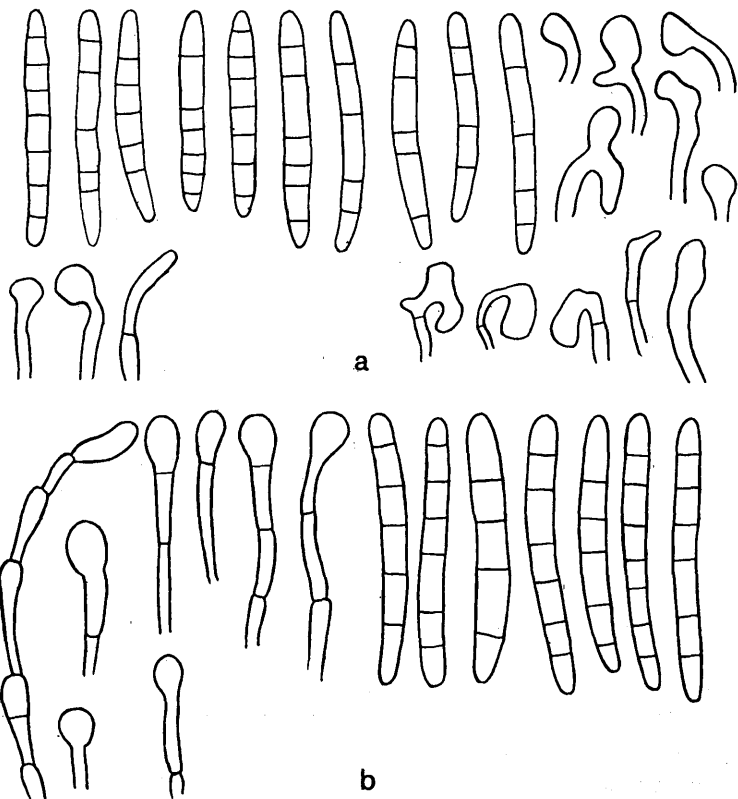


Fig. 4. Paraphyses and spores of a. *G. elongatum* (Typus: Kvillinge, HAGLUND). b. *G. vleugelianum* (Typus: Umeå, VLEUGEL). — About 600  $\times$ .

forthcoming monograph of the Japanese *Geoglossaceae*. It is in my opinion widely different by *i. a.* longer and slenderer spores.

##### 5. *Geoglossum elongatum* STARB. in sched.

Ascomata vulgo valde gracilia, exsiccata ad 5 cm longa, umbrina («Blackish Brown» sec. nomencl. Ridgway), »forma clavulae eleganter, fere lineariter elongatim et anguste clavulata» (STARBÄCK in sched.), clavula a stipite non distincte delineata. — Stipes fere filiformis, teres, verrucis acutis hypharum passim ornata. — Asci clavati, 110–150  $\times$  14–18  $\mu$ , apice rotundati, 8-spори. — Sporidia bi-multi-seriata, cylindraceo-clavata, longe hyalina demum pallide brunnea, 0–7-septata, (40–)50–60  $\times$  5–7  $\mu$ . — Paraphyses numerosae, filiformes, rare septatae, hyalinae, sursum subhyalinae, valde irregulariter incrassatae, saepe piriformes vel capitatae, rectae vel curvatae, apicibus cohaerentibus, epithecium brunneum supra ascos formantibus. — Hab. ad terram in Suecia media.

Typus: K. HAGLUND, 12. X. 1896, in Hb. Naturhistoriska Riksmuseum (Stockholm).

Ill.: Tab. (nostra) IV a–b; Fig. (nostra) 4 a.



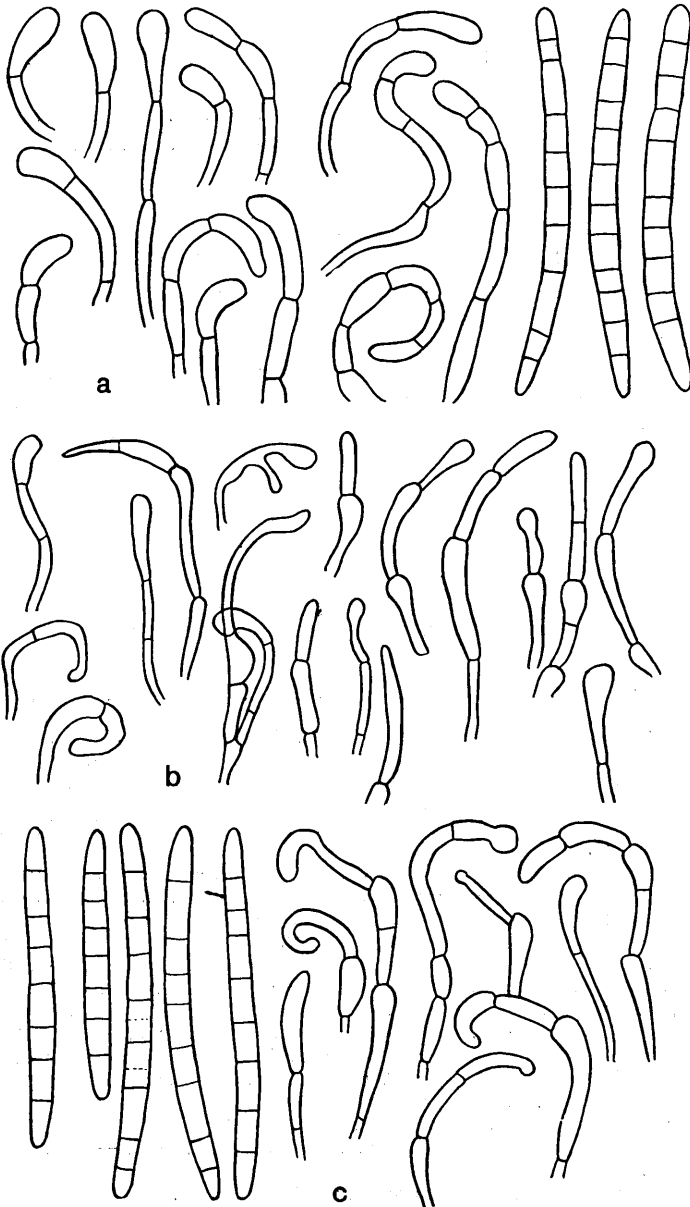


Fig. 5. Paraphyses and spores of a. *Geoglossum fallax* (LOYD n. 03707).  
 b. *G. Starbaeckii* (Typus: STARBÄCK n. 42). c. *G. Starbaeckii* (NANNFELDT  
 n. 4447).

## Sweden:

Östergötland: Kvillinge, Norrviken, 12. X. 1896. KERSTIN HAGLUND[-STARBÄCK] (S!).

Uppland: Bondkyrka, Kungsparken, 1. XI. 1861, J. E. ZETTERSTEDT (U!). — Uppsala, Galgbacken, 21. IX. 1892, H. v. POST (S!).

This species resembles the description of *G. cohaerens* very much as to shape, septation, and colour of the spores, but differs widely in the shape and colour of the paraphyses and in the stipes, which are provided with acute tufts of hairs, similar to those in *G. alveolatum*. It differs moreover from *G. littorale* in its gracility and earlier septated spores. There is no described species, with which it can be identified, and so it is a pleasure to me to take up STARBÄCK's herbarium name for it.

The three gatherings united here agree closely in all characters, except that the spores of the type-gathering are on the average somewhat more septated, those of the other gatherings (though mostly coloured), possessing only in exceptional instances more than 3—4 septa. This difference is probably due to different stages of development.

6. *Geoglossum fallax* DUR., Ann. myc. 6 p. 428 (1908).

Syn.: *G. glabrum*  $\beta$  *paludosum* PERS., Myc. eur. I p. 194 (1822). — *G. paludosum* DUR., Ann. myc. 6 p. 429 (nom. event.); LLOYD, Geogl. p. 11 (1916). — *G. rugosum* LASCH in KLOTZSCH, Herb. viv. mycol. n. 816 (nom. nud.) (fide v. LUYK 1919 p. 7).

Typus: U. S. A., N. Y., Ithaca, Coy Glen, E. J. DURAND in Hb. Cornell Univ. n. 19197.

Exs.: CKE, F. brit. n. 469 (s. n. *G. hirsutum*). — EHRH., Pl. crypt. n. 140 (s. n. *G. ophioglossoides*). — Erb. critt. ital., ser. I, n. 975 (s. n. *G. hirsutum*) (p. p.); p. p. *G. nigratum*; p. p. *Tr. hirsutum*. — KLOTZSCH, Herb. viv. mycol. n. 816 (s. n. *G. rugosum*) (fide v. LUYK 1919 p. 7). — KRIEGER, F. saxon. n. 2027 (s. n. *G. ophioglossoides*). — MOUG. & NESTL., Stirp. crypt. vog.-rhen. n. 95 (s. n. *G. glabrum*). — PETR., Fl. Boh. et Mor. exs., II. ser., 1. Abt., n. 2335 (s. n. *G. ophioglossoides*) — RABENH., F. eur. n. 1820 (s. n. *G. olivaceum* v. *viride*) (p. p. fide v. LUYK l. c.; p. p. *Microglossum olivaceum*<sup>1</sup>). — REHM, Asc. n. 2100 (s. n. *G. fallax*) (p. min. p.; p. max. p. *Tr. hirsutum*). — ROUMEG., F. gall. exs. n. 262 (s. n. *G. glabrum*)<sup>2</sup>. — SYD., Mycoth. germ. n. 2170 (s. n. *G. nigratum*).

Ill.: DURAND, Ann. myc. 6 tab. 7 fig. 61—64; tab. 13 fig. 133—137. — v. LUYK, Mededeel. 's Rijks Herb. Leiden 39 fig. 3, 6—8. — Tab. (nostra) V a. Fig. (nostra) 5 a.

Distrib.: North America, Europe and Asia (Japan).

<sup>1</sup> I find only *Microglossum olivaceum* in the Uppsala copy.

<sup>2</sup> DURAND cites this number under *G. glabrum*, but v. LUYK and I have found the copies studied by us to contain *G. fallax*.

Sweden<sup>1</sup>:

Småland: Femsjö, Kvarnhagen, amongst mosses and grasses along a rivulet, 18. IX. 1940, T. NATHORST-WINDAHL (n. 2116, W!).

Halland: Bredared, Bygget, 1909, C. G. LLOYD (Hb. LLOYD n. 36549, fide STEVENSON & CASH 1936 p. 25). — (This is evidently the gathering from Femsjö, referred to in LLOYD 1916 p. 11, as Femsjö is situated only about 10 km from Bygget.)

Östergötland: Kimstad, 13. X. 1915, KERSTIN HAGLUND [-STARBÄCK] (S!). — Skedevi, Reijmyre, »Stora Hagen», 1. X. 1866, H. v. POST (S!).

Uppland: Gustavsberg, Värmdön, Betsede, IX. 1889, H. KUGELBERG (S!); between Betsede and Gustavsberg, 22. IX. 1895, L. ROMELL (n. 16359 c; S!). — Stockholm, 25. IX. 1881, E. WETTERHALL (S! in alc.). — Alsike, Fredrikslund, 10. IX. 1866, TH. M. FRIES (U!). — Bondkyrka, Graneberg, 4. IX. 1888, H. v. POST (S!); midway between Flottsund and Graneberg, margin of the wood just S. of the high-road, in *Hylacomium*-carpet amongst herbs and grasses, 26. IX. 1937, ROLF SANTESSON (VU!); Gottsunda, X. 1895, T. VESTERGREN (U!); Kungsparken, 26. VIII. 1866, TH. M. FRIES (U!); Kungsparken 2. X. 1895, H. v. POST (S!). — Uppsala, F. EHRHART (Pl. crypt. n. 140; U!); C. G. LLOYD (1916 p. 11). (The specimen LLOYD n. 03707 in Hb. REHM (S!) is probably part of this gathering; another part of the same gathering was studied by DURAND (1908 p. 429).) — Ärentuna, Storvreta, 18. IX. 1920, S. LUNDELL (Hb. ROMELL n. 16366 a; S!). — Östervåla, »Törbrobacken», grass-land along the road, 7. X. 1935, G. DEGEILIUS (VU!)

## Norway:

Akershus: Bærum, at the Haslum Road between the [ancient] Drammen Road and the River Øverlandselven, in grassy spot amongst *Vaccinium vitis idaea* etc., 16. IX. 1879, A. BLYTT (O!; IMAI 1940 p. 276). — Asker, Leangsbugeten, 18. X. 1882, A. BLYTT (O!; IMAI l. c.).

I have not had an opportunity of seeing the type specimen of *G. fallax*, nor have I seen any other North American material, but I have studied parts of the two European gath-

<sup>1</sup> The specimen from ERIK HAGLUND in Hb. LLOYD n. 5800, cited under *G. paludosum* by STEVENSON & CASH (1936 p. 25), is evidently part of a gathering, of which the material in Hb. HAGLUND belongs to *G. nigratum* (q. v.).

erings that DURAND referred to this species, *viz.* LLOYD's Swedish gathering and MOUGEOT & NESTLER, *Stirp. crypt. vog.-rhen.* n. 95. The LLOYD gathering was referred to *G. fallax* with some reservation only: »It has paraphyses slightly constricted at the septa but agrees otherwise.» (DURAND 1908 p. 429). This alleged difference should not be taken too seriously, as DURAND's drawing from the type specimen (DURAND fig. 61) shows distinct constrictions as well, and the MOUGEOT-NESTLER specimens, which he referred without any reservation to *G. fallax*, and drew with non-constricted paraphyses, show at least some with distinct constrictions.<sup>1</sup> In these specimens the presence of amorphous matter in considerable quantities could be established, though it had not been noticed by DURAND. — LLOYD (1916 p. 11 under *G. paludosum*) doubts on the whole the identity of the American and the Swedish material: »In the Swedish plant I have never found any spores so dark that they could well be called fuliginous. The paraphyses are pale-coloured and hardly circinate.» As I have not seen any American material, I am unable to adopt any attitude to this problem, but with regard to the great variability presented by the European material I cannot find LLOYD's reasons conclusive. — Also in Japan the variability is very great. Two deviating forms, *G. proximum* (*q. v.*) and *G. subpumilum* (*q. v.*), originally described as distinct species, are now reduced to varieties of *G. fallax* (according to kind information by Prof. IMAI). I have had the opportunity of studying a fragment of the type specimen of *G. subpumilum*, which differs from all European material through the earlier coloured spores and the high number of septa, which often amounts to 15.

As the presence or absence of amorphous matter in the hymenium seems to be of little value as a specific criterion, *G. fallax* must be compared anew with the species possessing spores whose septa are formed only tardily and are variable in number but surpass 7. *G. intermedium* is well marked by different paraphyses and much shorter spores. In *G. Starbaeckii* the paraphyses are much more gracile and more strongly coloured, always free and easily discernible, never agglutinated, and their tips are neither so swollen nor so regularly

<sup>1</sup> Two copies, *viz.* those in Hb. Uppsala and in Hb. REHM, have been examined and are identical. Their state of preservation is very poor, and my usual methods in »reviving» herbarium specimens, *viz.* treatment with ammonia or lactophenol, were unsuccessful. It was only after prolonged stay in a strong solution of sodiumhydroxide that part of the paraphyses swelled and became discernible.

circinate. Moreover, the spores are on the average shorter, relatively broader and less septated.

*G. fallax* seems to be widely distributed, and in Scandinavia it is one of the commonest species. It is soil-inhabiting and seems to prefer grassy spots.

7. *Geoglossum glabrum* PERS. ex FR., Syst. myc. I p. 488 (1821), emend. CKE.

Syn.: *G. sphagnophilum* EHRENB. [Sylv. myc. berol. p. 30 (1818)] ex RABENH., Krypt.-Fl. 1 p. 328 (1844). — *G. sphagnorum* PERS. ex MOUG. & NESTL., Stirp. crypt. vog.-rhen. n. 684 (nom. nud.). — *G. laevipus* PERS. in sched. — *G. ophioglossoides* »(L.)» SACC., Syll. fung. 8 p. 43. — *G. ophioglossoides* var. *sphagnophilum* REHM, Discom. p. 1156.

Typus: PERSOON in Hb. Leiden n. 910, 262—109 (selected by DURAND; comp. v. LUYK 1919 p. 3).

Exs.: JACK, LEINER & STITZENB., Krypt. Badens n. 55 a & b (s. n. *G. glabrum*). — Krypt. exs. Mus. Vindob. n. 530 (s. n. *G. ophioglossoides*). — MOUG. & NESTL., Stirp. crypt. vog.-rhen. n. 684 (s. n. *G. sphagnorum*). RABENH., F. eur. n. 2845 (s. n. *G. sphagnophilum*). — REHM, Ascom. n. 503 b (s. n. *G. sphagnophilum*). — SYD., Myc. march. n. 285 (s. n. *G. glabrum*).

Ill.: COOKE, Mycogr. fig. 9. — DURAND, Ann. myc. 6 tab. 7 fig. 50—52, 55; tab. 12 fig. 124—129. — REHM, Discom. p. 1145 fig. 1—4. — *Tab. (nostra) II c. Fig. (nostra) 2 c.*

Distrib.: Europe (in *Sphagnum*-bogs) and Japan.

Sweden<sup>1</sup>:

Småland: Femsjö, [E. FRIES] (U! as *G. glabrum* var. *Sphagni*); 19. IX. 1856, E. P. FRIES (U! as *G. hirsutum*); Hallanäs, 1851, TH. M. FRIES (U!).

Östergötland: Skedevi, Reijmyre, in *Sphagnum*-tuft in the swamp at Lake Mögsjön, 16. VIII. 1862, H. v. POST (S!).

Uppland: Össeby-Garn, Hakunge, wood-land, amongst *Sphagna*, VIII. 1906, C. A. M. LINDMAN (S!). — Danmark, »Danmarks allmänningsskog», on a *Sphagnum plumulosum*-islet in a fen in the E. part of the wood, 14. IX. 1940, T. ARNBORG & G. E. DU RIETZ (VU!). — Harbo, at the W. end of Lake Laksjön, amongst *Sphagna*, 5. VIII. 1933, G. LOHAMMAR (U!).

Hälsingland: Hudiksvall, Kråkö, *Sphagnum*-bog, 8. IX. 1927, TH. ARWIDSSON (U! in alc.).

Jämtland: Häggenäs, Ollstamyra, the NE. shore of Näckrostjärn (just S. of Storsjötjärn in »Österåsens naturpark»), abundantly in *Carex lasiocarpa*-*Sphagnum balticum*-soc., 29. VIII. 1937, B. COLLINI, G. E. DU RIETZ, K. FÆGRI a. o. (VU! in alc.). — Hamnerdal, Stormyren, S. of Hallhåsåsen, *Sph. Warnstorfi*-tuft in calcareous fen, 30. VIII. 1938, B. COLLINI, G. E. DU RIETZ, K. FÆGRI a. o. (VU! in alc.); just W. of

<sup>1</sup> Old records unsubstantiated by any specimens must be neglected, as they may refer to any non-viscid member of this genus.

Sörviksnäset, calcareous fen N. of the high-road, *Sph. Warnstorffii*-tuft, 31. VIII. 1937, B. COLLINI, G. E. DU RIETZ & T. HASSELROT (VU! in alc.).

Ångermanland: Grundsunda, the bog S. of Önskatenna, amongst *Sphagna*, 7. VIII. 1920, G. HASSELBERG (U! in alc.).

#### Norway:<sup>1</sup>

Akershus: Ø. Aker, Abildsø, »in paludibus inter muscos». IX. 1842, N. G. MOË (O!; IMAI 1940 p. 276). — Bærum, Jonsrudtjern, 2. IX. 1935, P. STØRMER (O!).

Møre og Romsdal: Smøla, Edøy, close to Lerviksvatn, fen amongst *Sphagnum subsecundum*, *Sph. teres*, and *Sph. Warnstorffii*, 14. VIII. 1937, G. E. DU RIETZ a. o. (VU! in alc.); Nælvikberget, the W. foot, in *Sph. papillosum*-carpet in swampy *Calluna-Erica-Nartheceum-Scirpus germanicus*-heath, 15. VIII. 1937, B. COLLINI, G. E. DU RIETZ, K. FÆGRI a. o. (VU! in alc.); Kongsmyra, just E. of the bog, in *Sph. compactum*-, *Sph. papillosum*-, and *Sph. plumulosum*-carpets, 17. VIII. 1937, G. E. DU RIETZ (VU! in alc.).

Troms: »in sphagneto prope Tromsø», VIII. 1894, G. LAGERHEIM (REHM, Ascom. n. 503 b, S!).

*G. glabrum* sensu DUR. comprises at least three well-defined types, which I treat here as distinct species under the names of *G. glabrum* PERS. ex FR., emend. CKE, *G. Cookeianum* NANNF. n. nom. (= *G. difforme* »FR.», sensu CKE), and *G. simile* PECK.

To judge from the material available to me the two first species are absent from North America and the third from Europe. DURAND's description is evidently — at least in the main — drawn from American material and contains thus several points that do not match European material. The three species are, however, all illustrated by him: — *G. glabrum* (fig. 50—52, 55, 124—129) from PERSOON's type of *G. glabrum* and from EHRENBERG's *G. sphagnophilum*; *G. Cookeianum* (fig. 56) from material, distributed in CKE, F. brit. exs. n. 481); and *G. simile* (fig. 53—54, 121—123) from PECK's type material and other North American gatherings. The differences in the paraphyses are easily recognizable already in these illustrations.

The basal, filiform parts of the paraphyses are relatively short in *G. simile*, and the distal, moniliform ones much the longer, surpassing the asci for a good distance and being straight, flexuose or curved. The latter parts, which are of

<sup>1</sup> The record from Alten: Bossekop (ROSTRUP 1904 p. 5), changed by IMAI (1940 p. 276) into *G. nigratum*, refers to *G. Starbaeckii* (q. v.).

a pale but distinctly brownish colour, consist of chains of barrel-shaped cells or pairs of cells; and these chains, which do not adhere to each other, break easily off in microscopical preparations, thus simulating chains of *Bispora*-conidia. — The paraphyses of *G. glabrum* are only slightly longer than the asci. Their filiform parts are very long and reach about the zone where the clavate asci commence tapering towards their apices. They adhere strongly to each other and form thus distinct strings between the asci. The distal parts consist of short chains of broadly ellipsoidal or globose cells that darken and enlarge rapidly towards the tips, and form thus divergent »wisps» filling the widening spaces between the tapering asci. The apical cells are almost invariably globose, very large (often reaching a diameter of 15  $\mu$ ), adhere almost indissolubly to each other and form a continuous dark, almost opaque layer above the asci, which layer is very conspicuous under the microscope, and renders *G. glabrum* recognizable already at first sight. — The paraphyses of *G. Cookeianum* are less characteristic, very variable in shape, with single ones approaching either of the two other species; but the chains are never so long as in *G. simile*, nor are the »barrels» formed by pairs of cells; the apical cells are never either so large or so dark as in *G. glabrum*. The basal, filiform and hyaline parts are adherent, though not so strongly as in *G. glabrum*; the apical parts are moniliform as in *G. simile* and of about the same colour. The cells are as a rule very much constricted at the septa, sometimes ellipsoidal, but usually obovate or pyriform, and some long cylindrical cells are not rarely inserted amongst the normal ones.

The spores are very similar in all three species, but are relatively broadest in *G. glabrum* and longest in *G. simile*.

As to the shape of the fruitbodies, there is a marked difference between *G. Cookeianum* and the other two species, for in the first-mentioned species they are robust with very short and relatively broad stems, while in *G. glabrum* and *G. simile* the stem is long and very gracile. The stem of *G. simile* is squamulose, in contrast to that of the two other species, where it is almost smooth, though in *G. Cookeianum* it may bear some small warts or hyphal tufts in the upper part, and in *G. glabrum* it may be covered by a weft of long, dark-brown mycelium-like hyphae in the lower part.

There is also a most interesting ecological difference between the three species. *G. glabrum* grows exclusively amongst *Sphagna*, and, as far as I am aware, no other European

species of *Geoglossum* is ever found in such a habitat.<sup>1</sup> By the way, it may be noted that *Trichoglossum hirsutum* exceptionally occupies such localities. — *G. Cookeianum* is humus- and soil-inhabiting, mostly growing in mossy lawns and woods. — *G. simile* seems to be the least exacting of these species, growing on soil and humus, amongst *Sphagna*, and even on rotten logs.

It may not be out of place to give the following amended description of *G. glabrum*:

Fruitbodies 4—10 cm high, gracile. — Ascigerous portion black, about  $\frac{1}{3}$  rd— $\frac{1}{5}$  th of the total length of the fruitbody, lanceolate, compressed, obtuse or acute, not sharply delimited from the stem. — Stem terete, slender and long, black and smooth or — especially at the base — umber or chestnut-brown, woolly from brown, long, cylindrical, remotely septated, mycelium-like hyphae. — Asci rather stout, clavate-lanceolate, apex narrowed but rounded,  $150-180 \times 18-22 \mu$ . — Spores 8 in parallel fascicles in the ascus, clavate, dark fuliginous, 7-septate, normally slightly curved,  $(55-65-80(-90) \times 6-8 \mu$ . — Paraphyses only slightly longer than the asci, strongly adhering into clusters; basally hyaline, filiform ( $2-3 \mu$  in diam.), remotely septate; in the distal  $\frac{1}{10}$  th— $\frac{1}{5}$  th clavate, consisting of short chains of ellipsoidal or globose cells, strongly constricted at the septa and rapidly increasing in diameter towards the apex of the chain, the apical ones reaching a diameter of  $10-15 \mu$  and intensely dark-brown, almost opaque, the colour rapidly fading towards the base of the chain.

## 8. *Geoglossum glutinosum* PERS. ex. FR., Syst. myc. I p. 489 (1821).

Syn.: *Gloeoglossum glutinosum* DUR., Ann. myc. 6 p. 419 (1908). — *Geoglossum glutinosum*  $\beta$  *lubricum* PERS., Myc. Eur. I p. 197 (1822). — *G. viscosum* auctt. (an PERS.?). — *Cibalocoryne viscosulum* HAZSL., Mag. Tudom. Akad. Ért. A Termés.-tud. Kör. 11:19 p. 8 (1881); Just's Botan. Jahresber. 10 p. 168. — *Geoglossum viscosulum* SACC., Syll. fung. 8 p. 43 (1889).

Typus: in Hb. PERSOON (Rijksherbarium, Leiden) (selected by DURAND).

Exs.: CKE, F. brit. exs., ed. II, n. 393 (s. n. *G. hirsutum*) (p. p.; p. p. *Tr. hirsutum*; p. p. *Tr. tetrasporum*); n. 394 (s. n. *G. difforme*). — KARST., F. fenn. n. 450 (s. n. *G. glutinosum*). — KRIEGER, F. saxon. n. 2026 (s. n. *G. glutinosum*). — MOUG. & NESTL., Stirp. crypt. vog.-rhen. n. 780 (s. n. *G. glutinosum* b *lubricum*) (fide DURAND). — RABENH., Herb. myc., ed. II, n. 319 (s. n. *G. glutinosum*). — ROUMEG., F. gall. n. 4044 (s. n. *G. viscosum*).

Ill.: COOKE, Mycogr. fig. 6, 10. — GILLET, Champ. Fr. Discov. pl. 23 fig. 2; pl. 26 fig. 1. — MASSEE, Ann. Bot. 11 pl. 13 fig. 66—67. — DURAND, Ann. myc. 6 tab. 8 fig. 70—72; tab. 14 fig. 149—155.

Distrib.: Europe, North America, and Asia (Japan, IMAI in litt.).

<sup>1</sup> VOSS (1882) gave a good description of our species (as *G. sphagnophilum*) and had also its special habitats clear. His material is distributed in RABENH., F. eur. n. 2845. It not clear what second species he had in mind, when he contrasted it to *G. »glabrum*», which species he described as having hyaline paraphyses and spores with only 3—4 septa (*G. glutinosum*?). It is a pity that EHRENBERG's very appropriate name cannot be used.



Sweden:<sup>1</sup>

Småland: Femsjö, »locis umbrosis subhumidis rarius» (FRIES 1814 p. 20); »passim» (FRIES 1827 p. 67). [The records of *G. viscosum* from Femsjö (FRIES 1814 p. 20: »ad Älmåhs», and 1827 p. 67: »rarius») refer probably to this species too.]

Västergötland: Lagmansered, Koberg, in moist lawn under large frondose trees, 30. VIII. 1939, T. NATHORST-WINDAHL (n. 1588; W!). — Ambjörnarp, VIII. & IX. 1893, J. W. HAMNER (S!; Hb. ROMELL n. 16357, S!).

Östergötland: Kvillinge, Älvdalen, »in margine viae graminosae», 4. IX. 1898, ERIK HAGLUND (HN!). — Skedevi, Reijmyre, »Stora Hagen», 1. X. 1866 & 20. IX. 1867, H. v. POST (S!); Reijmyre, Saltbacken, road-side, X. 1860, H. v. POST (S!); Reijmyre, close to Östtjuttberget, 27. IX. 1863 & 15. IX. 1866, H. v. POST (S!).

Uppland: Solna, Karlbergsparken, X. 1888, H. KUGELBERG (S!); Hagaparken, »ad terram arenosam», X. 1889, H. KUGELBERG (S!). — Skokloster, Bagarbo, IX. 1890, K. STARBÄCK (S!). — Vänge, »Fiby urskog», 8. X. 1930, J. A. NANNFELDT (n. 5191, U!).

This species, which is one of the best-marked, seems to occur in rather small quantities, and in the same spots as other *Geoglossa*, for single specimens of it are often found in gatherings of other species.

Due to the turbulent political conditions it has been impossible for me to see the type specimen of *Cibalocoryne viscosulum* HAZSL., preserved in the Hungarian National Museum (Magyar Nemzeti Múzeum), but Dr. G. v. MOESZ has most benevolently sent me (in a letter of 21. V. 1941) a full description and excellent drawings of the said specimen, and so I can state with full confidence that it is identical with *G. glutinosum*. The following lines may be cited from his letter: »Das Exemplar ist 24 mm lang, 3 mm breit, . . . , vollkommen schwarz, etwas flachgedrückt. In frischem Zustande müsste der Pilz klebrig sein, denn auf der Oberfläche einer seiner breiteren Seiten waren Holzbröckchen angeklebt. Auf der entgegengesetzten Seite waren auf der Oberfläche netzförmige schmale Rippen sichtbar. Die Rippen ziehen sich in vertikaler und horizontaler Richtung. Diese Rippen gehören nach meiner Meinung nicht zu den Eigenschaften des Pilzes, sind vielmehr Eindrücke vielleicht eines Löschpapiers. Nach Entfernen der Holzbröckchen auf der anderen Seite, habe ich hier keine Spur von Rippen wahrnehmen können. — Die Aszi . . . sind 175—200  $\mu$  lang, 11—13  $\mu$  breit, 8-sporig, dünnwandig. — Die Paraphysen sind bräunlich, oben verschiedenartig geformt: unverändert, also dünn fadenartig, oder verdickt, oder gekrümmt, und meist dicht an einander geklebt, . . . oben 2,5—10  $\mu$  breit. — Die Sporen sind zylindrisch, leicht gebogen oder gerade, braun, 65—87  $\times$  5—6  $\mu$  . . . Die Teilung der Sporen kann sich aber auch fortsetzen, dann werden die Sporen 8-zellig, seltener nur 7-zellig.» A second gathering under the same name is probably

<sup>1</sup> The record of *G. viscosum* from Stockholm (»Djurgården ad Lidingöbro») by LUND (1846 p. 109) refers probably to this species.

*G. nigratum*. The net-work on the hymenium is also in this case most probably caused by a blotting paper. The genus *Cibalocoryne* lacks thus every *raison d'être*.

**Geoglossum Heuflerianum** BAIL ex SACC., Syll. fung. 8 p. 43 (1889).

»Minimum clavatum, nigrum, glabrum, 3—4 mm. longum; sporidiis tereti-fusoideis, utrinque rotundatis, rectiusculis, 45—50 × 10 μ, 3-septatis, fuliginis; paraphysibus apice articulato-moniliformibus. — Hab. in muscosis pr. Muttern Tiroliae.»

Typus: BAIL, Herb. mycol. typ. n. 180 b.

The description of this species is too vague to make it identifiable. The figure given for the thickness of the spores must either be incorrect or refer to abnormalities. I have not been able to find a copy of the said exsiccatum, though I have applied to several museums that could be surmised to possess it.

**Geoglossum intermedium** DUR., Ann. myc. 6 p. 431 (1908).

Typus: U. S. A., N. Y., Knoxboro, 20. VIII. 1904, H. S. JACKSON in Hb. DURAND.

Ill.: DURAND, Ann. myc. 6 tab. 8 fig. 66—67; tab. 13 fig. 142—144.

Distrib.: North America (Ontario, N. Y., Virg.; DURAND 1921 p. 184).

Amongst the species with 7—11-septate spores this is marked by the very stout spores and the abundance of amorphous brown matter in the hymenium.

**Geoglossum littorale** (ROSTR.) NANNF. n. comb.

Syn.: *Leptoglossum littorale* ROSTR., Bot. Tidsskr. 18 p. 75 (1892).

Typus: Denmark, Jutland, »Snabegaards Plantage», on the shore of »Snehvide Sø», 8. VIII. 1890, E. ROSTRUP in Hb. København.

Ill.: LIND, Danish Fungi tab. 1 fig. 10—12.

This species is up-to-date found only in the type gathering. I have had the type specimen on loan, and found the earlier descriptions (ROSTRUP 1892 p. 75; LIND 1913 p. 89) to be misleading, as the spores are not permanently hyaline but take finally a very faint greyish-brown colour.

## 9. **Geoglossum montanum** NANNF. n. sp.

Ascomata pusilla, gracilia, exsiccata ad 3 cm. alta, brunneo-atra. — Clavula angusta, tenuis, paullo compressa, exsiccata ad 2 mm. lata, a stipite non discreta. — Stipes gracilis, teres, laevis. — Asci clavati, 120—150 × 14—20 μ, apice rotundata. — Sporidia bi-multi-guttulata, vulgo tantum 3—6 evoluta, (40—50—65(—70) × 5—6 μ, initio continua hyalina, demum fusciscentia et septata, denique fulgineo-brunnea et vulgo 7-septata. — Paraphyses numerosissimae, fragiles, valde distinctae et non agglutinatae, filiformes, basaliter hyalinae et circ. 2 μ crassae, sursum fusciscentes, remote septatae, cellulis 15—20 μ longis, saepe ad septa leviter constrictae, apice paullo incrassatae (ad 5 μ), subrectae vel curvatae vel circinatae, interdum pedum episcopi aemulantes. — Hab. ad terram inter muscos parvos ad vias in Suecia subalpina.

Typus: NANNFELDT n. 5189 in Hb. Uppsala.

Ill.: Tab. (nostra) III b. Fig. (nostra) 1 d—e.

## Sweden:

Härjedalen: Storsjö, between Ljungdalen and Storsjö Chapel, road-side, 25. VIII, 1931, K. G. RIDELIUS (U!).

Lule Lappmark: Jokkmokk, Kvikkjokk, on the foot-path to Snjerak, 11. VIII. 1936, J. A. NANNFELDT (n. 5189; S!, U!).

This new species approaches *G. nigratum* and *G. Barlae*, but the asci contain hardly ever 8 developed spores, as usually 2—4 spores degenerate early. The paraphyses are thinner, more strongly coloured and much more fragile, by which characters they resemble those of *G. Starbaeckii*. The spores equal in length those of the type gathering of *G. nigratum*, and are thus much shorter than the average in that species. The fruitbodies seen are also much smaller than those of the said species, but my material is too scanty to decide if this character holds true in all cases. It is also too early to decide whether this species has a truly montane distribution, but this seems quite possible.

10. *Geoglossum nigratum* CKE, Mycogr. p. 205 (1879).

Syn.: *Clavaria nigrita* FR., Hym. Eur. p. 676 (1874) (non PERS.; vix FR., Syst. myc. et Epicr.). — *Geoglossum umbratile* SACC., Mich. 1 p. 444 (1878) (ex descr.). — *G. Peckianum* CKE f. *umbratile* MASSEE, Arn. Bot. 11 p. 251.

Typus: Sweden, Uppland, Halmbyboda, 1853, E. P. FRIES in Hb. Kew. (Cotype material in Hb. FRIES.)

Exs.: Erb. critt. Ital., Ser. I, n. 975 (1)<sup>1</sup> (s. n. *G. hirsutum*) (p. max. p.; p. p. *G. fallax*; p. p. *Tr. hirsutum*). — FUCH., F. rhen. n. 1142 (2) (s. n. *G. glabrum*). — HOLL, SCHM. & KZE, Deutsch. Schw. n. 97 (3) (s. n. *G. glabrum*). — LUNDELL & NANNF., F. exs. suec. n. 399 (4) (s. n. *G. nigratum*); n. 1000 (5) (s. n. *G. nigratum*). — RABENH., Herb. myc., ed. II, n. 424 (6) (s. n. *G. difforme*). — ROUMEG., F. gall. n. 2419 (7) (s. n. *G. difforme*).

Ill.: COOKE, Mycogr. fig. 345. — PECK, Rep. N. Y. State Mus. 29 pl. 1 fig. 20—22. — DURAND, Ann. myc. 6 tab. 7 fig. 57—59; tab. 12 fig. 130—132. — *Tab. (nostra) III c—d. Fig. (nostra) 1 a—b.*

Distrib.: Europe, North America, and Asia (Japan, ITO & IMAI 1932).

Sweden:<sup>2</sup>

Gotland: Västerhejde, Nygårds, the wood S. of the railway Högklint—Hallvarvs, 16. X. 1932 (8), K. G. RIDELIUS (U!).

Östergötland: Norrköping. Vrinnevid, »ad marginem viae in silva acerosa», 8. X. 1902 (9), ERIK HAGLUND (HN!). — Skedevi, Reijmyre, close to Östtjuttberget, 27. IX. 1863

<sup>1</sup> The bracketed numbers refer to the tabulation of the spore-measurements.

<sup>2</sup> The record from Umeå (VLEUGEL 1911 p. 337) refers, at least in part, to *G. Starbaeckii* and *G. Vleugelianum*.

(10), H. v. POST (S!); Reijmyre, »Stora Hagen», 1. X. 1866 (11), H. v. POST (S!).

Västmanland: Ramsberg, Vrethammaraskogen, 17. IX. 1921 (12), ERIK HAGLUND (HN!). [Hb. LLOYD n. 5800, cited by STEVENSON & CASH (1936 p. 25) as *G. fallax* is probably part of this gathering.].

Uppland: Skokloster, Bagarbo, VIII.—IX. 1890 (13), K. STARBÄCK (n. 16; S!, U!). — Bondkyrka, Kungsparken, the butt, in lawn, 13. VII. 1898 (14), H. v. POST (S!). — Uppsala, Botanic Garden, X. 1878 (15), TH. M. FRIES (U! in alc.); Carolinaparken, in lawn, 1. IX. 1902 (16), H. v. POST (S!); O. JUEL (Sv. Bot. Tidskr. 9 p. 469); 28. IX. 1922 (17), R. SERNANDER (VU! in alc.); 29. IX. 1927 (18), H. G. BRUUN & J. A. NANNFELDT (n. 5188; U!); on mossy lawn, amongst grasses, *Fragaria* etc., 23. IX. 1936 (4), S. LUNDELL (LUNDELL & NANNF., F. exs. suec. n. 399). — Funbo, Halmboda, 1853 (19), E. P. FRIES (U!). — Bälinge, Löten, just E. of the high-road, about 1 km N. of Lytta, amongst short grasses, *Trifolium repens*, *Gnaphalium silvaticum*, mosses etc., in open spot at the margin of coniferous wood, 5. X. 1937 (5), S. LUNDELL & H. SMITH (LUNDELL & NANNF., F. exs. suec. n. 1000). — Ärentuna, Storröta, amongst grasses and mosses, margin of coniferous wood, 18. IX. 1920 (20), S. LUNDELL (Hb. ROMELL n. 16366; S!).

#### Norway:<sup>1</sup>

Akershus: Bærum, IX. 1882 (21), A. BLYTT (O!; IMAI 1940 p. 276).

[Further specimens used for the tabulated spore-measurements: Japan: Hokkaido, Mt. Soramuma near Sapporo, 19. IX. 1930 (22), S. IMAI (U!). — U. S. A.: Michigan, Glen Lake, 1902 (23), C. G. LLOYD (n. 02516, S!). — Italy: Sardinia (24), MATTIROLLO (S). — Germany: Triglitz in der Prignitz (25), O. JAAP (n. 674; S); ditto (26). O. JAAP (n. 352; S!).]

This species, which was unravelled by DURAND, is easily recognized by its uniformly 7-septate spores and its characteristic paraphyses. The spore-size is unusually variable from one gathering to another (vide the tabulation), and the type gathering (19;  $M = 58.7 \mu$ ) represents almost the one extreme, the other extreme being represented by a gathering from the Uppsala Botanic Garden (15;  $M = 86.9 \mu$ ). Specimens collected in Carolinaparken, a park just outside the Botanic Garden, show great differences from year to year: — a fruitbody (17) collected in 1922, had  $M = 86.8 \mu$ , one (18) collected in 1927, had  $M = 81.4 \mu$  and two fruitbodies (4 a & b) collected simul-

<sup>1</sup> The record from Alta in IMAI (1940 p. 276) refers to *G. Starbaeckii*, that from Asker is indeterminable due to the poor state of the specimens.

Spore-length in  $\mu$  of different gatherings of *Geoglossum nigratum*.

	44	6	8	50	2	4	6	8	70	2	4	6	8	80	2	4	6	8	90	2	4	6	8	100	2	4	6	M	$\sigma$	
13	2	1	7	8	13	15	17	16	12	4	3	2																	58.3	4.6
19		1	5	6	12	23	17	14	10	9	0	2	1															58.7	4.2	
1 a		0	1	6	9	14	13	16	13	10	6	2	2	1														59.0	5.3	
6		1	1	4	5	8	15	22	12	6	5	4	4	3	2	0	1											61.0	6.8	
10		1	1	4	5	8	13	17	17	14	15	5	4	3	2	0	1											61.3	4.8	
11 a		1	0	2	4	3	13	17	17	14	15	5	4	3	2	0	1											60.1	4.2	
11 b		2	2	2	10	14	17	24	10	10	7	1	1															62.7	4.3	
11 a + b			1	1	12	16	14	17	20	10	4	3	1	0	0	1												61.4	5.4	
14			3	3	1	12	16	8	14	14	10	8	1	2														64.9	5.4	
23			1	4	8	11	15	14	17	20	7	3	3	5	2													65.2	4.1	
20			4	9	9	14	13	17	13	9	6	6	5	2														66.1	4.9	
24			1	0	0	2	3	9	13	15	17	18	15	5	2													66.5	4.3	
16			1	0	2	2	1	5	5	14	17	18	17	5	6	4	1	2	0	1								68.5	5.3	
25			1	1	2	6	6	13	13	12	21	8	8	5	3	1												69.0	5.1	
22			1	2	7	6	8	12	11	12	12	11	8	5	2	3												70.1	5.1	
5			1	2	1	2	5	3	10	8	10	16	8	13	11	6	3	1										70.4	6.0	
26			1	2	1	2	5	3	10	8	10	16	8	13	11	6	3	1										70.5	6.3	
1 b			1	0	1	0	1	6	2	9	11	18	10	8	19	9	4	0	2									72.6	5.4	
8			1	0	0	2	1	2	3	5	5	8	9	15	20	18	5	5	1									74.5	5.8	
4 a			1	0	0	2	1	2	4	5	5	7	10	12	15	13	11	5	5	1	3	1	1					76.4	6.3	
4 b			1	1	0	2	1	2	4	5	5	7	10	12	15	13	11	5	5	1	3	1	1					76.7	5.9	
4 a + b			1	1	0	2	1	2	4	5	5	7	10	12	15	13	11	5	5	1	3	1	1					76.6	5.9	
21																												76.6	4.6	
12																												76.9	4.5	
3																												77.5	5.8	
2																												78.3	5.5	
18																												78.5	5.5	
9																												81.4	5.5	
17																												83.1	5.8	
7																												86.8	5.5	
15																												86.8	6.0	
																												86.9	8.8	

taneously in 1936, showed  $M = 76.4$  resp.  $76.7 \mu$ , and one fruit-body (16) from 1902 showed  $M = 68.5 \mu$ .<sup>1</sup> — Though the extremes are so far apart, they are connected by a continuous series of intermediates. The specimens are, moreover, absolutely alike in all characters, and belong thus without doubt to a single species.

*G. umbratile* is most probably synonymous, and *G. Barlae* (*q. v.*) represents in my opinion a closely related species.

### 11. *Geoglossum Peckianum* CKE, Hedw. 14 p. 10 (1875).

Syn.: *G. difforme* FR. [Obs. myc. I p. 159] ex FR., Syst. myc. I p. 489 (1821) (p. p.; non auctt.). — *Gloeoglossum difforme* DUR., Ann. myc. 6 p. 421 (1908).

Typus: N. Y., Forestbourg, C. H. PECK in Hb. Kew.

Exs.: ELL. & EV., F. columb. n. 1731 (s. n. *G. Peckianum*) (fide DURAND).

Ill.: COOKE, Mycogr. fig. 5. — DURAND, Ann. myc. 6 tab. 8 fig. 75—77; tab. 15 fig. 150—160, 162—164. — MASSEE, Ann. Bot. 11 pl. 12 fig. 42—43.

Distrib.: North America (common), Asia (Japan, ITO & IMAI 1932), Europe (England, France, Sweden).

Sweden:<sup>2</sup>

Småland: Femsjö, E. FRIES (U! as *G. difforme*; comp. DURAND 1908 p. 422).<sup>3</sup>

This very characteristic species is rather common in North America, but much rarer in Europe. DURAND (1908) considered it to be FRIES's true and original *G. difforme*. His reasons were the following two: (1). A specimen in Hb. FRIES labelled in FRIES's own handwriting »*Geoglossum difforme* — Femsjö», is this species, to which fact DURAND makes the following comment: »Whether this is the original type it is impossible to say, but since FRIES's early home was in Småland it is probably, at least, one of the earlier collections. At any rate

<sup>1</sup> The measurements cited in my tabulation are made from single fruit-bodies. Different fruitbodies from one gathering show very small differences. Two such cases (4 and 11) are given in the tabulation, but I have studied many more cases. The exception offered by a gathering (1) is certainly only ostensible, as the heterogeneity of this number, in which three different species have been distributed, make it highly probable that it has been collected in different spots and perhaps also in different years. — The gatherings from Carolinaparken, which show different spore-size in different years, indicate that the size of the spores may be highly dependent upon the weather-conditions during the growth-period. This problem is worth special investigation.

<sup>2</sup> The record of *G. difforme* from Umeå by VLEUGEL (1908 p. 374) was later changed into *G. nigratum* and refers, at least in part, to *G. Starbaeckii* and *G. Vleugelianum*.

<sup>3</sup> *G. difforme* is curiously enough lacking from FRIES' »*Stirpes agri femsionensis*».

it is the most authentic specimen of the species in existence.» — (2). »This is the only plant which exactly conforms to the original description. There its consistency is distinctly stated to be 'viscosum', and the species is compared with '*Geogl. glutinoso et viscoso*'.»

I can follow DURAND as far as the conclusion that there is »no evidence anywhere to justify the interpretation given to *G. difforme* by COOKE and some other more recent writers», but I cannot consider DURAND's reasons for his own interpretation conclusive either. FRIES's idea of *G. difforme* was evidently very vague from the beginning. Besides the specimen in Hb. FRIES, there is another, perhaps still older one, *viz.* a specimen in Hb. AGARDH at Lund. That specimen is in a very bad state of preservation but can, nevertheless, be identified as *G. glutinosum*. A third specimen (at Kew) must be different from *G. Peckianum* as well, for MASSEE cites it — together with *G. nigritum* — as *G. glabrum* f. *difforme* (FR.) MASSEE. The original description is in my opinion too vague to be referable to one species only, and FRIES himself used the name *G. difforme* in a very broad sense; in his »Epicrisis» (1838 p. 583) we find thus »in graminosis silvat. frequens, vulgo cum *G. glabro* confusum», and in »Summa vegetabilium Scandinaviae» (1849 p. 347) it was listed in italics, testifying that he considered it to be a common species. And *G. Peckianum* is, to be sure, anything but common in Sweden! — As the name *G. difforme* has furthermore been used in widely different senses by different authors, but never for *G. Peckianum* until, in 1908, DURAND published the new combination *Gloeoglossum difforme*, it would lead to permanent confusion to use FRIES's name in DURAND's sense. The name valid for the species in question becomes then *G. Peckianum*.

***Geoglossum proximum*** IMAI & MINAKATA, Proc. Jap. Assoc. Adv. Sci. 7 p. 148 (1932; nom. nud.); ap. IMAI, Trans. Sapporo Nat. Hist. Soc. 13 p. 180 (1934).

Typus: Japan, Honshu, Kii.

Ill.: IMAI l. c. pl. 7 fig. 6—8.

Distrib.: Japan.

Prof. IMAI has kindly informed me that he will reduce this species to a variety of *G. fallax* (*q. v.*).

***Geoglossum pumilum*** WINT., Grev. 15 p. 91 (1886).

Typus: Brasilia, S. Francisco, E. ULE.

Distrib.: South America (Brazil), North America (Bermuda and Virginia; DURAND 1921 p. 185), and Asia (Japan, IMAI in litt.).

***Geoglossum pygmaeum*** GER. ex DUR., Ann. Myc. 6 p. 429 (1908).

Syn.: *G. pygmaeum* var. *Leveillei* PAT., Bull. Soc. Myc. Fr. 25 p. 133 (1909) (ex descr.).

Typus: U. S. A., N. Y., Poughkeepsie, W. R. GERARD in Hb. New York State Museum (Albany).

Exs.: ZOLLINGER, Pl. Javan. n. 1122 (s. n. *G. hirsutum*) (fide PATOUIL-LARD 1909 p. 132 et v. LUYK 1919 p. 7).

Ill.: DURAND, Ann. myc. 6 tab. 7 fig. 60; tab. 13 fig. 140—141. — v. LUYK, Meded. 's Rijks Herb. Leiden 39 fig. 8. — MAINS, Amer. Journ. Bot. 27 p. 324 fig. 7—8.

Distrib.: North America (N. Y., Tenn.), Java.

**Geoglossum simile** PECK. Bull. Buff. Soc. Nat. Sci. 1 p. 70 (1873).

Syn.: *G. glabrum* sensu DUR. p. p. (i. e. quoad specimina americana).

Typus: U. S. A., N. Y., Sandlake, C. H. PECK in Hb. New York State Museum (comp. DURAND 1908 fig. 53).

Exs.: ELL. & EV., F. columb. n. 1730 (s. n. *G. ophioglossoides*). — ELL. & EV., N. Amer. F. n. 980 (s. n. *G. glabrum*); n. 2031 (s. n. *G. glabrum*).

Ill.: DURAND, Ann. myc. 6 tab. 7 fig. 53—54; tab. 12 fig. 121—123. — *Tab. (nostra) II d. Fig. (nostra) 2 a—b.*

Distrib.: North America and Asia (Japan).<sup>1</sup>

For comparison with *G. Cookeianum* and *G. glabrum* it may not be out of place to give the following description of *G. simile*:

Fruitbodies 3—7 cm high, gracile. — Ascigerous portion black, about  $\frac{1}{3}$  rd of the total length of the fruitbody, lanceolate, compressed, 1—3 cm long, obtuse or acute, not sharply delimited from the stem. — Stem terete, brownish-black, rather slender, densely squamulose, 2—5 cm high, externally covered by projecting hyphae in the form of flexuose, septate hairs up to 100  $\mu$  long, single or agglutinated into groups. — Asci rather stout, clavate-lanceolate, apex narrowed but rounded, 170—200  $\times$  20—22  $\mu$ . — Spores 8 in parallel fasciae in each ascus, clavate, dark-fuliginous, 7-septate, usually slightly curved, (70—)75—85(—100)  $\times$  6—8  $\mu$ . — Paraphyses distinctly longer than the asci; basally hyaline, filiform (2—3  $\mu$  in diam.), remotely septated; in the upper  $\frac{1}{3}$  rd—one-half pale-brown, thicker and closely septated into cells rarely more than twice as long as broad, usually constricted at the septa and swollen so as to give rise to chains of barrel-shaped links; the constrictions often occur only at every second septum, the »barrels» being then formed by two cells; the chains are easily broken off at the constrictions and simulate then conidial chains of *Bispora*: chains straight, flexuose or curved, 4—6  $\mu$  in diam., the apical cells often swollen up to 8  $\mu$ .

<sup>1</sup> Besides the exsiccata cited above, I have had an opportunity of studying the following specimens: Nova Scotia, Earlton Road, on stumps, 19. VIII. 1931, L. E. WEHMEYER (n. 1130 e; U!). — Ontario, T. F. R., Lake Temagami, Bear Island, in swamp, 26. VIII. 1935, H. S. JACKSON (Univ. of Toronto, Crypt. Hb. n. 7944; S!); in *Sphagnum*, 7. IX. 1935, H. S. JACKSON (ditto n. 7946; S!); Lake Temagami, Cattle Island, on ground in *Sphagnum*-bog, 17. VIII. 1937, R. F. CAIN (ditto n. 11580; S!). — New Hampshire, Shelbourne, IX. 1891, W. G. FARLOW (S!). — Vermont, Lake Dunmore, IX. 1896, E. A. BURT (U!). — Massachusetts, Williamstown, IX. 1901, W. G. FARLOW (S!). — Rhode Island, East Providence, 1892, W. G. FARLOW (U!). — New York, Ithaca, Cayuga Lake Basin, on rotten wood, 11. VIII. 1906, E. J. DURAND (n. 800; S!). — Virginia, (Egdon?), 1902, C. G. LLOYD (n. 02644, S!; n. 02657, S!). — Japan, Honshu, Prov. Shimotsuke, Oku-Nikko, ad truncos putridos, 7. X. 1939, S. IMAI (U!).



12. *Geoglossum Starbaeckii* NANNF. n. sp.

Ascomata solitaria vel gregaria, exsiccata ad 5 cm. alta, fusca vel umbrina («Dusky Brown» — «Dusky Drab» sec. nomencl. RIDGWAY); clavula lanceolata, compressa, ad 2 cm. longa et 3 mm. lata. — Stipes gracilis, teres, conspicue squamulosus. — Asci cylindracei vel anguste clavulati, 180—210 × 10—18  $\mu$ , 8-spори, apice rotundati. — Sporidia subdisticha, cylindraceo-clavata, primo continua et hyalina, demum fuliginea, denique septata, septis vulgo 7—9, rarius ad 14, (50—)65—85(—100) × 5—6  $\mu$ . — Paraphyses numerosissimae, valde distinctae et non agglutinatae sed materia amorphae brunnea inspersae, filiformes, basaliter subhyalinae et circ. 2  $\mu$  crassae, sursum clavuliformiter incrassatae (ad 4—5  $\mu$ ), fusciscentes, remote septatae, cellulis 20  $\mu$  longis v. ultra, saepe anguste clavulatis, ad septa non vel vix constrictae, subrectae vel curvatae vel irregulariter circinatae. — Hab. ad terram inter muscos in pratis silvisque in Scandinavia.

Typus: STARBÄCK n. 42 in Hb. Naturhistoriska Riksmuseum (Stockholm).

Ill.: Tab. (nostra) V b—c. Fig. (nostra) 5 b—c.

## Sweden:

Skåne: Riseberga, Skärålid, VIII. 1902, T. VESTERGREN (S!).

Östergötland: Kvillinge, Norrviken, 12. X. 1896, KERSTIN HAGLUND[-STARBÄCK] (S! as *G. difforme*). — Simonstorp, Rodga, »locis graminosis silvaticis», VIII. 1887, ERIK HAGLUND (HN!).

Västmanland: Västanfors (or Gunnilbo?), along the high-road between Flyten and Gunnilbo, »locis graminosis udis», 18. VIII. 1844, H. v. POST (S!).

Uppland: Ekerö, Sundby, 25. VIII. 1913, A. ROMELL (n. 16364; S!). — Stockholm, Uggleviken, VIII. 1883, O. JUEL (S!). — Gustavsberg, Betsede, VII. 1888, H. KUGELBERG (S!). — Blidö, Furusund, 1898, H. KUGELBERG (S!). — Skokloster, Bagarbo, IX. 1890, K. STARBÄCK (n. 12, as *G. umbratile*, the name later changed to *G. difforme*, S!; n. 13, as *G. glabrum* var. *decemseptatum* n. var., later changed to *G. difforme*, S!; VIII.—IX. 1890, K. STARBÄCK (U! in alc.). — Knivsta, Ledinge, VIII. 1895, K. STARBÄCK (n. 42, as *G. difforme*; S!). — Bondkyrka, »S. Åsen», close to »Brunn», 3. VIII. 1898, H. v. POST (S!); Ultuna, 1874, H. v. POST (S!); Nosten, S. of Läbyvad Railway Station, 16. IX. 1932, M. A. DONK, S. LUNDELL & J. A. NANNFELDT (n. 4447; U!). — Ärentuna, Storsveta, close to the railway station, 17. IX. 1928, S. LUNDELL & J. A. NANNFELDT (n. 5187; U!).

Gästrikland: Hille, Edskär, 22. VII. 1904, K. STARBÄCK (S!).

Hälsingland: Norrbo, 1895, MARIA ROMELL (Hb. ROMELL n. 16362; S!); Tjärnvallen, 14. VIII. 1895, MARIA ROMELL (Hb. ROMELL n. 16360; S!). [A gathering («Hålsjö, road-side ditch, 1. IX. 1896, MARIA ROMELL», Hb. ROMELL n. 16363, S!) is totally immature; only some few asci show differentiated spores,

which are faintly coloured, have 1—3 septa and measure 40—50  $\mu$  in length. The paraphysal characters indicate this species.]

Västerbotten: Umeå, grassy spots in coniferous wood, IX. 1902, J. VLEUGEL (1908 p. 374, p. p., as *G. difforme*; 1911 p. 337, as *G. nigratum*, S!; Hb. ROMELL n. 16943 b, S!).

#### Norway:

Nordland: Saltdalen, VIII, 1818, S. CHR. SOMMERFELT (O!).

Finnmark: Alten, Bossekop, 1841, M. N. BLYTT & N. G. MOË (O!; IMAI 1940 p. 276, as *G. nigratum*).

This species, which is one of the most common *Geoglossa* in Scandinavia, was evidently clear to STARBÄCK, who identified it (wrongly) with *G. difforme*, misled — as it seems — by the illustration in COOKE'S Mycographia (which in reality represents *G. Cookeianum* with incorrectly drawn paraphyses). On account of its common occurrence in Scandinavia it is surprising that no description matching it could be found, but as no gatherings from outside Scandinavia have been seen as yet, it is probable that our fungus is a northern species, either totally lacking farther south, or at least very rare there. DURAND and IMAI have evidently placed the few gatherings they have seen of it under *G. nigratum*. The coloured, narrow and remotely septate, not seldom curved paraphyses and the often 7-septate spores give indeed to our fungus an indisputable resemblance to *G. nigratum* and to COOKE'S illustration of his *G. difforme*. But the differences are so great that they should never be mistaken for each other. *G. nigratum* belongs to those species in which the spores ripen only tardily (numerous still hyaline or unseptated spores being present even in old fruitbodies) and where the septation is very irregular, the definite number of septa being variable (very often higher than 7) and the size of the cells most unequal. It is distinguished from the majority of these forms by non-agglutinated, gracile and distinctly coloured paraphyses, strongly resembling those of *Corynetes arenarius* in shape, but less dark.

*G. intermedium* is clearly distinct by the shorter and stouter spores and the straight subhyaline paraphyses being strongly agglutinated. For the differences from *G. fallax* see under that species. I feel thus confident in describing this fungus as a *nova species*, which will be dedicated to the memory of its first discoverer, the late Dr. K. STARBÄCK.

The most characteristic feature of this species is the profusion of paraphyses, the like of which is found only in *Cory-*

*netes arenarius* and *G. littorale*. The paraphyses are, moreover, always discrete and distinctly seen, as they have their definite colour already in very young specimens. They never agglutinate into indissoluble masses no matter how old or badly preserved the specimens may be.

**Geoglossum subpumilum** IMAI, Proc. Jap. Assoc. Adv. Sci. 7 p. 148 (1932; nom. nud.); Trans. Sapporo Nat. Hist. Soc. 13 p. 179 (1934).

Typus: Japan, Hokkaido, Ishikari in Hb. Sapporo.

Ill.: IMAI, Trans. Sapporo Nat. Hist. Soc. 13 pl. 7 fig. 3—5.

Distrib.: Japan (Hokkaido).

Prof. IMAI has kindly informed me that he will reduce this species to a variety of *G. fallax* (*q. v.*).

### 13. *Geoglossum Vleugelianum* NANNF. n. sp.

Ascomata gracilia, exsiccata ad 5.5 cm. longa, umbrina («Blackish Brown» sec. nomencl. Ridgway); clavula anguste lanceolata, compressa ad 2 cm. longa, a stipite non distincte delineata. — Stipes pro ratione crassa, teres, fere atra, glabra vel verrucis acutis hypharum passim ornata. — Asci anguste clavati, 130—160 × 12—16  $\mu$ , apice rotundati, 8-spori. — Sporidia bi-multi-seriata, cylindraco-clavata, saepe leviter curvata, primo hyalina continua, dein fusciscentia, continua vel 1—3-septata, denique intense brunnea et 5—7-septata, (40—)50—60 × 4—6  $\mu$ . — Paraphyses numerosae, a basi distincte coloratae, discretae sed apicem versus massa amorpha brunnea inspersae, crassae, basaliter remote septatae, cylindraco-clavatae vel anguste clavatae vel subpyriformes, apicalibus vulgo abrupte globosis, 6—8  $\mu$  in diam., rectae vel apice leviter et irregulariter curvatae. — Hab. in locis graminosis silvae coniferarum in Suecia septentrionali.

Typus: Suecia, Umeå, IX. 1902, J. VLEUGEL in Hb. Naturhistoriska Riksmuseum (Stockholm).

Ill.: Tab. (*nostra*) IV c—d. Fig. (*nostra*) 4 b.

#### Sweden:

Västerbotten: Umeå, grassy spots in coniferous wood, IX. 1902, J. VLEUGEL (1908 p. 374, p. p., as *G. difforme*; 1911 p. 337, p. p., as *G. nigritum*; S!).

Though I have seen only one gathering, and this consisting of rather few specimens, the characters of this species are so marked that I do not hesitate in describing it. An envelope labelled «Umeå, sept. 1902, J. VLEUGEL» (S) contained a number of fruitbodies of *G. Starbaeckii* and some few of this new form. VLEUGEL's find was originally published as *G. difforme* (VLEUGEL 1908 p. 374), but later the determination was changed (on DURAND's authority) to *G. nigritum* (VLEUGEL 1911 p. 337). As VLEUGEL cited «IX. 1902, 1906» as finding dates in his last-mentioned publication, but no specimens with the latter date are preserved in his herbarium, it is an open question whether he collected also the true *G. nigritum*, until the specimens sent to DURAND have been re-examined. — I was able

to sort out the specimens of *G. Vleugelianum* already with the naked eye, and subsequent microscopical study proved the sorting to be absolutely correct. The specimens of *G. Vleugelianum* are somewhat darker than those of *G. Starbaeckii*, and their stems are totally different. In *G. Vleugelianum* they are covered by acute tufts of dark, almost black hyphae, but these tufts persist only rarely. When they are torn off, the stems become smooth and almost black.

This species is well marked microscopically by the spores and the paraphyses. The short and stout spores become septated only tardily, and the maximum number of septa is 7, but ripe spores with only 5—6 septa are very common, and thus this species goes into one group with *G. cohaerens*, *G. elongatum*, and *G. littorale*. The paraphyses of *G. Vleugelianum* are very conspicuous, coloured and stout from their bases, remotely septated and straight, upwardly clavulate and their tips pyriform or globose. *G. cohaerens* and *G. littorale* have much narrower and darker paraphyses, which, moreover, are strongly coherent. The paraphyses of *G. elongatum* are very irregular in shape and hyaline.

*Leotia* PERS. ex. FR., Syst. myc. II p. 25 (1822).

The delimitation of this genus offers no difficulties but that of its species all the more. DURAND (1908) admits for North America three species, of which one (*L. lubrica*) is common to North America and Europe, another (*L. chlorocephala* SCHW., sensu DUR.) is the North American substitute for the European *L. atrovirens* PERS. ex. FR. and only doubtfully distinct from that, whereas the third species, *L. viscosa* FR. [= *L. stipitata* (Bosc) SCHROET. = *L. chlorocephala* SCHW., sensu LLOYD] is endemic to North America.

LLOYD (1916) united DURAND's *L. chlorocephala* with *L. atrovirens*, but divided his *L. lubrica* into two species, viz. *L. lubrica* and *L. marcida* [MÜLL.] FR. The latter, originally described from Norway as *Phallus marcidus*, may — according to LLOYD — be distinguished by the colour of the stem, which is greenish-olive (and concolorous with the pileus) in *L. lubrica* but yellow in *L. marcida*. In the Scandinavian material available to me, all transitions between the two colours are to be found, and no other character by which to divide the material can be detected. — Moreover, the type material of *Ph. marcidus* is probably lost, as it cannot be found either in København or in Oslo, but the original description and illustration indicate, in my opinion, rather *Cudonia confusa* (q. v.) than *L. lubrica*.

IMAI (1936 a) has recently taken an extreme position in uniting all *Leotias* into the one species *L. lubrica*, of which he recognized not less than 9 forms differing in size and colour. This goes evidently too far, as *e. g.* the species admitted by DURAND seem to be well characterized. The European *L. atrovirens* is also amply different from *L. lubrica* and has a more southern distribution, not reaching Scandinavia.

*L. lubrica*, which is the only Scandinavian species of this genus, is extremely polymorphous, but its different shapes are probably only modifications due to various environmental conditions, for its habitats are greatly varying. It grows mostly on rich soil under frondose trees, often amongst decaying leaves, but once — on an excursion together with Prof. G. E. DU RIETZ *a. o.* — I found some specimens in a peat-bog growing in a very wet *Sphagnum cuspidatum-balticum*-soc. The specimens resembled in shape a species of *Craterellus*: their consistency was very gelatinous; they were almost translucent, and their colour a brownish-olive. Also after drying they diverge most pronouncedly from all other specimens seen by me. My first impression was that of a new species, but on closer examination I failed to find any tangible differences, and so I consider *ad interim* this gathering as a strange modification of the common *L. lubrica*. Whether it represents an ecologically differentiated form (an »ecotype») cannot be decided from this single find, and no second one has become known to me, but peat-bogs attract only rarely the interest of mycologists!

14. *Leotia lubrica* [SCOP.] PERS. ex FR., Syst. myc. II p. 29 (1822).

Syn.: [*Helvella revoluta* AFZ., K. [Sv.] Vet. Acad. Nya Handl. 4 p. 309 (1783).] — Vide etiam DURAND 1908 p. 446.

#### Sweden:

Skåne: Skarhult, the Crown forrest N. of Skarhult, 2. X. 1937, LUNDS BOTANISKA FÖRENING (Bot. Not. 1938 p. 339). — Tosjö, in the neighbourhood of Långhult, amongst mosses and beech-leaves, 20. X. 1940, OLOF ANDERSSON (L!).

Småland: Femsjö, »frequens» (E. FRIES 1827 p. 67); »Intågten» close to a brook, 11. IX. 1940, S. LUNDELL (U!).

Bohuslän: Rödbo, Ellesbo, under beeches, 23. IX. 1937, T. NATHORST-WINDAHL (G! in alc.); 7. IX. 1938, T. NATHORST-WINDAHL (n. 1219; W!).

Östergötland: Simonstorp, Rodga, »in silva acerosa», IX. 1887, ERIK HAGLUND (HN!, S!); Kammartäppan, 20. IX. 1903, ERIK HAGLUND (HN!).

Värmland: Alster, »Alsters kronoskog», H. G. SVENSSON (in litt.).

Västmanland: Västerås, Rocklunda, »in pratis», M. B. HALL (Hb. THUNBERG s. n. *L. Relhani*, U!). — Linde, Katrine-lund, in mixed coniferous wood, amongst mosses between spruces, 23. X. 1938, K. G. RIDELIUS (LUNDELL & NANNF., F. exs. suec. n. 999 a).

Södermanland: Gnesta, Visbohammar, 18. IX. 1907, L. ROMELL (n. 16992; S!).

Uppland: Ytterenhörna, Bastmora, 6. X. 1935, B. CORTIN (S!). — Stockholm, 19. IX. 1888, L. ROMELL (n. 16347; S!); »ad Holmiam, in silva mixta», 20. X. 1889, L. ROMELL (F. exs. praes. scand. n. 96; HN!, S!, U!). — Skokloster, Bagarbo, X. 1890, K. STARBÄCK (n. 20; S!). — Alsike, Fredrikslund, 10. IX. 1866, TH. M. FRIES (U! in alc.). — Danmark, Näntuna, under *Corylus*, 10. IX. 1885, H. v. POST (S!). — Bondkyrka, »Sunnerstaskogen», 1849, E. P. FRIES (U!); »Sunnerstaskogen», rock just S. of »Lilla Hjortronmossen», in *Hylocomium Schreberi*-soc., 16. X. 1937, G. E. DU RIETZ (VU! in alc.); »Vård-sätra löväng», 18. IX. 1922, H. G. SVENSSON (U!, VU! in alc.); 23. X. 1927, R. SERNANDER (VU! in alc.). — Uppsala, E. FRIES (Hb. LINDBLAD, S!); Carolinaparken, under frondose trees, in sparse lawn, 24. IX. 1938, S. LUNDELL (U!). — Lena, »Årby skog», amongst mosses in moist coniferous wood, 14. IX. 1935, S. LUNDELL (LUNDELL & NANNF., F. exs. suec. n. 999 b). — Östervåla, Stormossen, in *Sphagnum cuspidatum-balticum*-soc., 22. IX. 1928, J. A. NANNFELDT (n. 5192; U!).

Dalarna: Norrbärke, Smedjebacken, amongst mosses and grasses in a park, 21. VIII. 1937, K. G. RIDELIUS (U!).

Norway (additions to IMAI 1940):

Vestfold: Holmestrand, IX. 1888, K. BJØRLYKKE (O!).

Akershus: Bærum, at Dælivatnet under Kolsås, 20. X. 1829, I. JØRSTAD (O!). — Asker, Hvalstad, 6. IX. 1934, P. STØRMER (O!).

Hedmark: Hamar, X. 1882, J. OLSEN [SOPP] (O!).

Hordaland: Etne, Søreimsmyren, 25. IX. 1866, CHR. SOMMERFELT (U!).

**Microglossum** GILL., Champ. Fr. Discom. p. 25 (1879).

The taxonomical position of this genus is probably close to *Corynetes*, from which it is distinguished by the bright ascomata. In some species the spores are large and multi-septate, but in others the spores are rather small and become only tardily some few, often inconspicuous septa. Such spe-

cies approach seemingly the genus *Mitrulea*, but until the development of the species concerned is worked out in detail, it will be impossible to decide whether this is due to real affinity.

The species fall into two distinct groups (IMAI 1938), *viz.* one marked by straight or flexuose paraphyses and greenish colours (sect. *Eumicroglossum* IMAI), and one by strongly curved or uncinata paraphyses and yellow-brown colours (sect. *Ochroglossum* IMAI). Only the first section is represented in Europe. Its two species, which are both very rare in Scandinavia, may be distinguished in the following way:

- I. Stem smooth, glossy, fibrous . . . . . *M. olivaceum* (PERS. ex FR.) GILL.
- II. Stem furfuraceous, squamulose, scarcely fibrous . . . . .
- . . . . . *M. viride* (PERS. ex FR.) GILL.

15. *Microglossum olivaceum* (PERS. ex FR.) GILL., Champ. Fr. Discom. p. 25 (1879).

Syn.: *Geoglossum olivaceum* PERS. ex. FR., Syst. myc. I p. 489 (1821). — Vide etiam IMAI 1938 p. 419.

Sweden:

Östergötland: Skedevi, Reijmyre, »Lilla Hagen», »in graminosis», 6. X. 1860, H. v. POST (ill. approb. E. FRIES 1866; S!); »Stora Hagen», 1. X. 1866, H. v. POST (S!); close to Långbrotäppan, pasture-land, under *Juniperus*, 18. IX. 1866, H. v. POST (S!). [The specimen in Hb. FRIES (cited by DURAND 1908 p. 410) labelled only »OGotia» emanates certainly from one of these finds.]

Uppland: Gustavsberg, Värmdön, Betsede, VII. 1888, H. KUGELBERG (S!). — Skokloster, Bagarbo, in grassy spot, 18. IX. 1890, K. STARBÄCK (U! in alc.). — Uppsala-Näs, »Vreta udde», 1891, TH. M. FRIES (U! in alc.).

16. *Microglossum viride* (PERS. ex FR.) GILL., Champ. Fr. Discom. p. 25 (1879).

Syn.: *Geoglossum viride* PERS. ex. FR., Syst. myc. I p. 489 (1821). — Vide etiam IMAI 1938 p. 419.

Sweden:

Småland: Femsjö, »passim», E. FRIES (1827 p. 67); Älmås, E. FRIES (1814 p. 20).

Uppland: Alsike, Fredrikslund (Hb. FRIES, U!; DURAND 1908 p. 412). [The locality »Upsala» in FRIES 1849 (p. 347) refers most probably to this gathering.]

Norway:

Vestagder: Kristiansand, Duedalen, 23. & 30. IX. 1939, J. JOHANNESSEN (O!).

**Mitruła** PERS. ex FR., Syst. myc. I p. 491 (1821).

This genus is here taken in a still more restricted sense than by DURAND, for *M. vitellina* BRES. and *M. irregularis* (PECK) DUR. are transferred to a genus of their own, *Spragueola* MASSEE (*q. v.*). In this sense *Mitruła* is a very homogeneous genus, which shows affinity only to *Microglossum*. Its species are very close to each other and very uniform as to microscopical features; a distinct group of great ecological interest and plant-pathological importance is formed by some species, whose fruitbodies develop from sclerotia in flowering plants. Two such forms are reported in Swedish literature, *viz.* *M. sclerotiorum* and *M. Brassicae*. These forms and their plant-pathological rôle are subjected to a thorough investigation by Dr. H. EKSTRAND of »Statens Växtskyddsanstalt», and a detailed account from his pen is to be expected shortly.

The Scandinavian flora numbers six species, which may be distinguished in the following way:

- I. Fruitbodies from sclerotia in flowering plants.
  - A. Fruitbodies white, from sclerotia in the underground parts of various papilionaceous plants. . . . . *M. sclerotiorum* (ROSTR.) ROSTR.
  - B. Fruitbodies straw-coloured, from sclerotia in leaves of *Brassica oleracea*. . . . . *M. Brassicae* HAMMARLUND.
- II. Fruitbodies not from sclerotia.
  - A. Ascigerous portion bright, vitellinous—orange, mostly 5—20 mm long. Stipe satiny-white. . . . . *M. paludosa* FR. ex FR.
  - B. Ascigerous portion duller, some shade of brown.
    - a. Ascigerous portion dark-brown, very variable in shape, 5—18 mm long. Stipe whitish. . . . . *M. multiformis* (E. HENN.) MASSEE.
    - b. Ascigerous portion ochraceous, tan-coloured or orange-brown, only rarely exceeding 5 mm in length. Stipe paler or darker, but otherwise concolorous.
      1. On fallen needles. . . . . *M. Abietis* FR.
      2. On live mosses in swamps, principally *Paludella squarrosa*. . . . . *M. gracilis* KARST.

17. **Mitruła Abietis** FR., Syst. myc. I p. 492 (1821).

Syn.: *M. pusilla* FR., Syst. myc. I p. 493. — *M. cucullata* (BATSCH ex FR.) FR., Elench. fung. I p. 233 (1828). — Vide etiam DURAND 1908 p. 402 et IMAI 1940 p. 270.

**Sweden:**

Småland: Femsjö, »passim», E. FRIES (1827 p. 67); just N. of Transholm, 26. IX. 1940, T. NATHORST-WINDAHL (n. 2271; U!, W!).

Västmanland: Köping, Johannisdal, 1845, H. v. POST (S!).

Uppland: Stockholm, Kaknäskogen, 4. XI. 1894, L. ROMELL (n. 16354; S!). — Lidingö, near Mølna, »in sylva acerosa», 6. X. 1895, ERIK HAGLUND (HN!); Gångsätra, 6. X. 1895, L. ROMELL (n. 16355; S!, U!). — Bondkyrka, Flottsund, 29. X



1882, C. J. JOHANSON (L!, S!, U!). — Uppsala, amongst ferns, 10. IX. 1885, L. ROMELL (n. 16353; S!). — Funbo, Halmbyboda, 1853, E. P. FRIES (U!). — Årentuna, Storvreta, 16. IX. 1932, M. A. DONK, S. LUNDELL & J. A. NANNFELDT (n. 4444; U!).

Norway (addition to IMAI 1940 p. 270):

Oslo: M. N. BLYTT (n. 308; O!).

This very inconspicuous species is certainly much more common than the small number of gatherings indicates. All Scandinavian specimens seen were on spruce-needles, but FRIES (1821 p. 493 under *M. pusilla*) indicates having seen it also on pine-needles. It occurs in foreign countries on needles of various conifers. The attempts that have been made to keep the forms from different conifers specifically distinct seem to be futile.

18. *Mitrula Brassicae* HAMMARLUND, Ark. f. Bot. 25 A: 3 p. 59 (1932).

Sweden:

Skåne: Bunkeflo, on leaves of *Brassica oleracea* f. *capitata*, 1918, E. KRISTOFFERSSON (HAMMARLUND 1932 p. 59).

This species, which I know from the original description only, is evidently very close to *M. sclerotiorum* and differs through the straw-coloured fruitbodies and larger spores (11—12 × 2—2.5 μ) as well as through the substrate, the fruitbodies developing from sclerotia on leaves of *Brassica*, similar to those of *Typhula gyrans* FR.

19. *Mitrula gracilis* KARST., Hedw. 22 p. 17 (1883); Acta Soc. F. Fl. Fenn. 2: 6 p. 110 (1885).

Syn.: *M. gracilis* var. *flaviceps* PECK, Rep. N. Y. State Mus. 49 p. 59 (1896). — *M. muscicola* E. HENN., Öfvers. K. [Sv.] Vet.-Akad. Förh. 42 p. 71 (1885).

Sweden:

Jämtland: Berg, Åsarna, amongst *Sphagna*, on live *Paludella squarrosa* (L.) BRID., 17. VIII. 1840, J. W. ZETTERSTEDT (L!; ZETTERSTEDT 1842 p. 550, 636, as *M. paludosa*). — Häggenäs, »Österåsens naturpark», the N. side of Lake Storsjö-tjärn, in *Sphagnum Warnstorfi*-carpet, on live *Calliargon stramineum* (DICKS.) LINDB. and *Drepanocladus badius* (HN) ROTH (the mosses determined by G. E. DU RIETZ), 11. IX. 1936, G. E. DU RIETZ (VU! in alc.).

Lule Lappmark: Jokkmokk, 2 km NE. of the mouth of Muddusjokk, on live *Paludella squarrosa* and *Calliargon stramineum*, VIII. 1935, T. ARNBORG (U! in alc.).

Torne Lappmark: Kiruna, on live *Paludella squarrosa*, 14. VIII. 1916, L. ROMELL (S!). — Jukkasjärvi, Abisko, bog just W. of Njakatjavelk, on live *P. squarrosa*, 30. VII. 1923, J. A. NANNFELDT (U! in alc.; NANNFELDT 1928 p. 126); Abisko, close to Njakajaure, 14. VIII. 1917, E. ASPLUND (U! in alc.); Abisko, calcareous fen below the railway, between »Naturvetenskapliga stationen» and »Turiststationen», on live *P. squarrosa*, *Helodium lanatum* (STRÖM) BROTH. and *Tomenthypnum trichoides* (NECK.) C. JENS. (the mosses determined by G. E. DU RIETZ), 21. VIII. 1939, G. E. DU RIETZ (VU! in alc.); Kårsavagge, in the delta of the glacial river into the uppermost glacial lake (721 m), on live *Philonotis tomentella* MOL. (determ. E. v. KRUSENSTJERNA), 10.—11. VIII. 1909, ERIK EKMAN (Hb. ROMELL n. 16941; S!); Vassitjåkko, reg. alp. inf., *Carex aquatilis*-fen, on live *P. squarrosa*, 17. VIII. 1927, R. SERNANDER'S »Excursio lapponica» (VU! in alc.).

#### Norway:<sup>1</sup>

Opland: Os, Hummelfjell, Gråhøgda, 1270 m. s. m., on live *P. squarrosa* and *Rhacomitrium fasciculare* (SCHRAD.) BRID., 11. VIII. 1883, E. HENNING (U! in alc.; type of *M. muscicola*; HENNING 1885 p. 71).

Sør-Trøndelag: Opdal, »Dovre», M. N. BLYTT (n. 306 b; O!); on live *P. squarrosa*, 1841, N. G. MOË (O!; IMAI 1940 p. 270); Knutshø, 20. VII. ?, E. JØRGENSEN (O!).

This species, growing on various living mosses (esp. *Paludella squarrosa*), has a true arctic-montane distribution. *M. muscicola* is a clear synonym, and *M. Rehmii* BRES. belongs at least in part here too, viz. »A) Forme alpine» on *Philonotis tomentella* in Briançon, but »B) Forme sylvatique» (= BRESADOLA's original type) on *Hypna* (HEIM & REMY 1932) is perhaps different.

20. *Mitruula multiformis* (E. HENN.) MASSEE, Ann. Bot. 11 p. 280 (1897).

Syn.: *Geoglossum multiforme* E. HENN., Öfvers. K. [Sv.] Vet.-Akad. Förh. 42 p. 70 (1885). — *Microglossum multiforme* SACC., Syll. fung. 8 p. 40 (1889).

#### Sweden:

Lule Lappmark: Jokkmokk, Kvikkjokk, VIII. 1891, E. NYMAN (U! in alc.).

<sup>1</sup> The gathering from Hedmark: Østerdalen, listed by IMAI (1940 p. 270) under this species, belongs to *M. paludosa*.

## Norway:

Opland: Os, Hummelfjell, Elvhøgda, about 700 m. s. m., »ad *Hypnum fluitans* [= *Drepanocladus fluitans* (L.) WARNST.] et ad ramulos foliaque dejecta *Betulae*», 7. VIII. 1883, E. HENNING (U! in alc.; type material; HENNING l. c.).

This very interesting species, which clearly belongs to the genus *Mitruła*, was up to the present known only from the type gathering. As HENNING has pointed out, the shape of the fruitbody is unusually variable. In size, shape and habitat it may resemble *M. paludosa* closely but the colour is totally different.

21. *Mitruła paludosa* FR. [in LILJEBL., Sv. Fl., ed. 3, p. 664 (1816)] ex FR., Syst. myc. I p. 491 (1821).

Syn.: *M. phalloides* [BULL.] CHEV., Fl. gén. env. Paris p. 114 (1826). — Vide etiam DURAND 1908 p. 400 et IMAI 1940 p. 269.

## Sweden:

Småland: Femsjö, »frequens», E. FRIES (1827 p. 67); E. FRIES (U!); Ålkistdammen, 11. VII. 1929, J. A. NANNFELDT (n. 2380; U!); between Flahult and Haghult, 24. VII. 1929, J. A. NANNFELDT (n. 2630; U!); between S. Bökeberg and Löjenäs, 12. VII. 1929, J. A. NANNFELDT (n. 2400; U!). — Aneboda, 1928, TH. C. E. FRIES (U! in alc.). — Tranås, on rhizomes of *Iris sp.*, VI. 1919, R. v. BAHR (Hb. ROMELL n. 16488; S!). — Annerstad, just S. of Lake Hästasjön, oxybiont-fen N. of the large morainic hummock in the bog, 9. VI. 1939, G. E. DU RIETZ (VU! in alc.).

Bohuslän: Svarteborg, Hede, in a rivulet, 25. VII. 1930, I. ARWIDSSON (U! in alc.).

Västergötland: Göteborg, Botanic Garden, »Naturparken», on decaying juniper-needles, female catkins of *Alnus*, twigs, leaves, etc., 8. VI. 1937, T. NATHORST-WINDAHL (G! in alc.; n. 572, W!).

Östergötland: Tåby, 13. VI. 1911, H. DU RIETZ (VU!). — Furingstad, 1912, P. A. ISSÉN (VU!). — Simonstorp, Rodga, »in paludibus», 4. VII. 1888, ERIK HAGLUND (HN!). — Skedevi, Reijmyre, Mögsjökärret, amongst *Alnus*, 1854, H. v. POST (S!).

Värmland: Borgvik, »Borgviks bruk», 1858, J. M. GREVILLI (U!). — Sunne, Gettjärnklätten, 12. VI. 1938, H. G. SVENSSON (in litt.).

Närke: Askersund, »Rockebro-kärret», 9. VI. 1930, R. SERNANDER (VU! in alc.). — Lerbäck, St. Gropdalen, on pinecone in water, end of July, 1894, K. STARBÄCK (S!). — Kumla, »in acubus, foliis etc. inter *Sphagna* in palude», 12. VII. 1892,

L. ROMELL (F. exs. praes. scand. n. 195; HN!, S!, U!); »Hörta-Vallersta skog», 11. VII. 1892, L. ROMELL (n. 16351; S!).

Västmanland: Grythyttan, Loka, M. B. HALL (Hb. THUNBERG s. n. *Leotia Dicksonii*; U!).

Södermanland: Vagnhärad, 7. VI. 1925, L. ROMELL (n. 16942; S!). — Björkvik, VI. 1884, C. TH. MÖRNER (U! in alc.). — Kärnbo, Kvartinge, 17. VI. 1860, C. P. LAESTADIUS (S!).

Uppland: Ö. Ryd, Rydboholm, 25. VI. 1881, G. LAGERHEIM & V. WITTRÖCK (S! in alc.). — Möja, 8. VI. 1915, L. ROMELL (n. 16994; S!). Bodskär, 8. VI. 1915, L. ROMELL (n. 16352; S!).

— Vittinge, Skattmansö, Ljustermossen, 1846, GUST. v. POST (S!). — Alsike, »Alsike-skogen», 26. V. 1923, J. A. NANNFELDT (n. 5233; U!).

— Bondkyrka, Nosten, 1. VI. 1928, J. A. NANNFELDT (n. 5234; U!); Nosten, close to Läbyvad Railway Station,

on needles, cones, leaves, etc., in bog in coniferous wood, 28. VI. 1932, S. LUNDELL (LUNDELL & NANNF., F. exs. suec. n. 91);

Norbykärren, 28. V. 1894, ROB. E. FRIES (U! in alc.); between Sommarro and Norby, 14. VI. 1920, T. Å. TENGWALL (U! in alc.);

L. Sunnersta, 22. VI. 1928, J. A. NANNFELDT (n. 5235; U!). — Uppsala, 1. VI. 1840, C. F. NYMAN (S!); 1849, TH. M. FRIES (U!);

»Lassby backar», 24. VI. 1899, K. A. TH. SETH (U! in alc.); »Lassby backar», in water-logged, abandoned quarry,

7. V. 1921, R. SERNANDER (VU! in alc.). — Läby, Nosten, »Kvarnbo akademiskog», two different localities in mesobiont-fen,

15. V. 1938, G. E. DU RIETZ & H. OSVALD (VU! in alc.). — Bälinge, Domarebo, in the »lagg» of Ryggmossen, 17. VI. 1940,

G. E. DU RIETZ (VU! in alc.); S. of Bandarbo, the N. margin of the mesobiont-fen, on fallen leaves and twigs, 13. VI. 1940,

G. E. DU RIETZ (VU! in alc.).

Dalarna: Norrbärke, Smedjebacken, 27. VI. 1931, K. G. RIDELIUS (U!). — Falun, water-logged, abandoned mine-shaft,

VII. 1924, P. THORSLUND (VU! in alc.). — Idre, E. of Sörbo, in the brook from Sömmelhån, where it crosses the high-road,

on decaying leaves amongst boulders, 8. VII. 1939, T. E. HASSELROT (U!).

Gästrikland: Valbo, Kubbo, 8. VI. 1937, H. SMITH (U!).

Hälsingland: Arbrå, Koldemo (close to Lake Galven), 9. VII. 1934, A. DALHEM (n. 55; U!).

Jämtland: Undersåker, Bunnerfjället, in the spruce-belt, 18. VIII. 1885, C. J. JOHANSON (U! in alc.).

Västerbotten: Umeå, on decaying leaves of *Alnus*, IX. 1904, C. P. LAESTADIUS (VLEUGEL 1908 p. 378).

Norrbotten: Neder-Luleå, Sunderbyn, on birch-leaves, abundant, VI. 1924, J. VLEUGEL (S!). — Pajala, IX. 1859, C. P. LAESTADIUS (S!, U!).

Åsele Lappmark: Fredrika, Volmsjö (on the boundary

to Åsele), »in palude», 29. VII. 1832, J. W. ZETTERSTEDT (L!; ZETTERSTEDT 1833 p. 201).

Lycksele Lappmark: Lycksele, at a rivulet near Nydal (near the church), »in foliis putridis *Betulae*, locis paludosis», 21. VI. 1832, J. W. ZETTERSTEDT (L!; ZETTERSTEDT 1833 p. 60); Navarträskliden, just S. of the road between the points 469,5 and 385,8 of the topographical map, spring in spruce-wood, 27. VII. 1939, T. ARNBORG (VU! in alc.).

Norway (additions to IMAI 1940 p. 269—270):

Oslo: Lindøen, V. 1827, M. N. BLYTT (O!).

Hedmark: Østerdalen, M. N. BLYTT (O!; IMAI 1940 p. 270 as *M. gracilis*).

Opland: V. Slidre, Volden, 24. VI. 1886, K. BJØRLYKKE (O!).

Telemark: Kvitseid, Fjågesund, in wet spot, 20. VII. 1936, P. STØRMER (O!).

Hordaland: Fana, the S. slope of Fanafjell, road-side in coniferous wood, VII. 1912, R. SERNANDER (VU! in alc.).

Sogn og Fjordane: Førde, Hallbrendslia, 6. VIII. 1938, B. LUNDE (O!). — Kinn, Florøy, 17. VI. 1877, J. M. NORMAN (O!).

Møre og Romsdal: Molde, along the road towards Stor-Tuen, 12.—13. VIII. 1885, J. SCHROETER (1885 p. 212). — Bolsøy, Moldeheia, 4. VII. 1934, A. HAGEN (O!).

Nordland: Alstenøen, 1841 (O!).

22. *Mitrula sclerotiorum* (ROSTR.) ROSTR., Medd. bot. Foren. 2 p. 93 (1888).

Syn: *Vibrissea sclerotiorum* ROSTR., Tidsskr. f. Landøkonomi, 5. Række, 4. Bd, p. 285 (1885).

Sweden:

Acc. to information, kindly supplied by Dr. H. EKSTRAND this parasite is distributed over most parts of Sweden, being known from Skåne in the south to Luleå in the north. It has been reported from Landskrona on *Lotus corniculatus* and *L. uliginosus* by HAMMARLUND (1932 p. 60). The only Swedish material seen by me is that collected at Uppsala by H. OSVALD.

This species develops from sclerotia in the underground parts of several papilionaceous plants, e. g. species of *Trifolium*, *Medicago lupulina*, *Lotus corniculatus*, *L. tenuifolius*, and *L. uliginosus*.

**Spathularia** PERS. ex FR., Syst. myc. I p. 490 (1821).

The delimitation of this genus offers no difficulties, though it is evidently very close to *Cudonia*. DURAND (1908) distin-

guished between two North American species, viz. *Sp. clavata* (= *Sp. flavida*) and *Sp. velutipes* CKE & FARL., and considered the latter to be closely allied to the European *Sp. rufa* Sw. I have had an opportunity of studying material of the American *Sp. velutipes*, and have found it to be clearly distinct from all European material.

The above-mentioned *Sp. rufa* was described already in 1812 by SWARTZ, who had found it once at Stockholm amongst needles and mosses, and gave the following Latin description (SWARTZ 1812 p. 11) of it:

»*Spathularia rufa*.

Fungus gregarius.

*Stipes* circiter uncialis, teres inferne parum incrassatus, apice attenuato pileo medio insertus glaber levissime striatus, pileo concolor. *Pileus* clavatus obverse ovatus compressus, margine integer l. subsinuatus, utroque latere in stipitem decurrens, oblique plicatus luteo rufescens; thesis s. vesiculis sporiferis superne tectus, hinc in adultis pulvere instar inspersus. Differt a *S. flavida*: stipite laeviori, minus rugoso, superne fere acuminato, pileo subundulato et Colore.»

The type specimen seems to be lost; it has at least not been possible to find it in the herbarium of »Naturhistoriska Riksmuseum». The description, which is unusually detailed for its time, leaves no doubt, however, as to the identity of SWARTZ' fungus, for specimens exactly matching it are found now and then in Sweden. They differ at first sight most markedly from the common *Sp. flavida* by the darker stem and by the colour of the hymenium, which is darker than in *Sp. flavida*, not brightly vitellinous or golden but duller, with tinges of brown and red, and so I was long inclined to regard such specimens as specifically distinct from *Sp. flavida*, and to compare the specific differentiation within this genus with that within *Cudonia*, where *C. circinans* and *C. confusa* seemed to form a somewhat analogous pair. It is impossible, however, to find any microscopical difference between the two types. During my continued studies on richer material intermediates were also met with, indicating that in reality the so-called *Sp. rufa* represents only a rare modification, induced perhaps by unfavourable weather conditions. It seems thus necessary to regard all Scandinavian specimens as belonging to one species.

From the more southern parts of Europe a number of species have been described, e. g. *Sp. lilacina* QUÉL., *Sp. Neesii* BRES., *Sp. nigripes* (QUÉL.) SACC., and *Sp. rufa* var. *badipes* PAT., that all differ from *S. flavida* in about the same way as *Sp. rufa*. I am not prepared to decide whether they all represent distinct species or whether in part they should be united with *Sp. flavida*. *Sp. Neesii* seems, however, to be sufficiently distinct, i. a. by its much longer spores.

23. *Spathularia flavida* PERS. ex FR., Syst. myc. I p. 491 (1821).

Syn.: *Spathulea flavida* FR., Summa veg. Scand. p. 347 (1849). — [*Helvella spathulata* AFZ., K. [Sv.] Vet. Acad. Nya Handl. 4 p. 312 (1783)]. — *Mitrula spathulata* FR., Epier. p. 583 (1838). — *Spathularia clavata* [SCHAEFF.] SACC., Mich. 2 p. 77 (1880). — *Sp. rufa* SW., K. [Sv.] Vet. Acad. Nya Handl. 1812 p. 11. — Vide etiam DURAND 1908 p. 441 et IMAI 1940 p. 271.

Sweden:

Skåne: Glimåkra, Trollebackarna, VIII. 1902, W. BÜLOW (L! in alc.).

Småland: Femsjö, E. FRIES (U!); »rarius», E. FRIES (1827 p. 67). — Lommaryd, »in silva acerosa», 8. VIII. 1900, ERIK HAGLUND (HN!).

Västergötland: N. Vånga, Höberg »etc.», L. GYLLENHAL (AFZELIUS 1783 p. 312).

Östergötland: Kvillinge, close to Åby, »in silva acerosa», IX. 1883, ERIK HAGLUND (HN!). — Skedevi, Damm, close to Gunnarsjökärret, 9. IX. 1859, H. v. POST (S!); Reijmyre, IX. 1863, H. v. POST (S!); Reijmyre, Bjursten, 6. IX. 1865, H. v. POST (S!); Reijmyre, the slope towards Hagkärret, 15. IX. 1859, H. v. POST (S!). — Regna, Regnaholm, IX. 1863, AUG. & L. GYLLENKROK (S!).

Värmland: Grava, Tollerud, H. G. SVENSSON (in litt.). — N. Råda, Hagfors, H. G. SVENSSON (in litt.).

Närke: Götlunda, the parsonage, 1860, N. G. BLOMBERG (L!).

Södermanland: St Nikolai, Oxelösund, IX. 1900, J. VLEGEL (S!). — Nyköping, 1866, C. INDEBETOU (S!). — Helgona, Bullersta, VIII. 1893, G. V. SCHOTTE (S!). — Botkyrka, Sturehof (AFZELIUS l. c.).

Uppland: Solna, »Carlbergsskogen», O. SWARTZ (1812 p. 11; type of *Sp. rufa*). — Stockholm, Kaknässkogen and Marieberg, N. LUND (1846 p. 109). — Lidingö, »at the high-road», J. AFZELIUS (AFZELIUS l. c.). — Munsö, Söderby, 4. X. 1929, ERIK HAGLUND (n. 66/1929; U!). — Lossa, Dävensö, 6. IX. 1936, B. CORTIN (S!). — Sigtuna, 16. VIII. 1937, B. CORTIN (S!). — Skokloster, Bagarbo, »in terra pineti», IX. 1890, K. STARBÄCK (n. 23, S!; U! in alc.). — Knivsta, Särsta, coniferous wood, 13. VIII. 1915, SVEN & STINA SERNANDER (VU! in alc.). — Lagga, Norreda, 15. VIII. 1937, D. LINNELL & G. LINDEBERG (U!). — Danmark, Säfja, margin of coniferous wood, VIII. 1922, FR. ÖHRN (VU!); close to the ancient parsonage, 22. VIII. 1930, J. A. NANNFELDT (n. 4018; U!). — Bondkyrka, Graneberg, VIII. 1905, TH. C. E. FRIES (U! in alc.); »Granebergs skog», 24. VII. 1889, TH. M. FRIES (U! in alc.); between Graneberg and Flottsund, 10. IX. 1927, J. A.

NANNFELDT (n. 5190; U!); Gottsundabergen, 1853, E. P. FRIES (U!); Sunnersta, the W. slope of »Klacken», amongst mosses in coniferous wood, 25. VIII. 1936, S. LUNDELL (LUNDELL & NANNF., F. exs. suec. n. 400); »Ultunaskogen», 11. VIII. 1892, E. BORGSTRÖM (U! in alc.); Ultuna, 1872 & VIII. 1877, H. v. POST (S!); Ultuna, 24. IX. 1885, L. ROMELL (n. 16348; S!); Ultuna, near the River Fyris, 9. IX. 1878, H. v. POST (S!); Ultuna, Långhagen, 23. IX. 1888, H. v. POST (S!); Kungsparken, amongst *Hypna*, 18. IX. 1819, G. WAHLENBERG (U!); Kungsparken, 15. X. 1859, A. W. TAMM (S!); Kungsparken, 31. X. 1899, H. v. POST (S!); Eklundshof, IX. 1866, TH. M. FRIES (U! in alc.); »Stabby backe», 17. VIII. 1927, S. JUNELL (U!). — Uppsala, 1871, J. LAGERGREN (U; in alc.); IX. 1892, J. W. HAMNER (Hb. ROMELL n. 16349; S!); 10. IX. 1895, O. JUEL (U! in alc.); Polacksbacken, 6. X. 1858, C. J. EMIL HAGLUND (HN!); »Lassby backar», 20. IX. 1895, H. v. POST (S!); »Lassby backar», 9. VIII. 1927, J. A. NANNFELDT (n. 5232; U!); the plantation close to Tunaberg, 9. X. 1893, H. v. POST (S!). — Funbo, Bärby, 3. IX. 1930, S. LUNDELL (U!). — Ärentuna, the wood just W. of the church, 3. IX. 1936, H. G. BRUUN, S. LUNDELL & J. A. NANNFELDT (n. 5315; U!); Storrreta, 21. VIII. 1927, S. LUNDELL (U!). — Lena, »Årby skog», 19. IX. 1930, S. LUNDELL (U!). — Skuttunge, about 1 km NW. of Kiplingeberg, 25. VIII. 1941, S. LUNDELL (U!).

Dalarna: Rättvik, Ickholmen, 10. VIII. 1936, B. CORTIN (S!). — Älvdalen, Garberg, 3. VIII. 1844, H. v. POST (S!).

Hälsingland: Arbrå, Vallsta, 8. VIII. 1935, A. DALHEM (n. 66; U!). — Norrbo, the church-village, 11. VIII. 1895, MARIA ROMELL (Hb. ROMELL n. 16350; S!); Tjärnvallen, 14. VIII. 1895, MARIA ROMELL (Hb. ROMELL n. 16487; S!).

Västerbotten: Umeå, amongst mosses in coniferous wood, IX. 1904, J. VLEUGEL (1908 p. 379).

Norrbotten: Älvsbyn, Rackberget, in mossy coniferous wood, 16. VIII. 1931, N. ODHNER (S! in alc.).

Lule Lappmark: Jokkmokk, Muddus, N. of Tåresape, in *Hylocomium splendens*-spruce-wood, 14. VII. 1936, T. ARNBORG (n. 265; VU! in alc.).

Torne Lappmark: Jukkasjärvi, Vuotasreita, 3. IX. 1909, L. ROMELL (n. 16940; S!).

#### Norway:

Oslo: M. N. BLYTT (n. 305; O!; IMAI 1940 p. 271).

Østfold: Trygstad, 29. VIII. 1881, CHR. SOMMERFELT (U!).

Opland: S. Aurdal, Bægdalen, 27. IX. 1870, CHR. SOMMERFELT (U!). — S. Fron, Gålå, VIII. 1896, A. BLYTT (O!; IMAI l. c. as *Sp. rufa*?).



Sør-Trøndelag: Singsås, »Dragås statsskog», 21. VIII. 1927, I. JØRSTAD (O!; IMAI l. c. as *Sp. rufa*?).

**Spragueola** MASSEE, Journ. of Bot. 54 p. 150 (1896).

Syn.: *Ascocoryneum* S. ITO & IMAI, Proc. Jap. Assoc. Adv. Sci. 7 p. 145 (1932) (nom. nud.); ap. IMAI, Trans. Sapporo Nat. Hist. Soc. 13 p. 179 (1934).

I agree with IMAI in considering it necessary to separate *Geoglossum irregulare* PECK [= *Mitrula irregularis* (PECK) DUR.] and *G. vitellinum* BRES. [= *M. vitellina* (BRES.) SACC.] from the genus *Mitrula*, with the lack of paraphyses in the hymenium as the distinguishing mark. ITO & IMAI gave to these forms a new generic name, *Ascocoryneum*, but in my opinion this genus possessed already a valid name, viz. *Spragueola* MASSEE, based on *Spr. americana* MASSEE, a sessile condition of *G. irregulare*. The names of the two species become then *Spr. irregularis* (PECK) NANNF. n. comb. and *Spr. vitellina* (BRES.) NANNF. n. comb.

No species of this genus has so far been found in Sweden, but it is not beyond the bounds of possibility that either or both may be found in our country.

**Trichoglossum** BOUD., Bull. Soc. Myc. Fr. 1 p. 110 (1885).

As mentioned before, this genus forms a very natural unit comprising a small number of closely affine species, distinguished from the genus *Geoglossum* by the presence of thick-walled, dark, protruding setae in the hymenium and on the stem. As DURAND (1908) and SINDEN & FITZPATRICK (1930) have pointed out, the gross features are about the same in all species, as are the paraphyses. »The only characters constant enough to be of use in separating species are the number of spores in the ascus and the spore length and septation.» (SINDEN & FITZPATRICK 1930 p. 56). The last-mentioned authors' study of the spore-septation in different species gave very remarkable results. The species examined by them fell into two groups, the one with normally 7- or 15-septate, the other with 5- or 11-septate spores. In the first group, exemplified by the 15-septate *Tr. hirsutum* and the 7-septate *Tr. confusum* and *Tr. Walteri*, »the normal septation is the result of successive equal divisions of the spore. The first septum forms in the center, dividing the spore into two equal cells. A septum is then laid down in the center of each of these cells giving four equal cells and three septa.» (l. c. pp. 57—58). In this way the spores become successively 1-, 3-, 7-, and 15-septate. Occasionally some cells may fail to divide, or divide once more after the usual divisions have been completed, and give thus rise to spores with fewer or more than 15 septa, but in such spores some cells are abnormally long or short, indicating the places where the divisions were disturbed. — In the second group, exemplified by *Tr. velutipes*, *Tr. Wrightii*, and *Tr. Far-*

*lowii*, the consecutive divisions were said to give rise to 1, 5, and 11 septa. »The first septum forms in the center of the lengthened spore, but following it four septa are formed, apparently simultaneously, dividing these two cells into three cells each and giving the spore 6 cells and 5 septa.» (l. c. p. 58). The next divisions then divide all six cells equally into halves. Also in this group septa may fail to form, or extra septa be laid down. These irregularities are not so easy to localize as in the first group, for the cells formed at the second division are more unequal in length.

DURAND had recognized a f. *variabile*, marked by spores with (8—)11—14 septa, under the 15-septate *Tr. hirsutum*, and SINDEN & FITZPATRICK find that in reality it belongs to the second group and »should be given specific rank, but they hesitate to take this step until a thorough cytologic investigation has confirmed their observations as to the difference in the development of septation.» (l. c. p. 59). In my Swedish material one gathering of this interesting form was found. As the true *Tr. hirsutum* is very constant as to septation, and the material of f. *variabile* on the one hand differs most markedly from the main-form, on the other seems to be very homogeneous, it seems to deserve a rather high taxonomic rank. Unfortunately, I took in the field my gathering for the common *Tr. hirsutum*, and did not examine it microscopically until much later, and so no material was saved for cytological study. In order to study the sequence in which the septa are formed, the spores — esp. the young ones — have been studied most carefully, as the evolution described by SINDEN & FITZPATRICK sound rather improbable, for it would mean that after the formation of the first septum, the nucleus of each daughter-cell should give rise to three nuclei, *i. e.* it should divide once, and *one* of the daughter nuclei divide again, before new septa were formed. My observations show that their interpretation is erroneous and that every cell divides into two (never into three). The position of the walls is much less regular than in *Tr. hirsutum* — even the first division may be far from mediane —; and as the longest cells usually are the first to divide again, the sequence of septa (and their definite number) is much more variable than in *Tr. hirsutum*. The normal number is without doubt 11, and their sequence is as follows: The first septum is median as in *Tr. hirsutum*, but the septa of the next order divide the two daughter-cells into two unequal cells, the distal ones becoming almost twice as long as the proximal (= central) ones. In the next step, the distal long cells divide but no septa are formed in the two central cells. Consequently, the spores

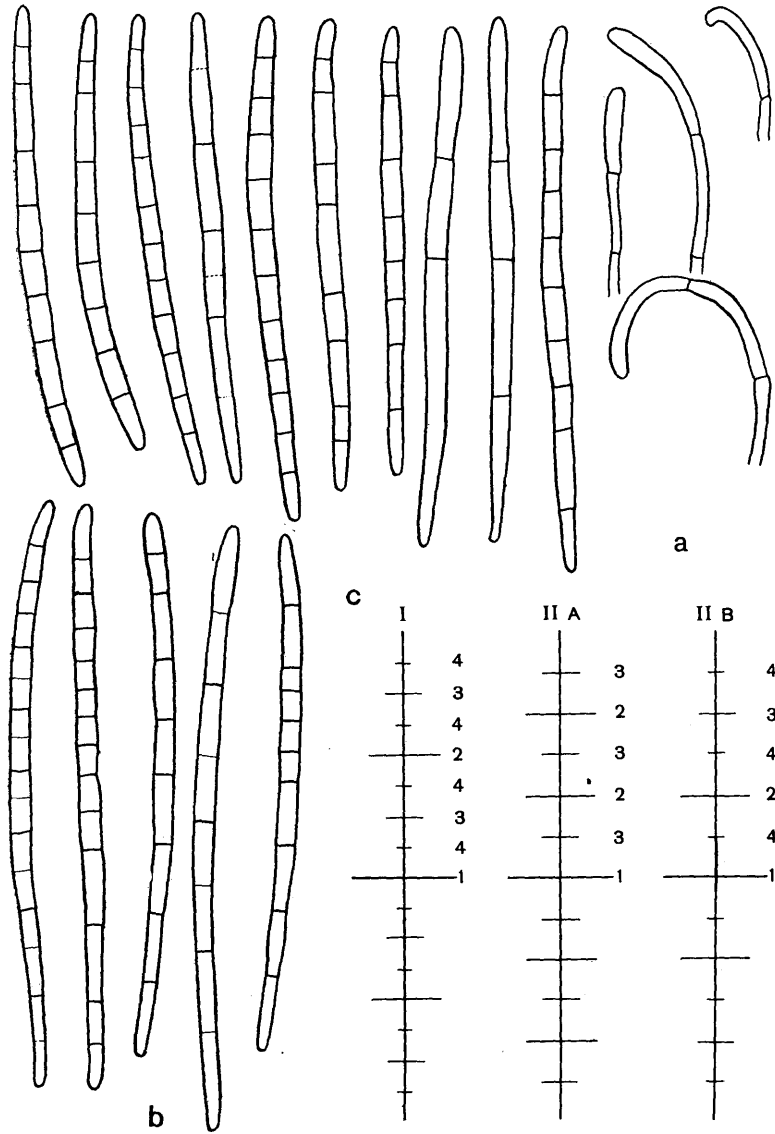


Fig. 6. a. Paraphyses and spores of *Trichoglossum variable* (NANNFELDT n. 4082). b. Spores (mature and immature) of *Tr. hirsutum* (Linnés Hammarby, LUNDELL). — About 600 X. — c. Scheme of the spore-septation in I. *Tr. hirsutum*. II. *Tr. variable* (A. acc. to SINDEN & FITZPATRICK, B. in reality).

have after this division 6 cells and 5 septa. In this stage the spores become mature in *Tr. Farlowii*, but in *Tr. variabile* each of the six cells divide once more, which results in a spore with 12 cells and 11 septa. One or more of the septa of the last step may fail to form, and then the mature spores possess less than 11 septa; sometimes supernumerary septa are formed in one or more of the cells.

The error in SINDEN & FITZPATRICK'S description is thus that they have united the second and the third steps. The spores reproduced as the 4th, 8th, and 9th from the left in my drawing (fig. 6 a) give full evidence, however, that these divisions are successive. A diagram of the spore-septation in *Tr. hirsutum* in comparison to *Tr. variabile* is given in fig. 6 c. Though the difference in spore-septation is thus less principal than gradual, it is constant enough to forbid the uniting of these two forms into one species.

Only three species are hitherto known from Sweden — and four from Europe on the whole —, but as we may expect more species to occur with us, it may not be out of place to give the following key to the world's species:

- I. Spores at maturity normally 15-septate.
  - A. Asci 8-spored. . . . . *Tr. hirsutum* (PERS. ex FR.) BOUD.
  - B. Asci 4-spored. . . . . *Tr. tetrasporum* SINDEN & FITZP.
- II. Spores at maturity normally 11-septate, but number of septa variable.
  - A. Asci 8-spored.
    - a. Spores mostly 11—14-septate, tapering in both directions from near the centre. . . . . *Tr. variabile* (DUR.) NANNF. n. sp.
    - b. Spores mostly 8—9-septate, pointed at the upper end, the tapering portion being confined to the two terminal cells and resembling the sharpened end of a pencil. . . . .  
. . . . . *Tr. Wrightii* (DUR.) DUR. (? = *Tr. rasum* PAT.).
  - B. Asci 4-spored. . . . . *Tr. velutipes* (PECK) DUR.
- III. Spores at maturity normally 7-septate. Asci 8-spored.
  - A. Spores 100—140  $\mu$  long, fusoid—clavate, tapering in both directions from slightly above the centre. . . . . *Tr. octopartitum* MAINS.
  - B. Spores (75—)90—95(—100)  $\mu$  long, cylindrical—clavate. . . . .  
. . . . . *Tr. Walteri* (BERK.) DUR.
  - C. Spores (55—)60—68(—75)  $\mu$  long, clavate. . . . . *Tr. confusum* DUR.
- IV. Spores up to 5-septate. Asci 8-spored. . . . . *Tr. Farlowii* (CKE) DUR.

**Trichoglossum confusum** DUR., Mycol. 13 p. 185 (1921).

Syn.: *Tr. Rehmianum* »(P. HENN.)» DUR., Ann. myc. 6 p. 439 (non *Geoglossum Rehmianum* P. HENN., q. e. *Tr. Walteri*).

Typus: U. S. A., N. C., Blowing Rock, 1901, E. J. DURAND in Hb. Cornell Univ.

Ill.: DURAND, Ann. myc. 6 tab. 10 fig. 93; tab. 16 fig. 168.

Distrib.: U. S. A (N. C.).

**Trichoglossum Farlowii** (Cke) Dur., Ann. myc. 6 p. 438 (1908).

Syn.: *Geoglossum Farlowii* Cke, Grev. 11 p. 107 (1883). — *G. velutipes* PECK (p. p.). — *Tr. rotundiforme* KAWAMURA, Jap. Journ. of Bot. 4 p. 301.

Typus: U. S. A., Mass., Newton, W. G. FARLOW in Hb. Kew.

Exs.: ELL. & EV., N. Amer. F. n. 3532 (s. n. *G. Farlowii*) (fide DURAND).

Ill.: DURAND, Ann. myc. 6 tab. 10 fig. 89—92; tab. 18 fig. 186—189.

Distrib.: U. S. A., Japan (ITO & IMAI 1932).

*Tr. rotundiforme* is according to Prof. IMAI (in litt.) only a compressed rounded form of *Tr. Farlowii*.

**24. Trichoglossum hirsutum** (Pers. ex Fr.) Boud., Hist. Class. Discom. d'Eur. p. 86 (1907).

Syn.: *Geoglossum hirsutum* PERS. ex FR., Syst. myc. I p. 488 (1821). — *G. hirsutum* var. *leotioides* CKE, Grev. 8 p. 61 (1887). — *G. hirsutum* f. *braziliense* P. HENN., Hedw. 34 p. 113 (1895) (fide DURAND 1921). — *Trichoglossum gracile* PAT., Bull. Soc. Myc. Fr. 25 p. 131 (1909) (ex descr.). — Vide etiam DURAND 1908.

Typus: in Hb. PERSOON (Rijksherbarium, Leiden) (selected by DURAND).

Exs.: ALLESCH. & SCHNABL, F. bavar. n. 352 (s. n. *G. hirsutum*). — CKE, F. brit., ed. II, n. 393 (s. n. *G. hirsutum*) (p. p.; p. p. *G. glutinosum*; p. p. *Tr. tetrasporum*). — DESM., Pl. crypt., ed. I, n. 420 (s. n. *G. hirsutum*). — ELL. & EV., F. columb. n. 1729 (s. n. *G. hirsutum*) (p. p. fide DURAND; p. p. *Tr. velutipes*!). — Erb. Critt. Ital., ser. I, n. 975 (s. n. *G. hirsutum*) (p. p.; p. p. *G. fallax*; p. max. p. *G. nigratum*). — FUCK., F. rhen. n. 1141 (s. n. *G. hirsutum*). — FUNCK, Crypt. Gew. n. 305 (s. n. *G. hirsutum*) (p. p.; p. p. »*G. glabrum*«, fide v. LUYK 1919).<sup>1</sup> — HOLL., SCHM. & KZE, Deutschl. Schw. n. 122 (s. n. *G. hirsutum*). — JACZ., KOM. & TRANZSCH., F. ross. n. 245 (s. n. *G. hirsutum*). — KARST., F. fenn. n. 451 (s. n. *G. hirsutum*). — KLOTZSCH, Herb. viv. myc. n. 44 (s. n. *G. hirsutum*) (fide PHILLIPS); n. 642 (s. n. *G. hirsutum* var. *capitatum*) (fide v. LUYK 1919). — MIGULA, Krypt. Germ., Austr., Helv. n. 64 (s. n. *G. hirsutum*). — MOUG. & NESTL., Stirp. crypt. vog. rhen. n. 94 (s. n. *G. hirsutum*). — RABENH., F. eur. n. 523 (s. n. *G. hirsutum*); n. 523 b (s. n. *G. hirsutum*). — RABENH., Herb. myc., ed. II, n. 237 (s. n. *G. hirsutum*) (p. p.; p. p. *Tr. Walteri*). — REHM, Ascum. n. 2032 (s. n. *G. hirsutum*); n. 2100 (s. n. *G. fallax*) (p. max. p.; p. min. p. *G. fallax*). — ROUMEG., F. gall. n. 63 (s. n. *G. hirsutum*); n. 4043 (s. n. *G. hirsutum*).<sup>2</sup> — SYD., Myc. march. n. 440 (s. n. *G. hirsutum*); n. 1069 (s. n. *G. hirsutum* f. *major*). — WESTEND., Herb. crypt. belge n. 1084 (fide PHILLIPS). — VIZE, Micro-Fungi n. 481 (fide MASSEE).

Ill.: COOKE, Mycogr. fig. 3. — GILLET, Champ. Fr. Discom. pl. 24 fig. 2. — PHILLIPS, Discom. pl. 2 fig. 9. — REHM, Discom. p. 1145 fig. 5—6. — MASSEE, Ann. Bot. 11 pl. 12 fig. 31—32. — DURAND, Ann. myc. 6 tab. 9 fig. 78—80; tab. 17 fig. 176—181. — v. LUYK, Mededeel. 's Rijks Herb. Leiden 39 fig. 4. — SINDEN & FITZPATRICK, Mycol. 22 pl. 13 fig. 3 a—c. — Fig. (nostra) 6b.

Distrib.: Europe, North America, Asia, New Zealand.

<sup>1</sup> I have seen only one copy of this exsiccatum, viz. that of the Paleobotanic Department of »Naturhistoriska Riksmuseet«, which copy contains only one fruitbody and this is *Tr. hirsutum*.

<sup>2</sup> This number is cited by DURAND (1908) under *G. glabrum*. At least the Uppsala copy contains, however, *Tr. hirsutum*.

Sweden:<sup>1</sup>

Gotland: IX. 1907, A. WERELIUS (Hb. ROMELL n. 16993; S!).

Småland: Femsjö, E. FRIES (U!). [The record »frequens» (FRIES 1827 p. 67) refers, at least mainly, to this species.]

Bohuslän: Öckerö, Öckerön, pasture-land, near Rördammen, 28. VIII. 1927, G. NILSSON-DEGELIUS (S!).

Västergötland: Skallsjö, Norsesund, 23. VIII. 1889, L. ROMELL (n. 16358; S!).

Östergötland: Norrköping, Vrinnevid, »ad marg. viae in silva acerosa», 8. X. 1902, ERIK HAGLUND (HN!). — Kvilleinge, Norrviken, 12. X. 1896, KERSTIN HAGLUND[-STARBÄCK] (S!). — Skedevi, Magnehult, 1866, H. v. POST (S!); Reijmyre, 8. IX. 1854, H. v. POST (S!); 1866, C. INDEBETOU (S!); Reijmyre, »Stora Hagen», VIII. 1866 & 1. X. 1866, H. v. POST (S!); Reijmyre, Mögsjökärret, 14. VIII. 1858, H. v. POST (S!).

Västmanland: Ramsberg, Vrethamarskogen, 15. X. 1922, ERIK HAGLUND (HN!).

Södermanland: V. Vingåker, road-side near Vinnala, 29. VIII. 1856, H. v. POST (S!).

Uppland: Solna, Karlbergsparken, X. 1888, H. KUGELBERG (S!). — Gustavsberg, Värmdön, between Betsede and Gustavsberg, 22. IX. 1895, L. ROMELL (n. 16359 b; S!). — Djursholm, »Ekebyträsk» (= Ekebysjön), 1848, C. F. NYMAN (S!). — Stockholms-Näs, Almarestäket, VIII. 1889, K. STARBÄCK (S!, U!). — Skokloster, Bagarbo, IX. 1890, K. STARBÄCK (S!; U! in alc.); Källbo, IX. 1890, K. STARBÄCK (S!). — Alsike, Fredrikslund, 10. IX. 1866, TH. M. FRIES (U!). — Danmark, Linnés Hammarby, the park, 25. IX. 1930, S. LUNDELL (U!). — Bondkyrka, Ultuna, 29. VII. 1879, H. v. POST (S!); 2. X. 1885, L. ROMELL (n. 16356; S!). — Uppsala, 1839, C. F. NYMAN (S!); Slottsbacken, IX. 1866, TH. M. FRIES (U!). — Ärentuna, Storvreta, 23. IX. 1936, S. v. MALMBORG (U!).

Dalarna: Avesta, 1880, C. INDEBETOU (S!).

Ångermanland: Nordmaling, Drivön, at the cove on the SW.-side, on sand close to the shore, 9. VIII. 1933, G. HASSELBERG (U! in alc.).

Västerbotten: Umeå, open spot in coniferous wood, IX. 1902, J. VLEUGEL (S!; Hb. ROMELL n. 16943 a, S!) (VLEUGEL 1908 p. 374).

<sup>1</sup> Old records of *Geoglossum hirsutum*, not substantiated by preserved specimens, are impossible to place with any certainty, as they may refer to any species of this genus.

Norway (additions to IMAI 1940 p. 277):

Oslo: M. N. BLYTT (n. 302 b & 303; O!); Linderud, »in pratis silvaticis inter muscos», XI. 1840, N. G. MOË (O!).

Akershus: Bjerke, »in pratis sphagnosis», IX. 1827, CRÖGER (O!).

Østfold: Trøgstad, at Moserud, 12. VIII. 1882, CHR. SOMMERFELT (U!).

Telemark: Gransherad, Vik at Folsjøen, VIII. 1879 (O!).

*Trichoglossum octopartitum* MAINS, Amer. Journ. of Bot. 27. p. 325 (1940).

Typus: Brit. Honduras, MAINS n. 4097 in Hb. Univ. of Mich.

Ill.: MAINS, Amer. Journ. of Bot. 27 p. 324 fig. 10.

Distrib.: C. America (Brit. Honduras); U. S. A. (Tenn.).

*Trichoglossum tetrasporum* SINDEN & FITZP., Mycol. 22 p. 60 (1930).

Typus: U. S. A., N. Y., Labrador Lake, 1924, H. M. FITZPATRICK in Plant Path. Hb. n. 17779 (Cornell Univ.).

Exs.: CKE, F. brit., ed. II, n. 393 (s. n. *G. hirsutum*) (p. p.; p. p. *Tr. hirsutum*; p. p. *G. glutinosum*).

Ill.: SINDEN & FITZPATRICK, Mycol. 22 pl. 13 fig. 5—8.

Distrib.: U. S. A. (N. Y.), Great Britain.<sup>1</sup>

The gross features as well as the microscopical details agree closely with those of *Tr. hirsutum*, but the asci are somewhat shorter and contain only four spores. Mature asci show no traces of the other four spores. Ripe spores agree fairly well with those of *Tr. hirsutum*, but are perhaps somewhat brighter in colour, and their upper part slightly more slender, as the spores taper more gradually from the thickest point towards the upper end, and the two distal cells as a rule are somewhat longer.

This species should be searched for in Sweden.

25. *Trichoglossum Walteri* (BERK. ap. CKE) DUR., Ann. myc. 6 p. 440 (1908).

Syn.: *Geoglossum Walteri* BERK. ap. CKE, HEDW. 14 p. 39 (1875). — *G. Rehmianum* P. HENN., Hedw. 38 p. (80) (1900) (non *Trichoglossum Rehmianum* DUR., q. e. *Tr. confusum* DUR., 1921). — *G. tuberaoense* P. HENN., Hedw. 39 p. (79) (1901) (sec. spec. auth. in Hb. REHM). — *Trichoglossum hirsutum* var. *Doassansii* PAT., Bull. Soc. Myc. Fr. 25 p. 129 (1909) (ex descr.).

Typus: Australia, Apollo Bay, Wild Dog Creek, WALTER in Hb. Kew.

Exs.: RABENH., Herb. myc. n. 237 (s. n. *G. hirsutum*) (p. p.; p. p. *Tr. hirsutum*).<sup>2</sup> — THÜM., F. austr. n. 927 (s. n. *G. glabrum* var. *glabratum*).

<sup>1</sup> This species, which was known previously from a single North American gathering, is distributed in the said number of COOKE's exsiccatum from Shire. The Uppsala copy contains three fruitbodies, of which one is this species.

<sup>2</sup> At least the copy in Hb. REHM (S!) is *Tr. Walteri*, but that in Hb. SYDOW (S!) is *Tr. hirsutum*. DURAND (1908 p. 437) cites this number under the latter species.

Ill.: COOKE, Mycogr. fig. 4. — DURAND, Ann. myc. 6 tab. 10 fig. 94—47; tab. 18 fig. 190—193.

Distrib.: Australia, S. America (Brazil), N. America, Europe, Asia (Japan).

Sweden: locality illegible, 15. X. 1863, H. v. Post (S!).

Östergötland: Skedevi, Reijmyre, »Stora Hagen», 1. X. 1866 & 6. IX. 1867, H. v. Post (S!).

Norway: vide IMAI 1940 p. 277.

## 26. *Trichoglossum variabile* (DUR.) NANNF. n. sp.

Syn.: *Tr. hirsutum* f. *variabile* DUR., Ann. myc. 6 p. 437 (1908).

Typus: U. S. A., N. Y., Knoxboro, 20. VIII. 1904, H. S. JACKSON (in Hb. Cornell Univ.

Ill.: DURAND, Ann. myc. 6 tab. 9 fig. 84—85; tab. 17 fig. 182—184.

— SINDEN & FITZPATRICK, Mycol. 22 pl. 13 fig. 3 d—f. — *Fig. (nostra) 6 a*.  
Distrib.: U. S. A. (N. C., Del., N. Y.), Europe (Sweden) and Asia (Japan, IMAI in litt.).

Sweden:

Uppland: Vänge, »Fiby urskog», 8. X. 1930, J. A. NANNFELDT (n. 4082; U!).

This interesting form is for reasons stated above treated as a distinct species.

*Trichoglossum velutipes* (PECK) DUR., Ann. myc. 6 p. 434 (1908).

Syn: *Geoglossum velutipes* PECK, Rep. N. Y. State Mus. 28 p. 65 (1876). — *G. hirsutum* var. *americanum* CKE, Mycogr. 1 p. 3 (1872). — *G. americanum* SACC., Syll. fung. 8 p. 46 (1889).

Typus: U. S. A., N. Y., Northville, C. H. PECK in Hb. New York State Mus. (Albany).

Exs.: ELL. & EV., F. columb. n. 1729 (s. n. *G. hirsutum*) (p. max. p.; p. p. *Tr. hirsutum*).

Ill.: COOKE, Mycogr. fig. 1. — PECK, Rep. N. Y. State Mus. 29 pl. 1 fig. 16—19. — DURAND, Ann. myc. 6 tab. 9 fig. 86—88; tab. 16 fig. 169—173. — SINDEN & FITZPATRICK, Mycol. 22 pl. 13 fig. 1—2.

Distrib.: U. S. A.

*Trichoglossum Wrightii* (DUR.) DUR., Mycol. 13 p. 187 (1921).

Syn.: *Tr. hirsutum* f. *Wrightii* DUR., Ann. myc. 6 p. 438 (1908). — ? *Tr. rasum* PAT., Bull. Soc. Myc. Fr. 25 p. 130 (1909) (ex descr.).

Typus: Cuba, 1857, WRIGHT in Hb. Harvard Univ.

Ill.: DURAND, Ann. myc. 6 tab. 9 fig. 83; tab. 16 fig. 174. — SINDEN & FITZPATRICK, Mycol. 22 pl. 13 fig. 4.

Distrib.: North America (Bermudas), West Indies (Cuba), C. America (Panama)<sup>1</sup>, ? N. Caledonia (*Tr. rasum*).

<sup>1</sup> A specimen in »Naturhistoriska Riksmuseum», collected by G. LAGERHEIM in Panama (Cristobal, in the lawn at the foot of the COLUMBUS Monument) and labelled by STARBÄCK »*Geoglossum hirsutum* var. *Columbi* n. var.».



For a description vide also SINDEN & FITZPATRICK 1930. — According to the description the New Caledonian *Tr. rasum* PAT. seems to be identical. If so, PATOUILLARD's name would be the valid one for this species.

According to SINDEN & FITZPATRICK this species differs already in its gross aspect from all other members of the genus, the ascomata being almost spatulate and gradually tapering from near the apex to the base.

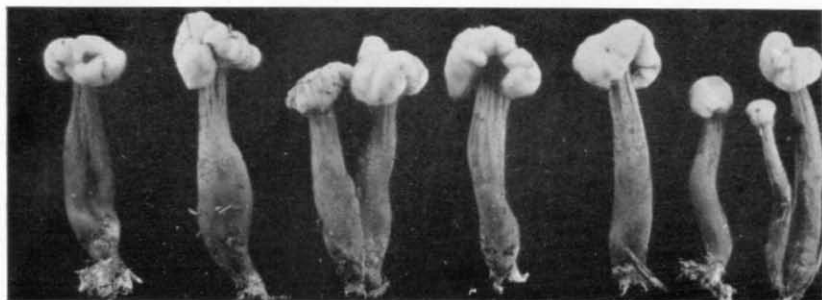
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Resa genom Umeå Lappmarker i Vesterbottens Län, förrättad år 1832. — Örebro. — ———, 1842, Berättelse om en Natur-Historisk Resa genom några Provinser af Nordligare Skandinavien och särdeles Jemtland. — In: WIKSTRÖM, J. E., Års-ber. om bot. arbeten o. upptäckter f. år 1838. — Stockholm.

Tryckt den 9 mars 1942.



a

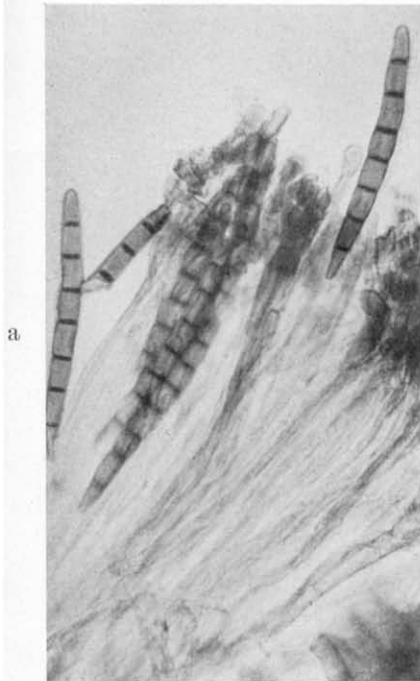


b



c

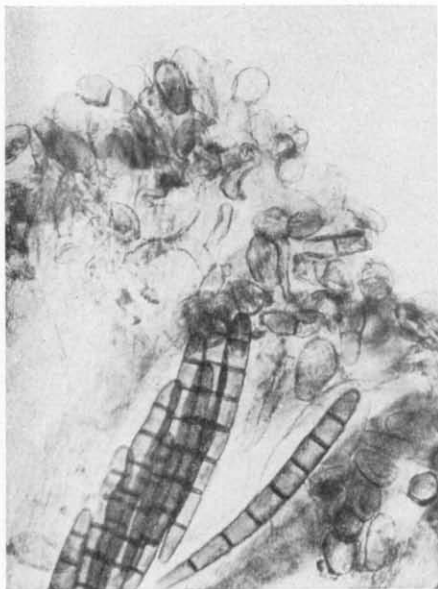
a. *Cudonia circinans* (NANNFELDT n. 5301). b. *C. confusa* (NANNFELDT n. 5304). c. *C. confusa* (NANNFELDT n. 5305). — Nat. size.



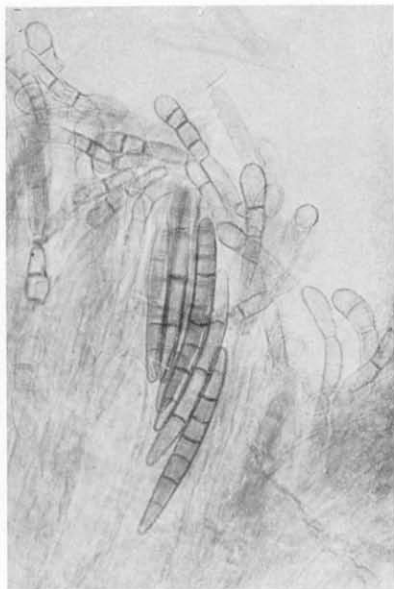
a



b

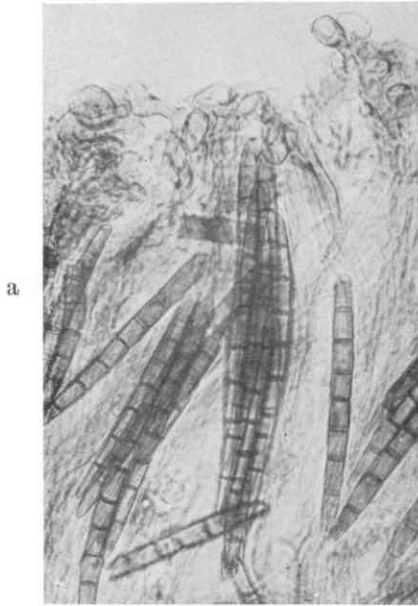


c



d

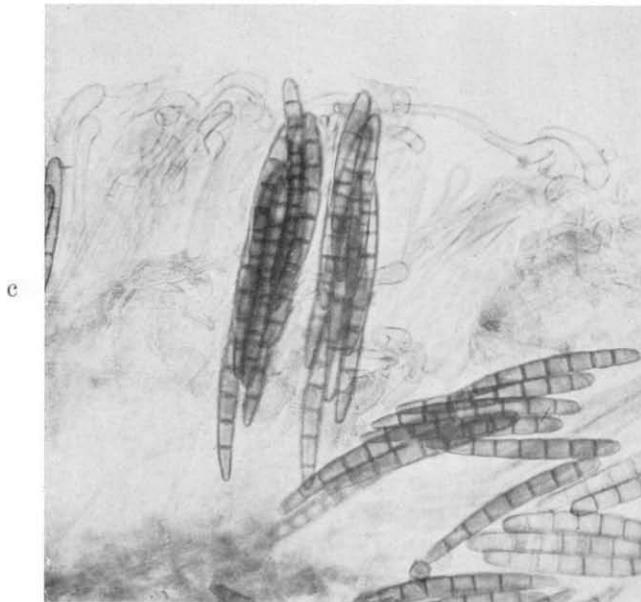
a. *Geoglossum Cookeianum* (Typus: COOKE, F. brit. n. 481). b. *G. Cookeianum* (Färö, RIDELIUS). c. *G. glabrum* (Grundsunda, HASSELBERG). d. *G. simile* (Univ. of Toronto n. 7946). — About 400 x.



a



b

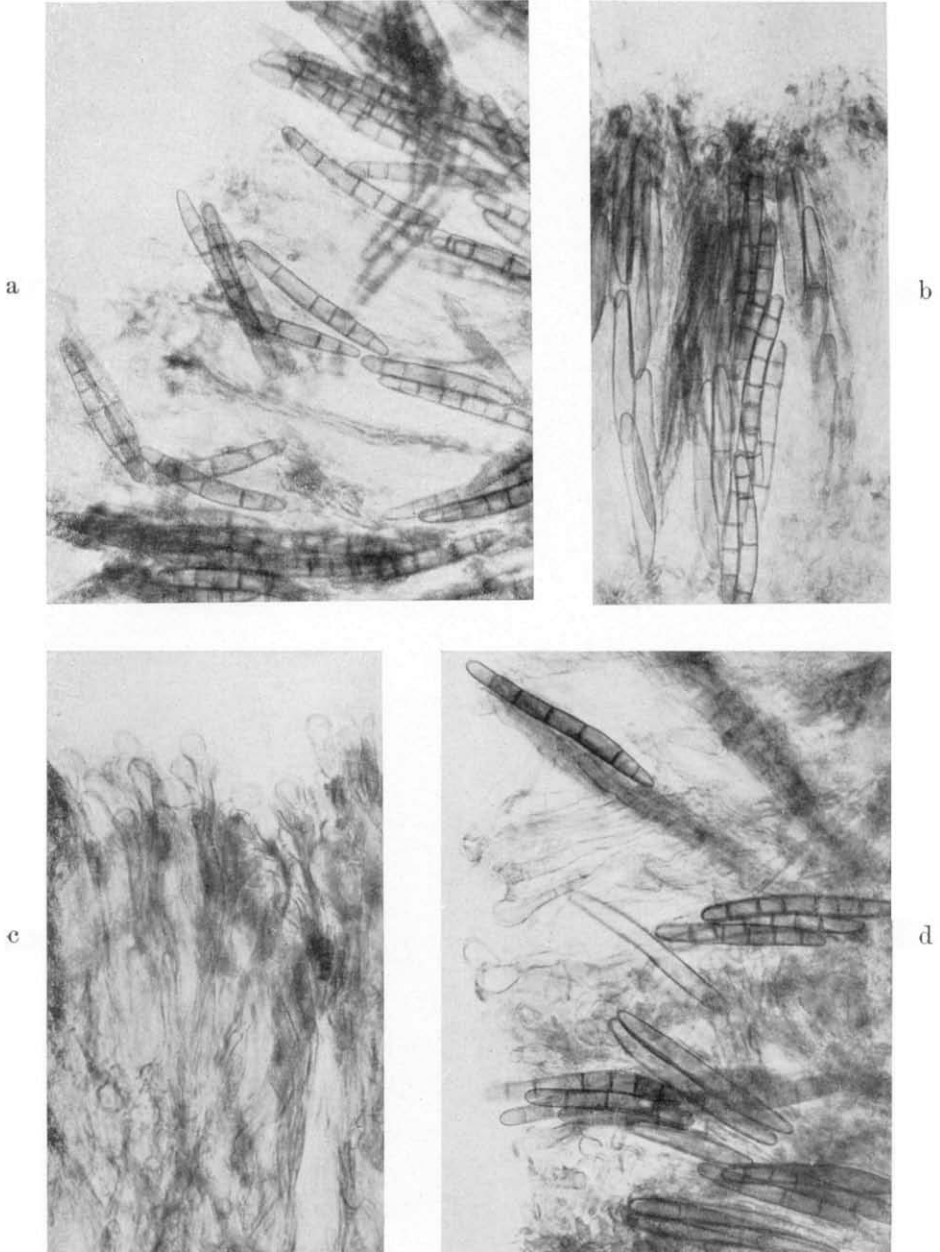


c

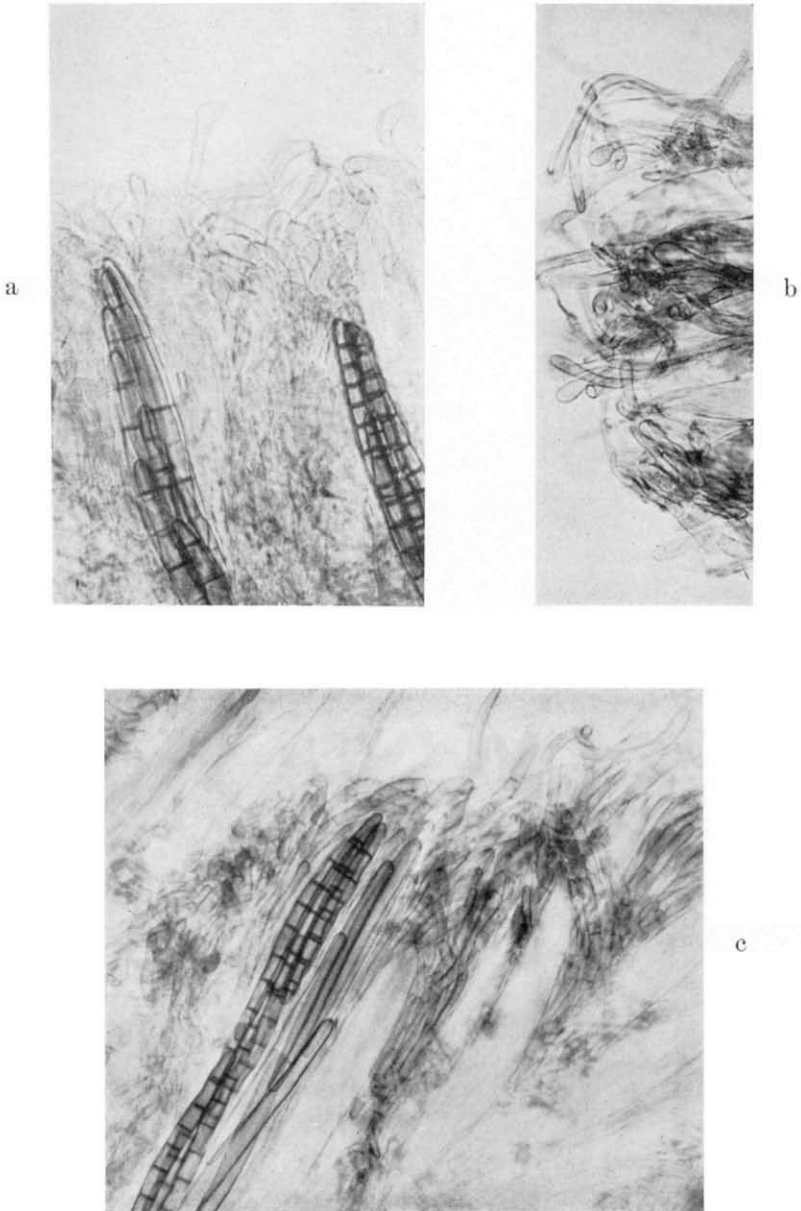


d

a. *Geoglossum Barlae* (TORREND n. 649). b. *G. montanum* (Typus: NANNFELDT n. 5189). c. *G. nigrinum* (Cotypus: Halmbyboda, E. P. FRIES). d. *G. nigrinum* (Uppsala, SERNANDER). — About 400 x.



a. *Geoglossum elongatum* (Typus: Kvillinge, HAGLUND). b. *G. elongatum* (Bondkyrka, ZETTERSTEDT). c.—d. *G. Vleugelianum* (Typus: Umeå, VLEUGEL). — About 400 x.



a. *Geoglossum fallax* (LLOYD n. 03707). b. *G. Starbaeckii* (Typus: STARBÄCK n. 42). c. *G. Starbaeckii* (NANNFELDT n. 5187). — About 400 x.