

ACTA UNIVERSITATIS UPSALIENSIS  
SYMBOLAE BOTANICAE UPSALIENSES

*Symbolae Botanicae Upsalienses*, which series from vol. XX, 1972, forms part of *Acta Universitatis Upsaliensis*, include original papers from the Department of Systematic Botany, Uppsala University. Editor: Prof. O. Hedberg. — The following volumes have appeared:

VOL. I.

1. *H.G. Bruun*, Cytological Studies in *Primula*. Uppsala 1932. (Out of print.)
2. *Ragnhild Grundell*, Zur Anatomie von *Myrothamnus flabellifolia* Welw. Uppsala 1933.
3. *J.A. Nannfeldt*, *Poa rigens* Hartm. versus *Poa arctica* R. Br. Uppsala 1934. (Out of print.)
4. *Sven Junell*, Zur Gynäceummorphologie und Systematik der Verbenaceen und Labiaten nebst Bemerkungen über ihre Samenentwicklung. Uppsala 1934.
5. *J.A. Nannfeldt*, Taxonomical and Plant-geographical Studies in the *Poa laxa* Group. A Contribution to the History of the North European Mountain Floras. Uppsala 1935. (Out of print.)

VOL. II.

1. *H.O. Juel*, Joachim Burser's *Hortus siccus*. Uppsala 1936. (Out of print.)
2. *Nils Svedelius*, The Apomeiotic Tetrad Division in *Lomentaria rosea* in Comparison with the Normal Development in *Lomentaria clavellosa*. Uppsala 1937.
3. *G.B.E. Hasselberg*, Zur Morphologie des vegetativen Sprosses der Loganiaceen. Uppsala 1937.
4. *George F. Papenfuss*, The Structure and Reproduction of *Claudea multifida*, *Vanvoorstia spectabilis*, and *Vanvoorstia coccinea*. Uppsala 1937.

VOL. III.

1. *Gunnar Lohammar*, Wasserchemie und höhere Vegetation schwedischer Seen. Uppsala 1938.
2. *Nils Fries*, Über die Bedeutung von Wuchsstoffen für das Wachstum verschiedener Pilze. Uppsala 1939.
3. *Daniel Lihnell*, Untersuchungen über die Mykorrhizen und die Wurzelpilze von *Juniperus communis*. Uppsala 1939.

VOL. IV.

1. *Nils Fries*, Researches into the Multipolar Sexuality of *Cyathus striatus* Pers. Uppsala 1940.
2. *Ewert Åberg*, The Taxonomy and Phylogeny of *Hordeum* L. sect. *Cerealia* Ands. with special reference to Tibetan Barleys. Uppsala 1940.
3. *George F. Papenfuss*, A Revision of the South African Marine Algae in Herbarium Thunberg. Uppsala 1940.
4. *J.A. Nannfeldt*, On the Polymorphy of *Poa arctica* R. Br., with Special Reference to its Scandinavian Forms. Uppsala 1940.
5. *Börje Åberg*, Växtodling i artificiellt ljus (konstljuskultur) med särskild hänsyn till tomat. (Pflanzenkultur bei künstlichem Licht (Kunstlichtkultur) mit besonderer Berücksichtigung der Tomate.) Uppsala 1941.

VOL. V.

1. *Oskar Modess*, Zur Kenntnis der Mykorrhizabildner von Kiefer und Fichte. Uppsala 1941.
2. *Daniel Lihnell*, *Cenococcum graniforme* als Mykorrhizabildner von Waldbäumen. Uppsala 1942.
3. *Börje Åberg* und *Wilhelm Rodhe*, Über die Milieufaktoren in einigen südschwedischen Seen. Uppsala 1942.
4. *Daniel Lihnell*, *Tetramyxa rhizophaga* Lihnell n. sp., ein Parasit in den Wurzeln von *Juniperus communis* L. Uppsala 1942.

VOL. VI.

1. *Gunnar Israelson*, The Freshwater Florideae of Sweden. Studies on their Taxonomy, Ecology, and Distribution. Uppsala 1942.
2. *Erik Björkman*, Über die Bedingungen der Mykorrhizabildung bei Kiefer und Fichte. Uppsala 1942.
3. *Daniel Lihnell*, Keimungsversuche mit *Pyrolasamen*. Uppsala 1942.
4. *Nils Fries*, Untersuchungen über Sporenkeimung und Mycelentwicklung bodenbewohnender Hymenomyceten. Uppsala 1943.

VOL. VII.

1. *Nils Hylander*, Die Grassameneinkömmlinge schwedischer Parke mit besonderer Berücksichtigung der *Hieracia silvaticiformia*. Uppsala 1943.
2. *Nils Fries*, Die Einwirkung von Adermin, Aneurin und Biotin auf das Wachstum einiger Ascomyceten. Uppsala 1943.

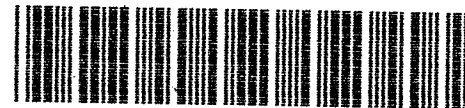
ACTA UNIVERSITATIS UPSALIENSIS  
SYMBOLAE BOTANICAE UPSALIENSES XXVIII:2

STUDIES IN THE LOPHIOSTOMATACEAE  
WITH EMPHASIS ON THE SWEDISH SPECIES

BY

LENNART and KERSTIN HOLM

89 H 495



03523235, 1



UPPSALA 1988

Distributor  
Almqvist & Wiksell International  
Stockholm — New York

**Abstract:** Holm, L. & Holm, K. 1988. *Studies in the Lophiostomataceae, with emphasis on the Swedish species.* Acta Univ. Ups. Symb. Bot. Ups. XXVIII:2.IV + 50 pp. Uppsala, ISBN 91-554-2261-6.

The work is a contribution towards a taxonomic revision of the Lophiostomataceae ("Pyrenomycetes"). The family is found to be heterogeneous and of little taxonomic value, as based on unstable morphological features (the compressed neck and the slotlike ostiole). The species treated (28 + four unnamed ones) are distributed in five genera, viz. *Lophiostoma*, *Lophiotrema*, *Massariosphaeria*, *Navicella*, and *Trematosphaeria*. Three new names are published, viz. *Lophiostoma massarioides* (Sacc.) n. comb., *Massariosphaeria alpigena* (Fckl) n. comb., and *Trematosphaeria wegeliniana* n. sp. Six basionyms are lectotypified, viz. *Sphaeria angustata* Pers.: Fr., *S. caulium* Fr., *S. excipuliformis* Fr.: Fr., *S. macrostoma* Tode: Fr., *S. nucula* Fr.: Fr., and *Mytilostoma subcompressum* Karst. A neotype is proposed for *Sphaeria pileata* Tode: Fr. Eleven species are recorded for the first time from Sweden.

Lennart Holm and Kerstin Holm, Department of Systematic Botany, Uppsala University, P. O. Box 541, S-751 21 Uppsala, Sweden.

UNIVERSITÄTS-  
BIBLIOTHEK  
HEIDELBERG

89 H 495

ISBN 91-554-2261-6  
ISSN 0082-0644

© Lennart and Kerstin Holm

Technical editor: Inga Hedberg

Printed in Sweden by Ekblads tryckeri, Västervik.

## CONTENTS

	Page
General part .....	1
Historical background .....	1
Material .....	1
Morphology .....	1
The neck .....	1
Peridium .....	2
Asci .....	2
Spores .....	2
Hamathecium .....	3
Anamorphs .....	3
Host spectra .....	3
Special part .....	4
Survey of the genera .....	4
<i>Lophiostoma</i> Ces. & De Not. ....	5
<i>L. macrostomum</i> (Tode:Fr.) Ces. & De Not. ....	6
<i>L. appendiculatum</i> Fckl .....	10
<i>L. Arundinis</i> (Pers.: Fr.) Ces. & De Not. ....	10
<i>L. caudatum</i> Fabre .....	11
<i>L. caulium</i> (Fr.) Ces. & De Not. ....	11
<i>L. compressum</i> (Pers.: Fr.) Ces. & De Not. ....	15
<i>L. curtum</i> (Fr.) Ces. & De Not. ....	16
<i>L. Fuckelii</i> Sacc. ....	17
<i>L. glaciale</i> Rehm .....	18
<i>L. macrostomoides</i> (De Not.) Ces. & De Not. ....	18
<i>L. massarioides</i> (Sacc.) L. & K. Holm .....	20
<i>L. myriocarpum</i> Fckl .....	20
<i>L. nuculoides</i> (Sacc.) Wint. ....	21
<i>L. quadrinucleatum</i> Karst. ....	21
<i>L. semiliberum</i> (Desm.) Ces. & De Not. ....	22
<i>L. subcorticale</i> Fckl .....	23
<i>L. vicinum</i> (Sacc.) Sacc. ....	24
<i>L. viridarium</i> Cooke .....	24
<i>L. Winteri</i> (Sacc.) Wint. ....	24
<i>Lophiotrema</i> Sacc. emend. L. & K. Holm .....	25
<i>L. nucula</i> (Fr.: Fr.) Sacc. ....	26
<i>L. boreale</i> G. Math. ....	27
<i>L. vagabundum</i> (Sacc.) Sacc. ....	27
<i>L. sp. 1</i> .....	28
<i>L. sp. 2</i> .....	29
<i>Massariosphaeria</i> (E. Müll.) Crivelli .....	29
<i>M. alpigena</i> (Fckl) L. & K. Holm .....	29
<i>M. cfr grandispora</i> (Sacc.) Leuchtman .....	30
<i>M. sp.</i> .....	31

<i>Navicella</i> Fabre .....	31
<i>N. pileata</i> (Tode: Fr.) Fabre .....	31
<i>Trematosphaeria</i> Fckl .....	32
<i>T. wegeliniana</i> n. sp. ....	33
Appendix. Notes on some dubious species .....	33
Acknowledgements .....	35
References .....	36
Index .....	38
Illustrations .....	39

## GENERAL PART

### Historical background

The Lophiostomataceae were first recognized as a family by Nitschke (1869) but were distinguished much earlier as a separate taxon, the origin of which can be traced back to *Sphaeria* subsect. *Platystomae* Persoon 1801. During its long existence the group has greatly increased in size through the activity of many mycologists: hundreds of species have been described and some 20 genera. They have probably been more studied than the majority of Pyrenomycetes, and as early as 1886 the family was monographed, even though somewhat uncritically (Lehmann 1886). An important modern study is the paper by Chesters & Bell (1970a) which will often be referred to here. It is a useful survey of the European and some North American species. With regard to the Nordic flora, the treatment by Munk (1957) should be particularly mentioned.

The overall character common to the Lophiostomataceae is the peculiar slot-like ostiole, generally on top of a flattened neck (cf. Figs. 1–8). However, the papillar form is an unstable and highly adaptive character and consequently the whole group can be supposed to be heterogeneous. However its validity has been hardly questioned until fairly recently by a few authors. L. Holm (1957) suggested that *Lophiotrema duplex* is closely akin to *Massarina emergens* and O. Eriksson (1981) emphasized the unique position of *Navicella* (*Lophiostoma*) *pileata*. A resolute step towards a natural classification was taken by Leuchtman (1984) when referring *Lophiotrema microthecum* to *Massariosphaeria*, a genus for the rest including solely species with normal ostioles. This trend ought to proceed and will ultimately result, we believe, in the complete dissociation of the Lophiostomataceae.

### Material

The present study is based on approximately 850

samples, most of which belong to the herbaria of S or UPS. Our own collections, about 200, will be deposited in UPS. In addition many specimens, including several types, have been obtained on loan from B, H, IMI, O, PAD, PC, and RO.

### Morphology

**The neck.** The flattened neck is a striking feature but nevertheless it is highly unstable. This was noticed already by Fries: "plures species variant ostiolis conicis et compressis" (1823 p. 467). The variation affects both size and form and can be observed within the same sample. The papilla can vary considerably in height and is not rarely lacking altogether, a common condition in, e.g. *Lophiostoma curtum* (Figs. 5, 6) and *Lophiotrema boreale*. Even the form is very variable; as a rule the neck is flattened but not rarely cylindrical: in sideview the contour will vary from square to rectangular or very often the upper edge is convex, sometimes broader than the base, in which case the neck will resemble an ancient battle axe in form (Fig. 1). Even when the neck is cylindrical – a condition not rare in certain species like *Lophiostoma caulium* or *Navicella pileata* (cf. Fig. 7) – the ostiole is nearly always linear, though very short. An approximately round pore is seen in a collection of *Lophiotrema nucula* (Holm 3439b). A variety of ascoma types is found in Syd., Myc. germ. 322 (*Lophiotrema vagabundum*): there are neckless fruitbodies with either pore or slit, and papillate fruitbodies with either cylindrical or flattened neck. It appears as if the slot-like shape of the ostiole is a much more stable character than the flattened shape of the papilla, and is perhaps evolutionarily older. In consequence of this great variability it is, in most cases, not possible to identify (reliably) these fungi on sight, as rightly emphasized by Chesters & Bell (1970a). In our experience, only *Navicella pileata* can be recognized with certainty without the aid of the compound microscope.

The crestlike neck is no doubt an adaptation to the mostly hard substrate, facilitating the emergence of the ascospores. It is significant that the crests in wood are parallel to the grain (and consequently to each other) while in bark the crests are arranged in all directions without order. It is also significant that the Lophiostomataceae are mainly found on hard wood, rarely on conifers. Some species are common on hard herbaceous stems but almost none are reported from leaves, a condition that certainly is no mere chance – in ordinary soft foliar tissue there is no need for this special type of fruit body. In fact, the only case known to us is a find of *Lophiostoma Fuckelii* on leaves of *Laurus nobilis*, thus a sclerophyllous plant, cf. p. 18.

**Peridium.** The peridial structure seems to be fairly constant within the species, whereas a certain variation is found within the group as a whole. *Navicella pileata* is characterized by a very strong peridium, up to 100 µm thick, of numerous layers of cells of varying size and shape, with irregular pigmentation (cf. Fig. 70, 71). Otherwise the differences are not very striking but two main types may be discerned: 1) the "Lophiotrema-type" with peridium of equal thickness, c. 25 µm, of textura angularis-textura globosa, of a few layers (c. 5) of cells of fairly uniform size (cf. Fig. 60–63). 2) the "Lophiostoma-type": peridium not of uniform thickness but broader laterally at base, up to 50 µm, and here composed of several layers parallel, long, prismatic cells (cf. Fig. 64–67).

This type of peridium occurs in, e.g. *L. macrostomum*, *L. massarioides*, and *L. Winteri*, less distinct in several other species like *L. semiliberum* and *L. Arundinis*. The "Lophiotrema-type" prevails in *Lophiotrema* but is found also elsewhere, e.g. in *Lophiostoma subcorticale*. The taxonomic significance of these differences is, however, fairly uncertain.

It may be noticed that the peridial cells are generally rather thinwalled, and there is no scleroplektenchyma of the *Leptosphaeria*-type in any species.

**Asci.** The asci are bitunicate and structurally all alike, as it seems, with a minute refractive body, J-, at the tip. But their shape is less uniform, two different types can be recognized: clavate and cylindrical. This character is constant within the species and its diagnostic value was rightly emphasized by Chesters & Bell (1970a). We think that it is significant also at generic level, as *Lophiotrema* is characterized by cylindrical asci whilst clavate asci are the rule (although with some exceptions) in *Lophiostoma*.

**Spores.** In the "Pyrenomycetes" the spores will generally give us the most useful taxonomic characters and the Lophiostomataceae are no exception: in fact they are unusually interesting. A very noteworthy trait is found in several *Lophiostoma* species, viz. terminal spore appendages. They are often said to be "gelatinous" which, however, seems less adequate. They are membranous insofar as the outermost spore wall layer is terminally prolonged (cf. e.g. Fig. 43). The cavity inside is perhaps filled with a gelatinous substance which is liberated when the appendage gets broken? Such a phenomenon has been described in the marine pyrenomycete *Kohlmeyeriella* (Garth Jones et al. 1983).

The appendages have been known for many years and were noticed already by Desmazières (1841). They have generally been considered to be taxonomically quite significant, rightly so we think. We cannot assent to the opinion of Chesters & Bell (1970a) that "within the Lophiostomataceae presence or absence of appendages can be ignored for taxonomic purposes". In our experience they are reliable characters and in a certain sample all spores either have them or lack them (be it noted that the appendages are apparently often lost in old herbarium material). In some species they seem to be always present (*Lophiostoma appendiculatum*, *L. Fuckelii*, *L. macrostomum*) whilst always lacking in certain related species (*L. Arundinis*, *L. semiliberum*, *L. macrostomoides* etc.) Very noteworthy are *L. Winteri* and *L. caulium* where appendiculate as well as non-appendiculate collections have been met with. This is perhaps an indication that these taxa are

heterogeneous but also that the development of the appendages is easily suppressed.

The size and shape of the appendages are fairly constant within the species (or varieties); they are small and easily overlooked in *L. Fuckelii* and *L. macrostomum*, very large in *L. caulium* var. c, and *L. glaciale*.

Another feature of taxonomic significance is the mucous sheath surrounding the spores of some species. Interestingly enough, it can obviously be formed in different ways. In *Lophiotrema vagabundum* it is hardly visible without, e.g. Indian Ink, and apparently formed from the spore surface. In *Massariosphaeria* the slime is formed by gelification of a middle wall layer and liberated by bursting of the outermost layer, which may partly persist as "flaps".

**Hamathecium.** The ascoma cavity is filled with a profuse "hamathecium" of freely branching, anastomosing interascal threads, c. 1 µm thick with sparse septa. They seem quite uniform within the whole group and as they are of little diagnostic value they will not be referred to by us. Chesters and Bell (1970b) made a thorough study of ascocarp development in several species and concluded that the interascal threads were "pseudoparaphyses", i.e. paraphysoids in the sense of recent authors.

**Anamorphs.** Next to nothing was known about this topic until quite recently when Leuchtman (1986) published the results of his work with cultures of some species, partly based on Swedish material. Pycnidia were produced by singlespore mycelia of five species, viz. *Lophiostoma caulium*, *L. macrostomum*, *L. semiliberum*, *L. sp.* and *Lophiotrema nucula*. The anamorphs were very similar and a fairly close match of the form

genera *Pleurophomella* and *Aposphaeria*. Similar anamorphs are known in *Melanomma* (Chesters 1938) but it would be premature to draw any taxonomic conclusions from the few data available.

### Host spectra

The Lophiostomataceae are no omnivores, even though several species have a broad host range. Like other Pyrenomycetes they are, as a rule, either lignicolous or herbicolous. The majority is (almost) exclusively found on wood or bark of deciduous trees and shrubs; within these limits, however they are usually quite polyphagous. Some species, though, have remarkable preferences, like *Lophiostoma subcorticale* for bark of *Malus*, and *L. caulium* var. b and *Massariosphaeria alpigena* for wood of *Lonicera*. *L. curtum* seems to be most common on *Salix* wood, as are perhaps also *L. appendiculatum* and *L. massarioides*. *Navicella pileata* seems restricted to bark of *Quercus*, *Tilia*, and *Fraxinus*.

On the other hand, some species occur solely or mainly on herbaceous hosts, and most of them have a marked preference for monocots: *L. Arundinis* and *L. semiliberum* have so far been found on grasses only, whilst *Massariosphaeria grandispora* and *M. sp.* (also) occur on Cyperaceae and Juncaceae. A contrast to them is formed by *Lophiotrema vagabundum*, predominantly growing on herbaceous dicots. An odd species is *Lophiostoma glaciale* with its predilection for *Aconitum* stems. It can be mentioned that ascospores seem most frequent on two-year-old stems.

A few species, finally, can live on a more mixed diet, as apparently rather frequent on ligneous as well as on herbaceous substrates: *Lophiostoma caudatum*, *L. caulium* s. lat., *L. Fuckelii*, *L. macrostomum*, possibly also *L. quadrinucleatum*.

## SPECIAL PART

## Survey of the genera

As already mentioned the lophiostomataceous fungi were recognized by Persoon (1801) as *Sphaeria* subsect. *Platystomae*. The group was given generic rank in 1822 as *Platysphaera* Dum., a name later superseded by *Lophiostoma* Ces. & De Not. 1863, now conserved. The all-embracing *Lophiostoma* was split into several genera by Saccardo (1878, 1883) and Trevisan (1877) in accordance with Saccardo's sporological principles:

Spores one-celled, dark	<i>Lophiella</i> Sacc.
Spores 1-septate, hyaline	<i>Lophiosphaera</i> Trev.
Spores 1-septate, dark	<i>Schizostoma</i> Sacc.
Spores phragmoseptate, hyaline	<i>Lophiostoma</i> Sacc.
Spores phragmoseptate, dark	<i>Lophiostoma</i> Ces. & De Not.
Spores muriform, hyaline	<i>Lophidiopsis</i> Sacc.
Spores muriform, dark	<i>Platystomum</i> Trev.
Spores vermiform	<i>Lophionema</i> Sacc.

In addition to these purely schematic genera, several others have been established by various authors, like *Navicella* Fabre (1879), *Dangeardiella* Sacc. & Syd. (1899) and *Byssolophis* Clem. (1931), to mention those represented in the Swedish flora. The two latter genera will not be dealt with in this article as they have been already treated by us elsewhere (Holm & Holm, 1978; L. Holm 1986).

The particular lophiostomataceous criteria — the slot-like ostiole and the flattened neck — are, as already emphasized, not very stable, at least in certain species. Their taxonomic significance is thus probably not very great. One may even call in question the *raison d'être* of the lophiostomataceous genera and consider the suitability of accommodating these species in related "normal"

genera. To some small extent such a transformation has begun and we will take a few more steps in this direction. *Lophiotrema microthecum* was transferred to *Massariosphaeria* (as *M. grandispora* cf. p. 00) for very good reasons by Leuchtmann (1984) and it is here followed by *Lophiostoma alpigenum*, cf. p. 29.

A new species of "*Lophiostoma*" is described in this paper as *Trematosphaeria wegeliniana* (p. 33) because it seems to be closely related to *T. hydrela*.

The majority of the Saccardian genera cannot be retained in a natural classification and we will keep *Lophiostoma* and *Lophiotrema* only, in a considerably amended sense. *Lophiostoma* is typified by *L. macrostomum* and most of our species seem related to it. In the first place, we refer to *Lophiostoma* all species with appendiculate spores, i.e. *L. caulium*, *L. Fuckelii*, *L. glaciale*, *L. appendiculatum* and *L. macrostomum*. A number of other species are obviously akin to *L. caulium* (which seems to be a central species), viz. *L. Arundinis*, *L. caudatum*, *L. curtum*, *L. compressum*, *L. massarioides*, *L. macrostomoides* and *L. quadrinucleatum*, probably also *L. vicinum* and *L. viridarium*. More doubtfully related is *L. subcorticale*. Several of these species have hyaline spores and have been referred to *Lophiosphaera* or *Lophiotrema*.

*Lophiotrema* is retained here for a few species which seem related to the type, *L. nucula*. The group is somewhat vaguely circumscribed but the cylindraceous asci are a diagnostic feature in common. The borderline between *Lophiotrema* and, e.g. *Massarina*, is probably rather diffuse.

## Artificial Generic Key

1. Ascomata superficial, crowded on a subiculum ..... **Byssolophis**  
Not so ..... 2
2. Spores hyaline ..... 3  
Spores brown ..... 7
3. Saphrophytic on ferns ..... **Dangeardiella**  
Saphrophytic on other hosts ..... 4
4. Asci cylindraceous ..... 5  
Asci clavate ..... 6
5. Spores 1-septate within asci, peridium of "Lophiotrema-type" ..... **Lophiotrema**  
Spores 3-pluriseptate within asci, peridium of "Lophiostoma-type" ..... **Lophiostoma** p.p.
6. Spore wall gelatinizing ..... **Massariosphaeria**  
Not so ..... **Lophiostoma** p.p.
7. Spore septa thickened, lumina lenticular ..... **Navicella**  
Not so ..... 8
8. Spores reddish brown, end cells pale ..... **Trematosphaeria**  
Spores dull brown ..... **Lophiostoma** p.p.

**Lophiostoma** Ces. & De Not. (nom. cons.)

Comm. Soc. Critt. Ital. 1:219 (1863) — Type: *L. macrostomum*.

*Platysphaera* Dum., Comm. Bot. p. 87 (1822) (nom. rej.) — Type: *L. compressum*.

*Lophiosphaera* Trev., Bull. Soc. Bot. Belg. 16: 20 (1877) — Type: Vide p. 34.

*Platystomum* Trev., op. cit. p. 16 — Type: *P. compressum*.

This genus includes the great majority of the lophiostomataceous fungi: as circumscribed here it

comprises a number of species which seem connected with the type "par enchaînement". As many natural groups it is rather vaguely defined:

*Ascomata* immersed-erumpent, generally with a distinct, flattened neck, opening by a slot-like ostiole. *Peridium* often of the "*Lophiostoma*-type". *Asci* mostly clavate, bitunicate. *Spores* 1-septate, pluriseptate or muriform, hyaline to dark brown, often with terminal appendages, but without mucous sheath. Saprophytic on woody as well as herbaceous plants, including grasses.

## Artificial key to the species

1. Spores hyaline ..... 2  
Spores brown ..... 12
2. Spores 1-septate, at least whilst still within ascus ..... 3  
Spores 3-pluriseptate ..... 6
3. Spores with terminal appendages, on dicots ..... 4  
Spores without appendages, on grasses ..... **15. L. semiliberum**
4. Spores  $\leq 20 \mu\text{m}$ , with 2 guttules/cell ..... **8. L. Fuckelii**  
Spores  $\geq 25 \mu\text{m}$ , with 3 guttules/cell .....
5. Appendages c.  $3 \mu\text{m}$  long ..... **1. L. macrostomum**  
Appendages (5–) 7–12  $\mu\text{m}$ , on *Aconitum* ..... **9. L. glaciale**
6. Spores with terminal appendages ..... 7  
Spores without terminal appendages ..... 8
7. Spores broadly fusiform, with obtuse ends ..... **19. L. Winteri**  
Spores narrowly fusiform, with pointed ends ..... **1. L. macrostomum** var.
8. Spores with transverse septa only ..... 9  
Spores also with longitudinal septa ..... **13. L. nuculoides**

9. Spores narrowly fusiform ..... 12. *L. myriocarpum*  
Spores broadly fusiform ..... 10
10. Spores < 35 µm ..... 19. *L. Winteri*  
Spores > 40 µm ..... 11
11. Spores 3–5-septate, finally brown ..... 16. *L. subcorticale*  
Spores 7-septate ..... 11. *L. massarioides*
12. Spores with transverse septa only ..... 13  
Spores also with longitudinal septa ..... 23
13. Spores 1-septate ..... 17. *L. vicinum*  
Spores with 3 or more septa ..... 14
14. Spores wall with longitudinal ridges ..... 18. *L. viridarium*  
Spores wall without longitudinal ridges ..... 15
15. Most spores distinctly caudate ..... 4. *L. caudatum*  
Not so ..... 16
16. Most spores 3-septate ..... 14. *L. quadrinucleatum*  
Most spores with 5 or more septa ..... 17
17. Spores appendiculate ..... 18  
Spores not appendiculate ..... 20
18. Spores full brown ..... 5. *L. caulium*  
Spores pale brown ..... 19
19. Spores 30–40 × 8–11 µm; lignicolous ..... 2. *L. appendiculatum*  
Spores 24–30 × 5–6 µm; herbicolous ..... 5. *L. caulium* var. c
20. On woody plants ..... 21  
On herbaceous plants ..... 22
21. Spores hyaline, only lately brown ..... 16. *L. subcorticale*  
Spores early brown ..... 10. *L. macrostomoides*
22. Spores > 30 µm; on *Glyceria* and *Phragmites* ..... 3. *L. Arundinis*  
Spores < 30 µm; on other hosts ..... 5. *L. caulium* var. e
23. Spores ellipsoid-oblong ..... 6. *L. compressum*  
Spores subclavate ..... 7. *L. curtum*

1. *Lophiostoma macrostomum* (Tode: Fr.) Ces. & De Not.

Comm. Soc. Critt. Ital. 1:219 (1863) – *Sphaeria macrostoma* Tode, F. Meckl. 2:12 (1791); Fr., Syst. Myc. 2:469 (1823) – Lectotype prop.: “*Sphaeria macrostoma* Femsjö”, scr. Fries (UPS!). Cf. Note 1.

*Sphaeria crenata* (Pers.): Fr., Syst. Myc. 2: 469 (1823) – *Sphaeria cristata* Pers. *β crenata* Pers., Syn. Meth. Fung. 54 (1801) – *Lophiostoma crenatum* Fckl, Symb. Myc. 157 (1870) – *Lophiotrema crenatum* Sacc., Mich. 1: 338 (1878) – Lectotype: Herb. Pers. no. 910.270–391 (vide L. Holm 1986 p. 193).

*Sphaeria angustilabra* Berk. & Br., Ann. Mag. Nat. Hist. ser. 3. 3:372 (1859) – *Lophiostoma angustilabrum* Cooke, Trans. Bot. Soc. Edinb. 9:330 (1868) – Type: England, Leicestershire, *Ulex*, Bloxam (n.v.).

*Lophiostoma sex-nucleata* Cke, Trans. Bot. Soc. Edinb. 9: 330 (1868) – *Lophiotrema sexnucleatum* Sacc., Mich. 1:338 (1878) – Type: England, Shere, *Urtica dioica*, III. 1868, Capron (n.v.).

Symb. Bot. Ups. XXVIII:2

*Lophiostoma Hederae* Fckl, Symb. Myc. 157 (1870) – *Lophiotrema Hederae* Sacc., Mich. 1:338 (1878) – Syn-types: “Um Neuchâtel und bei Oestrich, auf durren berindeten Aestchen von *Hedera Helix*” (n.v.).

*Lophiostoma praemorsum* Lasch ex Fckl, Symb. Myc. 157 (1870); Rbh., Herb. Myc. I no. 1249 (nom. nud.) – *Lophiotrema praemorsum* Sacc., Mich. 1:338 (1878) – Type: Germany, pr. Driessen, canes of *Rubus caesius* (B!).

*Lophiostoma microstomum* Niessl ap. Rbh., R. eur. no. 1870 (1874); Hedw. 13:186 (1874) (“*microstoma*”), non *L. microstoma* Cke & Ellis, Grevillea 4: 179 (1876) – Type: Germany, pr. Eisleben, *Epilobium hisutum* (S. iso!) – See also Note 2, p. 9.

Exs.: All. & Schnabl., F. bav. 535 (S) – Ell. & Ev., N. Am. F. 3318 (S) – Fckl, F. rhen. 928, (1808) (S) – Karst., F. fenn. 885, 886 (UPS) – Krieg., F. sax. 1464, 2209 (S) – Kze, F. sel. 99 (“*L. Hederae*”) (UPS) – Rbh., Herb. Myc. I:1249 (B); F. eur. 1239, 2234 (S, UPS) – Rehm, Asc. 693 (“*L. semiliberum*”) – Syd.,

Myc. march. 1555, 1556, 1573, 1574, 2343, 2344 (“*L. caespitosum*”) 2550, (“*L. Hederae*”), 2551 (S, UPS). –

Figs. 1, 37, 68, 94–96.

**Ascocarps** generally densely scattered, sometimes confluent, often in great numbers over large patches, immersed-erumpent from the often blackened substrate, (0.3–) 0.4–0.5 mm diam. with a rather strong papilla, up to 0.2 mm high, laterally flattened, often ± fanshaped, crest up to 0.5 mm long, often somewhat notched. **Asci** clavate, 110–120 × 12–13 µm, 8-spored. **Spores** fusiform, 26–33(–38) × 5–7 µm, hyaline, with distinct oil drops. (2–)3(–4) in each cell, and short terminal appendages. When overripe the spores get faintly brown and occasionally 3- to 5-septate.

On wood and bark of frondose trees and shrubs, less often on herbaceous stems.

*L. macrostomum* can hardly be safely identified on sight: when growing on wood or bark it is apt to be confused with, e.g. *L. macrostomoides*, on herbaceous stems with *L. caulium*. Microscopically it is generally easily recognized by the rather large, hyaline, 1-septate spores with short terminal appendages and conspicuous globules. At first sight the spores are recollective of *Lophiotrema vagabundum*, but the two species are easily distinguished, i.a. by the different ascus form.

Several authors have reported 3–5-septate spores as a normal feature of this species, obviously by mistake; they have believed that the conspicuous guttules are separated by septa. Certainly, sundry 3- or 5-septate spores do occur but at a very late stage only. See further the unnamed variety below.

It is with some hesitation that we introduce the name *Lophiostoma macrostomum* for this species, already well known under other names, like *L. angustilabrum* and *L. crenatum*. The reasons for this change of name are given below, p.8. The synonymy above has already been indicated, without much discussion, by Chesters & Bell (1970a).

Some authors have tried, for unclear reasons,

to separate *L. praemorsum*, the spore characters reported are tabulated below:

	<i>L. crenatum</i>	<i>L. praemorsum</i>
Berlese	6-celled	2–6-celled
Rehm 1911	6-celled often with appendages	6-celled, often with appendages
Schröter	4-celled	6-celled often with appendages
Winter	4–6-celled	6-celled, with appendages

The name *L. praemorsum* has generally been used for the fungus when growing on *Rubus* canes. The differences suggested above are purely illusory: the number of “cells” reflects the number of guttules only, and, as far as we are aware, the spores are always appendiculate, although this condition is easily overlooked.

*L. macrostomum* is noteworthy for its wide host spectrum, including not only a multitude of deciduous trees and shrubs, but apparently also several herbs, particularly *Epilobium hirsutum* and *Urtica dioica*; in the latter cases the fungus has often been classified as *L. microstomum* and *L. sexnucleatum*, respectively. S. Francis has also collected it repeatedly on *Rumex* stems (Chesters & Bell 1970a). Herbicolous specimens are a close match of the lignicolous ones as regards asci and spores, but deviate usually by a less prominent crest (as do corticolous ascomata).

*L. macrostomum* may formerly have been rather common, judging from the numerous early collections in the herbaria. Possibly it is less frequent today, in any case it is not common in the Uppsala area. Altogether we have examined more than 50 samples from Sweden (Skåne, Halland, Närke, Uppland, Jämtland), England, Germany, Austria, Italy and Canada (Ontario).

**L. macrostomum** var.

Exs.: Karst., F. fenn. 886 (“*L. crenatum*”).

Spores fusiform, 5-septate, 33–37 × 6–7 µm, hyaline or eventually very dilute brown, with short terminal appendages, c. 3 µm.

This seems to be a distinctive form probably wor-

Symb. Bot. Ups. XXVIII:2

thy of recognition as a named taxon. We have found it in three samples which closely agree. Its taxonomic treatment is a delicate problem: it seems intermediate between *L. macrostomum* and *L. caulium*. It differs from the former by the spores being pluriseptate when still in ascus, and from the latter by the hyaline spores. More material of this interesting fungus is desirable.

Specimens seen:

**Sweden.** Uppland. Uppsala, Bot. Garden, on bark of *Crataegus Douglasii* 2. VIII. 1985, Yue Jingzhu & Holm. — Gästrikland. Gävle, Lövudden, wood of *Rosa* cf. *damascena*, 21. VII. 1977, Nannfeldt 24479b (UPS).

**Finland.** Åbo, *Rosa* sp., V. 1866 (= Karst., F. fenn. 886)

NOTE 1. THE TYPIFICATION OF SPHAERIA MACROSTOMA TODE:FR.

*Lophiostoma* is lectotypified by *S. macrostoma*, for reasons expounded by L. Holm (1975 p. 481). However, this typification is somewhat of a half-measure as the name of the type species itself badly needs typification. Because of its crucial importance this problem will be discussed at some length.

As originally conceived, *Sphaeria macrostoma* certainly was a collective species, including all lignicolous Lophiostomataceae. It comprised five subspecific taxa, viz.  $\alpha$  *nigra*,  $\beta$  *fusca*,  $\gamma$  *nigrofusca*,  $\delta$  *libera*, and  $\epsilon$  *pileata*. As far as known, no material of Tode's is left which could support an interpretation of those names of doubtful application. The first four have long sunk into oblivion, whilst  $\epsilon$  *pileata* has survived as basionym of *Navicella pileata*.

*Sphaeria macrostoma* Tode was accepted, and thereby sanctioned, by Fries in Syst. Myc. (1823); consequently typification of the name "is based on everything associated with the name in that work" (Art. 7.17 of the Sydney Code). When publishing the name, Fries provided a description of his own and gave the following references: "S. macrostoma.  $\alpha$  —  $\delta$  Tod. Meckl. 2. p. 12. f. 76, 77. cum variis quoad aetatem varietatibus. S. dehiscentes & libera. Pers. syn. p. 55. Nees syst. f.

350. b. Lophium Lonicerae. Fr. V. A. H. p. 115".

As we can see, Fries has excluded Tode's variety  $\epsilon$  *pileata*, which he recognized as a separate species, *S. pileata* (Tode) Pers.: Fr., i.e. *Navicella pileata* of today. This is very important, implying that *S. pileata* should be out of question when we try to typify *S. macrostoma*. Otherwise the cited synonymy is of little help. Persoon's treatment in his Synopsis was wholly based on Tode's work. *Sphaeria dehiscentes* was erected for Tode's taxa  $\alpha$  —  $\gamma$ , and the name an illegitimate substitute for *S. macrostoma*. *S. libera* was based on Tode's  $\delta$  *libera*. The figure quoted from Nees's System der Pilze und Schwämme is said to illustrate *S. libera*. *Lophium Lonicerae* Fr., finally, is a dubious name, not supported by any preserved material.

As mentioned above, Fries also provided a description of his own, remarking that he knew the species from autopsy ("v.v." = vidi vivam). This will imply that material studied by Fries at that time may be relevant for typification. There are three collections in Herb. Fries (UPS) which should be considered:

1. "Sphaeria macrostoma Femsjö", scr. Fries. The substrate is wood, the material is rich and in good condition and belongs to the species generally known as *Lophiostoma crenatum* or *L. angustilabrum*. It is reported under the latter name by Chesters & Bell (1970a p. 9).

2. "Sphaeria macrostoma. In cortice Quercus". The epithet "*macrostoma*" was possibly written by Fries, the other words not. Th. M. Fries has added the notation "misit Mougeot". This material was studied by Bell, who rightly identified it as *Navicella pileata* (Chesters & Bell 1970a p. 32).

3. "621 Sph. macrostoma? Tode" (not in Fries's handwriting). According to Th. M. Fries "misit Dufour". The sample is very meagre but probably represents *L. crenatum*.

Of these three samples, no. 1 is obviously the only one that could be chosen as lectotype. It is at least quite possible that Fries had this specimen at hand when making his description. We think that it is reasonable to select this material as type, and it will keep *Lophiostoma* in the current sense.

Consequently, the two competing epithets *crena-*

*tum* and *angustilabrum* must both be abandoned. Finally, it should be noticed that the (heterogeneous) material issued in Scleromyceti Sueciae no. 345 (cf. below) probably is out of consideration, as being of later date; anyway it was not distributed until 1834.

In matters of typification one should, if possible, try to conform to an established tradition, if any. In this respect we have great freedom in the actual case. The name *Lophiostoma* (*Sphaeria*) *macrostomum* has been applied to many species, as will be shown by some examples.

Several exsiccata have been issued under one of those two names: Desm., Pl. Crypt. Fr. ed. 1:622 (= *L. macrostomoides*, UPS) — Fckl, F. rhen. 923 (= *Navicella pileata*, S) — Fr., Scl. suec. 345 (= *L. quadrinucleatum*, BPI; = *L. compressum*, RO) — Rbh., F. eur. 2040 (= *L. compressum*, RO, UPS) — Sacc., Myc. ven. 679 (= *L. crenatum*, RO, UPS) — Westend., Herb. Crypt. Belg. 909, 1205 (= *L. viridarium*, RO).

We have thought it particularly interesting to try to ascertain the concept of Cesati and De Notaris, as the authors of *Lophiostoma*. Some relevant collections are preserved in RO:

1. "Sphaeria macrostoma Kunze! ad Salices pr. Taurinum smbr 1838", scr. De Notaris. This is *L. macrostomoides*.

2. "Branches sèches de Saule; Lébisey, i.x. 1839. Sphaeria (1272)" in unknown handwriting (?Roberge). "macrostoma" scr. De Notaris. This is *L. compressum* var. *pseudomacrostomum*.

3. "Sphaeria macrostoma", scr. Cesati. This is *Navicella pileata*.

4. "Sphaeria macrostoma Tode forma major Andorno ad Juglandis corticem", scr. Cesati. In poor condition, probably *Navicella pileata*.

5. "Sphaeria macrostoma Tode? Sui Gelsia a Perolino prope Faenza. Luglio 1859 L. Caldesi" ex herb. Cesati. This is *Navicella pileata*.

6. "Sphaeria macrostoma Tode Lips. ad Tiliis raro!", scr. Kunze. Someone else has annotated "Kunze 1837" and "simil. S. macrostomoides". It is a well-developed *L. macrostomoides*.

Karsten reported *L. macrostomum* from Finland (1873 p. 83); his description is indicative of *Navicella*, which is also confirmed by a sample in

H (Herb. Karsten 2708); moreover Karsten has annotated on the label that *S. excipuliformis* (i.e. *Navicella pileata*) is a synonym of *S. macrostomum*.

In Winter's Flora (p. 302) we find the name *L. macrostomum* applied to a species, which — judging from the description and the reference to Fckl, F. rhen. 923 — obviously is again *Navicella*. In Berlese's Icones Fungorum, *L. macrostomum* is cited in synonymy only; it is stated (p. 15) to be = *L. excipuliforme* (= *Navicella*) but also (p. 11) to be, in the sense of "plur. auct." a synonym of *L. pseudomacrostomum*.

Turning to Chesters & Bell (1970a) finally, we find still another interpretation: their *L. macrostomum* is plainly distinct from *Navicella pileata* but likewise characterized by rich brown, pluriseptate spores, with light end cells. They cite seven collections, two of which we have studied: Rbh., F. eur. 2422, "L. pinastri", and Rehm, Asc. 1021, "L. ?elegans". These two specimens clearly represent different species, the first one being treated by us, p. 34, as *Lophiostoma* sp., whilst Rehm's is described as *Trematosphaeria wegeliniana* n. sp., p. 33.

To sum up: in the course of the above excursion we have come across eight different species, most frequently *Navicella pileata*. This species is, however, not available as type, for reasons already adduced. We can thus safely conclude that there is no tradition to guide us when selecting a type for *L. macrostomum*.

NOTE 2. THE NAME LOPHIOSTOMA MICROSTOMUM NIESSL.

The name has been a source of considerable confusion as it was used in two different senses by Niessl himself. The type material is good *L. macrostomum*, as might be inferred from the original description (although Niessl overlooked the appendages, as is easily done). However, Niessl rejected the name only one year after having published it. In an article in Hedwigia (1875) he discussed the name *Sphaeria caulium* Fr., and following Desmazières (1841) he applied that name

to a species with hyaline spores or, more exactly, to his own *L. microstomum*. Consequently, this name would be a younger synonym of *Lophiostoma caulium*. (It seems quite possible that Niessl was right when identifying *S. caulium* sensu Desmazières with *L. microstomum*, i.e. with *L. macrostomum* in the present sense.)

However, because *S. caulium* Fr. by other authors was (rightly) considered to be a dark-spored species, Niessl later thought fit to revive his *L. microstomum*, as done in Flora Exs. Austro-Hungarica no. 1580, in sched. (matrix: *Oenothera biennis*). It is unfortunate that the name was resurrected in a new sense (unintentionally?), now applying to *Lophiotrema vagabundum*; Niessl commented, moreover, (l.c.) that "die später beschriebenen *L. vagabundum* Sacc. und *L. anaxaeum* Sacc. dürften mit der vorliegenden sehr nahe verwandt sein". Concerning *L. anaxaeum*, cfr. p. 33.

## 2. *Lophiostoma appendiculatum* Fekl

Symb. Myc. App. 2:29 (1873) – Type: Germany, Oestrich, "Auf faulendem Holz und noch berindeten Aesten von *Salix (fragilis?)*" (S. iso!).

Exs.: Fekl, F. rhen. 2527 – (Rhb., F. eur. 1771 = *L. caulium*) (S. UPS) – Rehm, Asc. 1647 – (Syd., Myc. march. 67 = *L. caulium*, 3651 = *L. compressum* S, UPS).

Figs. 55, 104.

**Ascocarps** generally numerous, often densely crowded, immersed-erumpent, large up to 0.8 mm long and 0.5 mm broad, with an often coarse papilla with an obtuse crest up to 0.3 mm long. **Asci** clavate, 100–110 × 20–25 μ, 8-spored. **Spores** fusiform, 30–40 × 8–11 μm, (5-) 7-septate, when young hyaline with pointed ends, when mature rather obtuse and pale brown, with terminal appendices.

In wood and bark of *Salix* spp. It is with express reservation that we treat this taxon, which we know from three old collections only. But they are obviously conspecific and seem to represent a taxon of its own, perhaps with preference for *Salix*. We believe that it is closely related to *L. caulium*, in fact it may be difficult to

Symb. Bot. Ups. XXVIII:2

keep them apart. *L. appendiculatum* seems distinctive, however, particularly by the fact that the spores remain hyaline for a long time, although eventually clearly brown.

Another problem is the relation to the very similar *L. massarioides*, and Chesters and Bell (1970a) united them. For the time being we prefer to keep them separate on account of the, admittedly small, spore differences – no appendages in *L. massarioides*, spores faintly brown, only. Fresh material is indispensable for a definite judgment.

Material examined; besides the type:

**Denmark.** Birkerød pr. Copenhagen, *Salix pentandra* wood, 16.VI.1907, J. Lind (S).

**Germany.** Rathenow, *Salix* wood, 1905, Kirschstein (=Rehm, Asc. 1647).

Just as this paper goes to press, we have seen a sample, which may represent this species: Sweden, Torne Lappmark, Abisko, Mt Nuolja, wood of *Salix reticulata*, 4.VII.1986, A. Nograsedk. The material is scanty and old but suggestive of this species.

## 3. *Lophiostoma Arundinis* (Pers.: Fr.) Ces. & De Not.

Comm. Soc. Critt. Ital. 1:220 (1863) – *Sphaeria cristata* β *arundinis* Pers., Syn. Meth. Fung. 56 (1801) – *Lophium Arundinis* F., K.V.A. Handl. 1818 p. 115 – *Sphaeria Arundinis* Fr., Syst. Myc. 2: 510 (1823) – Type: Leiden No 910.270-510 (fide Chesters & Bell 1970a).

Exs.: (Berk., Brit. F. 87 = *L. semiliberum*, UPS) – Linh., F. hung. 169 – (Moug. & Nestl., Stirp. Vog. 1172 = *L. semiliberum*, S) – Petr., Fl. Bohem. Mor. II (1): 111, "*L. semiliberum*".

Figs. 25–27, 85.

**Ascomata** scattered–crowded, often confluent, large up to 0.8 mm long, with a strong flattened papilla with a rather sharp crest up to 0.4 mm long. **Spores** fusiform, generally 30–40 × 6–7 μm, mostly 5-septate with rather pointed ends, basally often somewhat prolonged, brown, without appendages.

On culms of *Phragmites* and *Glyceria*.

There has been much confusion around this species. It has often been confused with or identified as *L. semiliberum*, which is well separated though, i.a. by its hyaline spores, cf. p. 00. The confusion is understandable as both species occur on *Phragmites* having the same appearance – they are indistinguishable on sight. A remarkable similarity, perhaps due to the host.

Another more serious problem is the delimitation towards the *caulium*-group. Traditionally all *caulium*-forms on grasses have been referred to *L. Arundinis* (or to *L. semiliberum*) but such a procedure is unsatisfactory. There are graminicolous specimens which are a close match of either *caulium* var. a or var. e. But on the other hand intermediate forms, approaching *L. Arundinis* seem to occur, e.g. Syd., Myc. march. no. 4139 (on *Phragmites*!). We have no definite solution to this predicament but tentatively regard the "true" *L. Arundinis* as a large-spored form, probably with a preference for aquatic habitats. It seems significant that a beautiful *L. Arundinis* has been collected on *Glyceria fluitans* (Petra, Fl. Bohem. Mor. II:1 no. 111).

*L. Arundinis* is perhaps a rare species, at least in Scandinavia, and we have never found it ourselves. Several British finds are reported by Chesters & Bell (1970a). Otherwise the records must be taken *cum grano salis*, as very often referring to *L. semiliberum* or *L. caulium*. We have seen only one Swedish collection that can be reliably referred to as *L. Arundinis*: Uppland, Danmark, 8.VI.1924, *Phragmites communis*, Nannfeldt "*L. semiliberum*" (UPS).

## 4. *Lophiostoma caudatum* Fabre

Ann. Sci. Nat. Bot., ser. 6. 9:103 (1879) – Type: France, Vaucluse, "ad caules exsiccatos denudatosque *Paliuri aculeati*" (= *P. spina-Christi*) (n.v.).

*Lophiostoma dacryosporum* Fabre l.c. – Type: France, Vaucluse, "ad calamos emortuos *Phragmitidis communis*" (n.v.).

Exs.: 0.

Figs. 52, 53, 84.

**Ascocarps** scattered, immersed-erumpent, 0.3–0.5 mm long, generally with a distinct neck surmounted by a c. 0.3 mm long crest. **Asci** clavate, 100–120 × 12 μm, shortly stipitate, 8-spored. **Spores** fusiform – caudate, generally 5-septate, brown, 24–36 × 6–7 μm, the basal cell ± caudate, often lighter.

When well-developed this species is quite characteristic by the caudate spores. These are particularly pronounced in two collections on *Elymus*, cf. below. On the other hand, some samples connect with *L. caulium*, as pointed out by Chesters and Bell (1970a p. 44). *L. caudatum* is in all probability derived from the *caulium*-group. It seems to be mainly graminicolous, and we have found it only once on another host (*Filipendula*). Chesters & Bell (op. cit.) report it from *Vitis* and *Urtica*, and the type is on a woody plant (*Paliurus*).

No type material has been available, but the original description is indicative. *Lophiostoma dacryosporum*, published simultaneously, is certainly a synonym; Chesters and Bell selected the epithet "*caudatum*" which then, according to Art. 57.2, is the correct one.

*L. caudatum* is apparently not common and was first recorded from Sweden by Eriksson (1967 p. 397), as "*L. dacryosporum*".

Specimens seen:

**Sweden.** Gotland: Östergarn, *Poa nemoralis*, VII.1895, Vestergren, det. O. Eriksson (S, UPS). Bro, gramen indet., 8.VIII.1896, Vestergren, det. O. Eriksson (S). Uppland: Dalby, pr. "Jerusalem". *Filipendula ulmaria*, 8.IV.1984, Holm 3071d. Värmdö, Sandön, *Festuca arundinacea*, VII.1886, Starbäck, det. O. Eriksson (S). Älvkarleby, Billudden, *Elymus arenarius*, 13.V.1962, O. Eriksson 1041 m. (UPS).

**Finland.** Nyland, Tvärminne, *Elymus arenarius*, 20.VIII.1962, O. Eriksson 1692a (UPS).

**Germany.** Bayern, Sinzing, grass culm, VIII.1883, leg. et det. Rehm (S).

**Czecho-Slovakia.** Brünn, *Poa nemoralis*, 1882, Niessl, "*Leptosphaeria culmicola*" (S).

## 5. *Lophiostoma caulium* (Fr.) Ces. & De Not.

Comm. Soc. Critt. Ital. 1: 219 (1863) – *Sphaeria caulium* Fr., Syst. Myc. 2:509 (1823) – Lectotype prop.: Sweden, Skåne, dead herbaceous stems, Fries (UPS).

*Sphaeria insidiosa* Desm., Ann. Sci. Nat. Bot. ser. 2.

Symb. Bot. Ups. XXVIII:2



15:144 (1841) — *Lophiostoma insidiosum* (Desm.) Ces. & De Not. Comm. Soc. Critt. Ital. 1:220 (“*insidiosus*”) — Type: Pl. Crypt. Fr. ed. I, 1825 (PC!).

*Lophiostoma bicuspidatum* Cke ssp. *simillimum* Karst., Myc. Fenn. 2:84 (1873) p.p. — *Lophiostoma simillimum* ligno ramorum Evonymi europaei, Solani dulcamarae et Salicis. Fennia meridionali et media.” (H!).

*Lophiostoma caulium* var. *alpincola* Rehm, Ann. Myc. 9: 108 (1911) p.p. — Syntypes: “An faulenden Stengeln von *Aconitum Napellus* und *Senecio Fuchsii* bei der Konstanzer Hütte . . . , Bärgelealpe . . . am Kartelgletscher im Moostal . . .”

**Ascomata** scattered — rather crowded, immersed-erumpent, up to 0.5 mm long, generally with a prominent neck up to 0.2 mm high with a crest attaining 0.3 mm in length. **Asci** clavate. **Spores** narrowly — broadly fusiform, 20–32 × 5–10 μm, (3–) 5–7-septate, 3rd cell often somewhat inflated, pale brown to full brown, most forms with terminal appendages, 5–12 μm.

*L. caulium* as conceived here is a very polymorphous species with a wide spectrum of spore forms, different in size, shape, septation, colour and appendages. The extremes are markedly unlike but appear connected by a continuous series of intergrading forms, which is why it does not seem feasible to discern well-defined taxa within this complex, the more so as there is no absolute correlation between forms and hostplants. A similar resignation was expressed by Chesters & Bell (1970a p. 42): “an extensive study of herbarium material by us has shown that these ‘species’ are linked by a number of intermediate forms having various spore sizes and degrees of septation”. As a matter of fact, we have been inclined to go a step or two further: we have seriously considered including also *L. Arundinis* and *L. macrostomoides* in *L. caulium*. Our treating them as separate species is largely a concession to established tradition.

Even if the lumping proposed by the British authors seems to be the only workable solution for the time being, certainly some patterns of variation are discernible. In order to get a survey of the variation we have tried to divide the material studied by us into some groups, five “varieties”, a–e. They have no formal status, but they may be

of practical value and also to some degree correspond to natural taxa. They are connected by intermediate forms, but can schematically be keyed out as follows:

1. Spores with appendages . . . . . 2  
Spores without appendages . . . . . 5
2. Spores mostly with 5 septa . . . . . 3  
Spores mostly with 7 septa . . . . . var. d
3. Appendages ≤ 5 μm long . . . . . 4  
Appendages up to 10(12) μm . . . . . var. c
4. Spores generally 5–7 μm broad . . . . . var. a  
Spores generally 6–10 μm broad . . . . . var. b
5. Spores mostly 5-septate . . . . . var. e  
Spores mostly 7-septate . . . . . var. d

Before treating these “varieties” we will make some comments on the nomenclature above. Probably no extant material can safely be considered a “holotype” but a sample in UPS seems to be an appropriate lectotype. It was examined also by Chesters & Bell (1970a p. 42). The specimen is fairly young but well preserved, even the appendages, and seems a good member of “var. a.”

The epithet “*caulium*” was in the past often applied to forms without appendages, a custom probably emanating from Cesati & De Notaris (1863) who obviously had based their concept on a copy of Scl. suec. no. 405. We have not had access to that exsiccatum, which however is of less importance as it was distributed by Fries long after he had published *Sphaeria caulium*, cf. Holm & Nannfeldt (1962). Authors adhering to this tradition have then used the epithet “*insidiosum*” for appendiculate forms, at least in theory — e.g. Rehm and Petrak were inconsistent in this respect as is evident from material issued in their exsiccata. But it is true that *Sphaeria insidiosa* Desm. is an appendiculate form, which seems to be a good match of var. a., as testified by the type material, and moreover apparent from the original description. *L. insidiosum* var. *sessile* Rehm is = *L. Winteri*, vide p. 25.

*Lophiostoma simillimum* Karst. has long been rightly synonymized with *L. caulium* by several authors, e.g. Rehm (1911 p. 109), Petrak (1940 p. 136) and Chesters & Bell (1970a). Karsten’s description is indicative of *L. caulium*, which is confirmed by a study of the syntypes at H: Finland.

Tav. austr., Mustiala: *Salix* wood, 4.1. 1886, Herb. Karst. 2615. twigs of *Rosa*, 28.IV. 1872, Herb. K. 2611. *Evonymus* wood, 20.IV. 1872, Hb K. 2614. Nos 2613 and 2615 are good representatives of var. a., nos. 2611 and 2614 probably too, except for the seeming lack of appendages, which can be due to age, and poor condition. — It is strange that for reasons not clearly exposed, Karsten, in addition to *L. simillimum* also recognized *L. caulium*. In order to elucidate this minor problem we studied Karsten’s own material of “*L. caulium*” (H), finding it to be a quite ordinary *caulium* “var. a.”, with the appendages readily visible. Karsten evidently overlooked them — they are not mentioned in his description nor indicated in his drawings appended to the material. The epithet “*simillimum*” was used by several authors following Karsten, and has figured also in Swedish floristics — Starbäck (1889) published a find under this name, from Öland, on *Lonicera*. The material is a good *caulium*, “var. b”.

*L. caulium* var. *alpincola* Rehm may also be mentioned. There are three syntypes in S: Germany, Bavaria, Bärgele-Alpe, *Aconitum napellus*, IX.1905. Austria, Tyrol, Konstanzer Hütte, *Aconitum napellus*. IX.1909. Ibid., but the host is stated to be *Senecio Fuchsii*. — The last-mentioned sample represents *L. glaciale* but the two others can well be accommodated in “var. a.” The spores are appendiculate, in spite of Rehm’s statement to the contrary. Rehm also emphasized the blackened substrate which, however, is a common phenomenon in *Lophiostoma*.

#### **L. caulium** var. **a.**

*Exs.*: (Unless otherwise indicated these numbers are issued as *L. caulium* or *L. insidiosum*. Brackets mean that no identifiable fungus has been found).

Ell. & Ev., N. Am. F. 3319 (UPS) — Fckl., F. rhen. 927 (S) — Karst., F. fenn. 969 — Kze., F. sel. (96 = *L. macrostomum*, S) 98 (339 = *L. vagabundum*, S) — Petr., Fl. Bohem. Mor. II (1): 736 a, b, 1670, 2270 (S) — Petr., F. pol. 434 (S) — Petr., Myc. gen. 1827 (S) — Rbh., F. eur. 1871 (S) — Rehm, Asc. 88 a–d, 1175, (1374 = *Winteri*?), 1550 (“*L. simillimum*”) (all S). — D. Sacc., Myc. ital. 387, 1051 (S) — Syd., Myc. germ. 387 (S) — Syd.,

Myc. march. 67, (257 = *Lophiotrema* cf. *vagabundum*), (851, 1354, 2552), 2679 (“*Leptosphaeria caespitosa*”), 3036, 3645 (“*Leptosphaeria dolioloides*”) (3651), 3652, 4528 (S).

*Figs.* 9–14, 72–75.

Spores comparatively narrow, mostly 20–28 × 5–6(–7) μm, generally 5-septate with a somewhat inflated 3rd cell, brown, with terminal appendages, c. 5 μm long.

The spores are often quite variable even in one and the same mount. In many samples 3- and 4-septate spores occur, in others 6- or 7-septate, the 3rd cell may be only slightly inflated or not at all. The spores have often rather pointed ends but obtuse spores are also common. The length/width ratio is about 4(–5):1.

This variety seems to be the most common one and could be called the “typical variety” as the type material apparently belongs here. We have seen some 50 collections, on 25 different hosts, mainly dicotylous herbs. But it is found also on ligneous hosts, cf. *L. simillimum* p. 12. We have seen only two samples on monocots, both on grasses: Sweden, Uppland, Vaddö, *Elymus arenarius*, 11.VI.1962, O. Eriksson 1252h (UPS) — Hungary, Kaposvár, culms of *Zea Mays*, Lojka, “*?L. caulium*”, det Rehm (S).

#### **L. caulium** var. **b.**

*Exs.*: Rehm, Asc. 881 (“*L. caulium*”) (S, UPS) — Syd., Myc. germ. 387 (*L. insidiosum* var. *Artemisiae*) (S, UPS).

*Figs.* 15–18, 76–79.

This form matches in most respects the var. a, but deviates by the strikingly broad spores, 20–32 × (5–) 6–10 μm, with a length/width ratio approaching 3:1. It is found mainly on ligneous hosts, especially on *Lonicera xylosteum*. Besides, we refer here also some collections on *Artemisia campestris*, viz. the two exsiccata mentioned above and two finds listed below.

Specimens seen (1 = *Lonicera xylosteum*, 2 = *Ribes grossularia*, 3 = *Sambucus nigra*, 4 = *Artemisia campestris*):

**Sweden.** Öland, Borgholm, 26.VI.1888 (1) Starbäck, "*L. simillimum*" (published by Starbäck 1889 p. 19). — Gotland, Visby, 2.VII.1887 (3), Romell 15342, "*L. pseudomacrostromum*" (S). — Västergötland, Vänersborg, 14.VI.1892 (2), Eliasson, "*Lophiostoma*" (S). — Uppland: Balingsta, 28.X.1984 (1), Holm 3372 c. Börstil, Raggårön, 29.IV.1986 (1), Holm 3997b. Dalby, 21.III.1984 (1), Holm 3060a. Harbo, Kalvnäset, 5.V.1980 (1), Holm 2103d. Jumkil, 7.IV.1978 (1), Holm 1268b. Lovö, Drottningholm, 18.V.1890 (1), Romell 16006, "*L. macrostromoides*" (S). Stockholm, 1889 (3), Romell 15975, "*Leptosphaeria Grossulariae* n. sp." (S). Älvkarleby, Billudden, 28.IX.1985 (1), Holm 3775. Österlövsta, Skyttskär, 6.V.1981 (1), Holm 2366b. 29.IV.1984 (1), Holm 3092.

**Germany.** Regensburg, IV.1879, (4), Rehm, "*L. pseudomacrostromum*" (S).

**Switzerland.** Graubünden, Ramosch, 5.IX.1984 (4), Holm 3321a.

#### *L. caulium* var. *c.*

Spores 5-septate, rather large, usually  $24-30 \times 5-6 \mu\text{m}$ , with a marked 3rd cell, generally with pointed ends, remarkably light brown, with very long appendages,  $10-12 \mu\text{m}$ .

Figs. 19–20, 80.

In its extreme form this variety is very characteristic, especially by the light spore colour, long almost hyaline — an interesting connection with *L. macrostromum*. Our sample no. 2590a approaches var. *a.* by darker spores but the appendages are very long. There are also transitions to var. *d.*, as noticed on p. 00. This form seems rather widespread in the Uppsala area, especially on composites:

**Sweden.** Uppland; Dalby: *Arctium tomentosum*, 2.IV.1983, Holm 2821c. *Cirsium arvense*, 27.VI.1987, Holm 4610a. *Geum rivale*, 6.VII.1982, Holm 2590a. *Serratula tinctoria*, 15.X.1983, Holm 2958. 4.X.1984, Holm 3349a. Gamla Uppsala: *Artemisia vulgaris*, 23.VII.1984, Holm 3178a. *Centaurea scabiosa*, 23.VII.1984, Holm 3176.

#### *L. caulium* var. *d.*

Exs.: Syd., Myc. march. 851 ("*L. insidiosum* var. *Gallii*") probably belongs here to judge from the statement in sched: "sporidiis 8–10-cellularibus, appendiculatis"

Symb. Bot. Ups. XXVIII:2

(the material at S and UPS is very poor). Matrix is *Galium verum*.

Figs. 21–22, 81–82, 86.

This group includes forms with predominantly 7-septate spores, which are rather large,  $26-32 \times 6-7 \mu\text{m}$ , generally appendiculate. It probably corresponds to *L. niessleanum* Sacc.. It is mainly herbicolous but also found on wood, cf. below. The group is certainly heterogeneous: Vestergren's collections are very similar to var. *a.*, whilst our 3040c and 3051 seem closer to var. *c.* Very noteworthy is 2043e with spores devoid of appendages.

The taxonomic value of the character in common, i.e. the 7-septate spores, is certainly not great, as transitional forms occur, with a mixture of 5-, 6- and 7-septate spores, e.g. Sweden, Uppsala, *Rosa* sp., 25. & 26.V.1884, Romell, "*L. simillimum*" (S, UPS).

Specimens seen:

**Sweden.** Gotland, Bro: *Galium mollugo*, 18.VI.1920, Vestergren, "*Lophiostoma* sp." (S). *Potentilla argentea*, 3.VI.1899, Vestergren. "*Lophiostoma* sp." (S). — Uppland: Börstil, Sandören, *Trifolium medium*, 29.IV.1980, Holm 2043e. Dalby: Jerusalem, *Centaurea jacea*, Holm 3051. Ormberget, *Artemisia campestris*, Holm 3040c. Älvkarleby, Billudden, *Artemisia absinthium*, 28.IX.1985, Holm 3780c. — Medelpad, Alnön, *Lonicera xylosteum*, O. Eriksson (UPS).

**Germany.** München, *Urtica dioica*, Rehm, "*L. caulium*" (S).

#### *L. caulium* var. *e.*

Exs.: Rbh., F. eur. 1725 ("*Leptosphaeria Artemisiae*") (S, UPS) — Rehm, Asc. 181 ("*L. caulium appendiculis sporarum deficientibus*") (S, UPS), 484 ("*L. caulium f. minutum*") (S, UPS), 749 ("*L. caulium f. majus*") (S, UPS).

Figs. 23–24, 83.

This variety accommodates the non-appendiculate forms of *L. caulium* and is probably heterogeneous. The common form is a parallel of var. *a.* The spores are thus relatively narrow, with a length/width ratio c. 4:1, Spores with 3 or 4 septa

are not rare, nor are somewhat caudate ones. This form is mainly herbicolous and perhaps more common on grasses than var. *a.* We are not able always to discriminate safely between var. *e.* and (the lignicolous) *L. macrostromoides* as transitional forms seem to occur. Two collections on wood, listed below, are thus mentioned here, in spite of the substrate, as they otherwise agree well with var. *e.*

Specimens seen, besides the cited exsiccata:

**Sweden.** Uppland: Dalby: *Arctium tomentosum*, 10.IV.1984, Holm 2834a. *Artemisia campestris*, 18.IV.1984, Holm 3101b. *Artemisia vulgaris*, 10.IV.1984, Holm 3073a. *Calamagrostis arundinacea*, 14.IX.1984, Holm 3333. *Deschampsia caespitosa*, 1.XI.1983, Holm 2971. Grass culm, 7.XII.1984, Holm 3380. *Viburnum opulus*, 5.III.1981, Holm 2363e. Danmark, grass culm, 1.V.1962, O. Eriksson 1647 (UPS). Gamla Uppsala, *Artemisia campestris*, 11.IV.1984, Holm 3081. Uppsala, *Rosa* sp., 11.XI.1962, O. Eriksson 1844b (UPS). — Dalarna: Säter, *Dactylis glomerata*, 4.VI.1962, O. Eriksson 1184a.

**Norway.** Sör-Trøndelag, Oppdal, *Anthriscus silvestris*, 24.VIII.1985, Holm 3753a.

#### 6. *Lophiostoma compressum* (Pers.:Fr.) Ces. & De Not.

Comm. Soc. critt. Ital. 1: 219 (1863) — *Sphaeria compressa* Pers.: Fr., Syst. Myc. 2: 470 (1823); Pers., Syn. Meth. Fung. p. 54 (1801) — *Platystomum compressum* Trev., Bull. Soc. R. Bot. Belg. 16:16 (1877) — *Lophidium compressum* Sacc., Mich. 1: 340 (1878) — Lectotype: Herb. Persoon no. 910.270–358 (vide Chesters & Bell 1970a p. 48).

*Lophiostoma angustatum* (Pers.:Fr.) Fekl, Symb. Myc. p. 158 (1870) — *Sphaeria angustata* Pers.: Fr., Syst. Myc. 2:470 (1823); Pers., Syn. Meth. Fung. p. 55 (1801) — Lectotype: Sweden, Femsjö, Fries (UPS), cf. below.

Exs.: Fr., Scl. suec. 89 — Karst., F. fenn. 986 — Kunze, F. sel. 341 — Rehm, Asc. 182 — Rbh., F. eur. 340 — Sacc., Myc. ven. 1948 — Syd., Myc. march 1948, 3035, 3171 — Thüm., Myc. univ. 1457, 1540.

Figs. 50, 91, 93.

**Ascocarps** scattered — rather densely crowded, often  $\pm$  covering considerable areas, immersed — erumpent, usually large and coarse  $0.6-0.8 \text{ mm}$  long, with a strong compressed crest,  $0.4-0.6 \text{ mm}$  long, in bark often Y-shaped. **Asci** clavate, c.

$150 \times 15 \mu\text{m}$ , generally 8-spored. **Spores** very variable in shape and septation, mostly oblong-ellipsoid, usually with 5(3–8) transverse septa and one or two segments with a longitudinal septum,  $(16-20) 20-28 \times 7-9 \mu\text{m}$ , usually with a mid constriction, brown.

On deciduous wood.

*L. compressum* is, together with *Lophiotrema nucula*, the most common of the Lophiostomataceae on frondose wood, and the two species often occur associated; with some certainty they can be distinguished with a lens — *L. compressum* generally having a stronger crest.

The species is certainly closely allied to *L. macrostromoides*, and intergrading forms do occur; we have seen several samples with the majority of spores perfectly matching *macrostromoides*, only a few having a longitudinal septum. Such intermediates have often been identified with *L. pseudomacrostromum* Sacc. Ten collections in S are more or less correctly designated with this name, one of which from Sweden, Närke, Almby, bark of aspen, 1885, Sernander, det. Petrak. It seems to be a good representative of this doubtful taxon. Another related species is probably *L. curtum*, cf. p. 16.

*L. compressum* was appropriately lectotypified by Chesters and Bell, vide supra. In herb. Fries four pertinent samples are preserved:

1. Scl. suec. 89. "Lophium compressum. Pers. & al. adf." This is *L. compressum* as generally conceived.

2. "Sphaeria compressa P. Femsjö", scr. Fries. Empty ascocarps only.

3. "Sphaeria angustata. Fr. sic! Femsjö", scr. Fries. This is *L. compressum*, with *Lophiotrema nucula* intermixed. — This sample seems to be a suitable lectotype of *Sphaeria angustata* Pers.: Fr., no Persoonian material being extant, as far as we know.

4. "Sphaeria diminuens. P. Femsjö . . ." scr. Fries. This is *L. compressum*, as pointed out by Chesters and Bell (1970a p. 48).

Otherwise we refrain from listing the many specimens seen of this common fungus.

Symb. Bot. Ups. XXVIII:2

7. *Lophiostoma curtum* (Fr.) Ces. & De Not.

Ces. & De Not., Comm. Soc. Critt. Ital. 1:219 (1863) ("curta") - *Lophium curtum* Fr., K. Vet. Akad. Handl. 1818 p. 113 - *Sphaeria curta* (Fr.: Fr.) Fr., Syst. Myc. 2: 470 (1823) - *Lophidium curtum* Sacc., Mich. 1: 340 (1878) - Type: Sweden, Östergötland, lignum, "Sphaeria curta Fr.! Misit Acharius ex Ostrog.", scr. Fries (UPS!).

*Mytilostoma deflectens* Karst., Medd. Soc. F. Fl. Fenn. 5:50 (1880) - *Lophiostoma deflectens* Starbäck, Bot. Not. 1887 p. 208 (1887) - *Lophidium deflectens* Berl., Ic. Fung. 1:17 (1890) - *Platystomum deflectens* Trev., Bull. Soc. R. Bot. Belge 16:16 (1877) - Type: Finland, Mustalia, wood of *Salix pentandra*, 24.IX.1872, Karsten (H!).

*Mytilostoma subcompressum* Karst., Medd. Soc. F. Fl. Fenn. 5:50 (1880) - *Lophidium subcompressum* Sacc., Syll. Fung. 2:712 (1883) - Lectotyp. prop.: Finland, Mustalia, lignum *Alni incanae*, 20.V.1866, Karsten (Herb. Karst. 2716! 2717 iso, H).

Exs.: 0.

Figs. 5, 6, 54, 92.

**Ascocarps** mostly crowded, immersed-erumpent, 0.3–0.4 mm diam., subglobose—somewhat elongated, papilla generally insignificant, often lacking. **Asci** cylindrical, c.  $110 \times 8 \mu\text{m}$ , 8-spored. **Spores** almost uniseriate, (14–)16–18(–20)  $\times$  5–6 (–7)  $\mu\text{m}$ , subclavate, brown, with variable septation: generally 3–5 (–6) transverse septa and as a rule at least one segment with a longitudinal septum.

On frondose wood, which is often blackened at the surface.

This species has been very little noticed, and is not mentioned, under any name, by Chesters and Bell, who perhaps included it in *L. compressum*. It seems distinctive, though, above all by the spore shape:  $\pm$  clavate in *L. curtum* whilst ellipsoid in *L. compressum*. The spores are also on the whole smaller with fewer septa. The general appearance is different, too; as a rule *L. compressum* has a stronger papilla, with a much sharper crest. The aspect of *L. curtum* is often reminiscent of *Lophiotrema nucula*.

The epithet *curtum* has not been used for a century, as far as we know. When (rarely) used, it was mostly misapplied. It is highly uncertain

whether *L. curtum* sensu Cesati and De Notaris was this species; in any case *L. curtum* sensu Saccardo was something else, probably *L. compressum*, to judge from Fungi Ital, tab. 229, and Berlese 1890, tab. XI:1. *L. curtum* sensu Lehmann 1886 is perhaps *Lophiotrema nucula*. However, the epithet *curtum* can be attributed to this species, thanks to the material present in Herb. Fries (cited above). It seems permissible to designate it as holotype. It is probable that Fries possessed the material when publishing *Lophium curtum* in 1818, as he had got it from Acharius, who died in 1819. It was studied by Starbäck, who on a slip with the material stated the identity with *L. deflectens* but apparently without publishing this observation.

Neither *Mytilostoma deflectens* nor *M. subcompressum* were typified by Karsten. The former name is no problem as represented by one sample only, in Herb. Karsten, whilst three collections (listed below) exist of *M. subcompressum*; they are syntypes and clearly conspecific. We have selected no. 2716 as lectotype as most closely matching the description.

*L. deflectens* and *L. subcompressum* were rightly synonymized already by Berlese (1890) who selected the former epithet. Karsten did not expressly indicate the differential characters but they can be inferred from his descriptions: *L. deflectens*: "perithecia sparsa, ostiolo minuto", *L. subcompressum*: "perithecia gregaria ligno superficie nigro-facto immersa, ostiolo prominulo". These alleged differences, however, are not very real. Referring to the Karsten material the ascogonia are gregarious in 2716, 2717, but not at all in 2718, and only partly so in 2697, 2698, 2715. The substrate is blackened also in the *deflectens* sample, but not in the *subcompressum* numbers 2697, 2698, 2715 and 2718. The papilla length, finally, is very variable in all the material, and often almost 0, cf. Fig. 5. There is a certain difference in spore septation, though. In the *deflectens* material 3-septate spores are common, but 5-septate are rare (and 6-septate lacking?), whilst the opposite holds for the *subcompressum* samples. We are inclined to believe that this is a matter of age: the *deflectens* material seems to be less mature.

Possibly *L. curtum* has a northern distribution. According to Mathiassen it is common in Troms, which hardly holds for the Uppsala area, as we have not found it there. In addition to the cited types we have seen the following material:

**Sweden.** Gävle, Lövudden, dead branch of *Salix caprea* lying on the ground, 7.I.1973, Nannfeldt 22901. - Torne Lappmark. Jukkasjärvi, Abisko, wood of *Betula*, 7.VII.1986, Holm 4233b.

**Norway.** Troms, Storfjord, Signalal, wood of *Salix nigricans* ssp. *boralis* 15.IX.1985, G. Mathiassen. - Finnmark: Porsanger, Skoganvarre, *Betula* wood, 24.VIII.1986, Holm 4223. Varanger, Nyborg, 1858, C. Sommerfelt, "*Sphaeria seminuda*" (UPS).

**Finland.** Mustiala; *Salix* wood, 21.XII.1865, Karsten (Herb. Karst. 2718, H), syntype of *M. subcompressum*. Ibid., *Salix* wood, VIII.1887, Starbäck, "*L. deflectens*". - Lapp. enontek., pr. Kevo, *Betula* wood, 29.VIII.1986, Holm 4281a.

**U.S.S.R.** Kola, Lapp. imandr., Sasheika, *Salix* wood, 27.VI.1861, Karsten (Herb. Karst. 2697, 2698, H), syntype of *M. subcompressum*.

8. *Lophiostoma Fuckelii* Sacc.

F. Ital. tab. 254 (1878) - *Lophiotrema Fuckelii* Sacc., Mich. 1:338 (1878) - *Lophiosphaera Fuckelii* Sacc., Syll. Fung. 2:678 (1883) - *Lophiostoma diminuens* sensu Fuckel, Symb. Myc. 156 (1871), non *Sphaeria diminuens* Pers.:Fr. - Type: Germany, pr. Eberbach, *Rubus fruticosus* (= Fckl, F. rhen. 2320).

*Lophiostoma pulveraceum* Sacc., Mich. 1:336 (1878) - Type: Italy, "in ligno quercino a Selva, Aug. 1876" (n.v.).

*Didymosphaeria lophospora* Sacc. & Speg., Mich. 1:376 (1878); F. ital. 367 (1878) - *Didymella lophospora* Sacc., Syll. Fung. 1:561 (1882) - *Lophiotrema lophosporum* Rehm, Ann. Myc. 5: 518 (1907) - *Lophiosphaera lophospora* Corlett, Can. J. Bot. 59: 2029 (1981) - Type: Italy, Conegliano, *Pteridium aquilinum* (PAD). (n.v.).

*Lophiosphaera mendax* Rehm, Ann. Myc. 5: 544 (1907) - *Lambottiella mendax* Sacc. & Trott. in Sacc., Syll. Fung. 22:547 (1913) - Type: Austria, Tyrol, Kastelruth, dry stems of ?*Epilobium Fleischeri*, 8.IX.1907, Rehm (S!).

Exs.: Ellis, N. Am. F. 588 (UPS) - Fckl, F. rhen. 2320 (S) - Sacc., Myc. ven. 1348 (UPS) - Syd., Myc. march. 3944 ("*L. rubicolum* Nke") (S).

Figs. 39, 40, 98, 99.

**Ascocarps** densely scattered, immersed-erum-

pent, 0.2–0.3 mm diam. with a short papilla, crista c. 0.1 mm long. **Asci** clavate,  $75-86 \times 8-10 \mu\text{m}$ , 8-spored. **Spores** shortly fusiform,  $15-20 \times 4-5 \mu\text{m}$ , slightly inflated above the median septum, hyaline with 2 guttules in each cell, with short terminal appendages.

Mainly in the periderm of *Rubus fruticosus* coll., also on wood and on herbaceous hosts.

*L. Fuckelii* seems to be a distinctive and little variable species, characterized by its small ascogonia and small, uniseptate spores with short appendages. It may be related to *L. glaciale*: the appendages of both species contain a substance that is stained by Cotton Blue.

The main host may be *Rubus fruticosus* but it is apparently more plurivorous than has been generally assumed. The identity with *L. pulveraceum* was tentatively suggested by Berlese (1890). No type material for the latter name has been available, but we have seen another collection on oak wood, from Switzerland, cf. below, which agrees well with *L. Fuckelii*. Chesters and Bell (1970a) have studied a sample from PAD which may represent type material and confirm the close resemblance with *L. Fuckelii*. They keep it as a variety, on account of the somewhat larger spores, but such a distinction seems difficult to uphold.

We have not seen any authentic material of *Didymosphaeria lophospora* but the name is obviously another synonym of *L. Fuckelii*, as demonstrated by Pirozynski & Morgan-Jones (1968) and Corlett (1981). The latter had the good fortune to study what apparently is type material. He, like the two other authors, also reported on another pertinent sample in Saccardo's herbarium (Crypt. Lyonn. 5770, Therry); it is moreover recorded by Saccardo (1882 p. 595) as *Didymella lophospora* ssp. *echinophila* and said to occur on chestnut spines.

The type collection of *D. lophospora* seems to be the only find of *L. Fuckelii* on bracken, so far known, and we believe it to be rare on this host, as we never encountered it when scrutinizing numerous samples of *Pteridium*, and other ferns, for microfungi (Holm & Holm 1978, 1979).

Corlett (1981) preferred the epithet "*lophospora*" to "*Fuckelii*" because of a misunderstanding

ing, considering the latter epithet to be linked to *Sphaeria diminuens* Pers. In fact, both epithets are of equal age, but certainly the much more familiar "*Fuckelii*" should have preference.

A further synonym is *Lophiosphaera mendax*. It was said by Rehm (1907) to differ from all related species by the small spores which were given as  $12 \times 4 \mu\text{m}$ . The type material agrees in all respects with *L. Fuckelii* with (immature) spores measuring  $14-16 \times 5-6 \mu\text{m}$ . We first found this discovery surprising, as *L. Fuckelii* has only rarely been reported from herbaceous hosts. However, Dr. Sheila Francis has informed us that she has collected it on several herbs, including *Agrimonia eupatoria*, *Epilobium angustifolium*, *E. hirsutum*, *Filipendula ulmaria*, *Rumex* spp., *Teucrium scorodonia*. It seems to be particularly common on *Rumex*. Moreover, she has also found the species on leaves of *Laurus nobilis*, a remarkable substrate for a *Lophiostoma*, cf. p. 2.

*L. Fuckelii* might be a southern species and has not been reported earlier from Sweden or Scandinavia.

Specimens examined (besides those cited above):

**Sweden.** Skåne: Vitaby, Stenshuvud, *Rubus fruticosus* coll., 5.X.1985, Holm 3802a. Åhus, pr. Sjögård, *R. caesius*, 6.X.1985, Holm 3809a.

**Great Britain.** Berks, Silwood Park, *Rubus* sp., IMI 111105. - E. Sussex, Seaford, *Rumex* sp., IMI 111501, 111655, 111682 (all leg. S. M. Francis).

**Germany.** Sachsen, Schmilka, *Rubus fruticosus*, 17.VIII.1903, Sydow, "*Metasphaeria sepincola* var. *Ruborum* f. *appendiculata*", det. Rehm (S).

**Switzerland.** Burgdorf, wood of *Quercus*, 28.VIII.1887, Wegelin, det. Rehm as *L. pulveraceum* (S).

### 9. *Lophiostoma glaciale* Rehm

Ber. Nathist. Ver. Augsburg 26:47 (1881) - *Lophiosphaera glacialis* (Rehm) Sacc., Syll. 2: 677 (1883) - Type: Hungary, Liptau, Mt Dzurowa, *Aconitum napellus*, VIII.1872, Lojka (= Rehm, Asc. 183 "*Lophiostoma Sedi*") (UPS, isö).

Exs.: 0.

Figs. 35, 97.

**Ascomata** scattered in the blackened substratum,

*Symb. Bot. Ups. XXVIII:2*

rather large and coarse, up to 0.5 mm diam., with a strong laterally flattened papilla, c. 0.2 mm high, with crest up to 0.3 mm. **Peridium** up to 50  $\mu\text{m}$  broad, of many layers of flattened cells, up to 12  $\mu\text{m}$ , with  $\pm$  uneven pigmentation. **Asci** clavate  $110-135 \times 12-15 \mu\text{m}$ , 8-spored. **Spores** fusiform, 1-septate, (25-)  $30-35 \times 5-6 \mu\text{m}$ , with distinct oil droplets, hyaline, with long terminal appendages, which are stained by Cotton Blue at the extremes.

*L. glaciale* is no doubt closely related to *L. macrostomum*, differing mainly by the unusually long appendages. It seems to prefer *Aconitum* stems, and is perhaps a representative of the "arctic-alpine" fungi. In any case, it is interesting that this Central-European species has turned out to occur also in Scandinavia. It has been greatly neglected, and so far has been noticed only by Rehm.

Specimens seen:

**Sweden.** Jämtland, Åre, *Aconitum septentrionale*, 24.VI.1930, Eliasson indet. (S), & ibid. 27.VI.1931, Eliasson, "*Lophiosphaera*" (S).

**Norway.** Oppdal hd; Kongsvold, *A. sept.* 23.VIII.1985, Holm 3736a. pr. Stölensåtra, *Polemonium coeruleum*. 24.VIII.1985, Holm 3751a.

**Austria.** Tyrol: pr. Taschach-Gletscher, VIII.1875, *A. napellus*, Rehm (S). Schrofenspass, IX.1905, *Senecio Fuchsii*, Rehm (S). (These two finds reported by Rehm, 1911 p. 95). Arlberg, Konstanzer-Hütte, IX.1905, *Senecio Fuchsii*, Rehm, "*L. alpincola*" (S).

**Czecho-Slovakia.** Tatra, Grosser Kohlbachtal, c. 1300 m., 1882, *Aconitum* sp., Linhart (S). Ibid.?, *Aconitum* sp. 1885, Linhart, "*L. vagabundum*" (S).

### 10. *Lophiostoma macrostomoides* (De Not.) Ces. & De Not.

Comm. Soc. Critt. Ital. 1: 219 (1863) - *Sphaeria macrostomoides* De Not., Mem. Accad. Sci. Torino ser. 2. 13: 111 (1854) - Type: Italy, pr. Milano, old bark of *Salix alba*, 16.X.1838, De Notaris (RO, holo!)

*Lophiostoma compressum* spp. *pseudomacrostomum* Sacc., Michelia 1: 334 (1878) saltem sensu auct. plur. - Type?

*Trematosphaeria hypoxyloides* Rehm, Ann. Myc. 5: 540 (1907) - Type: Germany, Ober-Lausitz, bark of *Tilia*, 12.V.1900, Feurich (S!)

Exs.: Erb. Critt. Ital. II: 453 (RO) - Rehm, Asc. 482 a & b, 1020 ("*L. salicum*") (S, UPS).

Figs. 47-49, 69, 88-90.

**Ascomata** scattered, large and coarse, up to 1 mm long, with a  $\pm$  distinct neck with a rather obtuse crest, attaining 0.4 mm. **Asci** clavate,  $140-150 \times 16-18 \mu\text{m}$ , 8-spored. **Spores** very variable, generally broadly cylindric, (25-)  $30-40 (-44) \times 8-10 (-13) \mu\text{m}$ , (3-) 5-7-septate, rich brown.

On bark and wood, generally of frondose trees and shrubs.

The circumscription of this species is very problematic as there are transitions to the *caulium* group as well as to *L. quadrinucleatum* and to *L. compressum*. We have been much inclined to treat it as a variety within the *caulium* complex and our keeping it at specific rank is partly a concession to the established practice.

When typically developed the species certainly seems quite characteristic: the spores are large and thick, sometimes very thick with a length/width ratio up to 3/1, with obtuse ends, often constricted at middle, 5-7-septate. It presents a bewildering spore variability, though, even within one single ascoma. In a mount one will often find, besides "normal" spores, also those approaching *L. caulium* var. e., i.e. narrower spores, with more pointed ends, often somewhat caudate. Spores with 3 or 4 septa may also be frequent, reminiscent of *L. quadrinucleatum* and sundry muriform spores are not seldom seen. We cannot propose a satisfactory delimitation towards non-appendiculate *L. caulium* ("var. e") but on the whole a rule of thumb seems workable: *L. macrostomoides* is found on wood and bark, whilst *L. caulium* e. is herbicolous. Certainly annoying exceptions occur. This problem has not been discussed by previous workers as far as we know.

Another puzzling and so far unnoticed question is the demarcation towards *L. quadrinucleatum*. Four-celled spores may be rather frequent in certain samples, whilst on the other hand there is an aberrant *quadrinucleatum* form on *Berberis*, with many five- or six-celled spores, cf. p. 00. For the

time being we cannot suggest a better solution than treating specimens with a majority of 3- or 4-septate spores as *L. quadrinucleatum* and those with a majority of 5-septate ones as *L. macrostomoides*.

Finally, there is the problem of occasional muriform spores. Such forms, approaching *L. compressum*, are not at all rare but have long been known as *L. pseudomacrostomum* Sacc. Chesters & Bell (1970a) have kept this taxon, though as a variety of *Platystomum* (= *Lophiostoma*) *compressum*, apparently including in it any specimen with a single muriform spore. A practical solution but not very satisfactory, as such forms indubitably are closely related to *L. macrostomoides*.

The traditional interpretation of *L. macrostomoides* (De Not.) is correct as evidenced by original material in RO that probably can be regarded as holotype. It is in a good state and quite typical. The synonymy of *Trematosphaeria hypoxyloides* Rehm is also testified by the type material, though Rehm himself later (1911) erroneously claimed it to be = *L. balsamianum*, i.e. *Navicella pileata*.

Specimens examined (besides the exsiccata):

**Sweden.** Stockholm, *Sambucus nigra*, decorticated wood, Romell 15368 (S). - Södermanland, Vallby, bark of *Salix fragilis*, Lindblad sub nom. "*Sphaeria excipuliformis*" (S). - Uppland: Dalby: pr. Jerusalem, wood of *Salix* sp., 26.IV.1984, Holm 3089; wood of *Salix cinerea*, 1.III.1986, Holm 3928 g. Säby klint, wood of *Salix fragilis*, 21.III.1986, Holm 3959h. Skokloster, ?*Corylus* wood, 23.V.1967, Lundqvist 5281. (Spores very large,  $30-44 \times 10-13 \mu\text{m}$ , 5-7-sept., dark brown). Uppsala, Vårdsåtra Naturpark, bark of *Salix fragilis*, III.1946, L. Holm 275. Västeråker, Eneby, bark of *Salix fragilis*, 1.III.1980, Holm 1931e. - Medelpad, Indal, wood of *Populus tremula*, E. Eriksson, "*L. macrostomoides*", det. Petrak (S).

**Norway.** Sör-Trøndelag, Oppdal, Stölegge, wood of *Alnus incana*, 24.VIII.1985, Holm 3742a.

**Finland.** Bark of *Salix fragilis*, Herb. Karsten no. 2711 ("*L. macrostomum*") (H).

**Germany.** Bayern: Auensberg, wood of *Hedera helix*, "*L. pseudomacrostomum*", det. Rehm (S). Dechbetten, V.1879, bark of *Salix* sp., "*L. macrostomoides*", Rehm (S). Hinterstein, wood of *Salix* sp., "*L. salicum*", Rehm (S). Raintal, pine wood, VI.1890, "*L. pinastri*", Rehm (S). Windsheim, *Populus* bark, III.1873, "*L.*

*macrostomoides*", Rehm (S). — Ober-Lausitz: Bark of *Tilia*, Feurich (S). — Sachsen: Leipzig, *Tilia*, 1837, Kunze, "*Sph. macrostomoides*" (RO).  
Austria. Tyrol. Zwieselstein, pine wood, IX.1888, "*L. pinastri*", Rehm (S).

11. *Lophiostoma massarioides* (Sacc.) Holm n. comb.

*Lophiotrema massarioides* Sacc., *Michelia* 1:412 (1878) — Type: Italy, Sermide, corticated branches of *Ailanthus glandulosa*, 13.V.1877 (PAD!).

Exs.: Rehm, Asc. 1019 (S, UPS).

Figs. 44, 106.

**Ascocarps** scattered, erumpent, large, up to 0.6 mm diam. (elongated up to 0.8 mm in length), with a strong papilla, up to 0.3 mm high with a rather blunt crest up to 0.3 mm long. **Asci** clavate 175–200 × 20–25 μm, (6–) 8-spored. **Spores** ± broadly fusiform, 40–50 × 10–12 μm, 7–9-septate, long hyaline, the median cells largest, eventually faintly brown, smooth.

On bark and wood of frondose trees.

We must emphasize that our treatment of *L. massarioides* is tentative, as based solely on old herbarium material and we may have missed some critical spore details. Saccardo, in his original description, reported gelatinous spores ("strato hyalino obvolutis"), whilst Fig. 360 of his *Fungi Italici* seems to depict spores with an incrassated hyaline wall. From these data one may rather infer a kinship to *Massariosphaeria alpigena* and Chesters & Bell (1970a) apparently regard them as closely related. However, we have found no mucous sheath around the spores and their wall is only slightly thickened. *L. massarioides* sensu Berlese is depicted with normally thin-walled spores (Ic. F. I, tab. IV, Fig. 7).

Chesters and Bell (1970a) have included *L. massarioides* in synonymy of *L. appendiculatum*, which seems questionable. For the time being we keep *L. massarioides* as a separate taxon, perhaps related to *L. appendiculatum*, but distinguished by the non-appendiculate spores with somewhat incrassated wall.

*L. massarioides* is possibly a rare species and we have seen only three samples besides the type:

*Symb. Bot. Ups. XXVIII:2*

Sweden. Gotland, Bro, *Salix cinerea*, VII.1896, Vestergren, "*Lophiotrema auctum*", det. Rehm (S). The find is reported by Vestergren (1897 p. 270) as *Lophiotrema massarioides*!

Switzerland. Burgdorf, *Salix* sp., 9.VII.1887, Wegelin indet. (S). *ibid.* XI.1889, Wegelin (= Rehm, Asc. 1019 (S, UPS)).

12. *Lophiostoma myriocarpum* Fckl

F. rhen. no. 1807 (1866); *Symb. Myc.* 156 (1870) — *Lophiotrema myriocarpum* Sacc., *Mich.* 1: 338 (1878) — Type: Germany, pr. Hattenheim, bark of *Platanus* (UPS, iso!).

*Lophiotrema vigheffulense* (Pass.) Berl., *Ic. Fung.* 1:4 (1890) — *Lophiosphaera vigheffulensis* Pass., *Erb. Critt. Ital. ser.* 2 no. 1373 (1883) — Type: Italy, Vigheffio pr. Parma, cortex of *Deutzia scabra* (n.v.).

Exs.: Fckl, F. rhen. 1807.

Fig. 41.

**Ascocarps** rather densely scattered, immersed — erumpent, 0.3–0.4 mm diam, sometimes prolonged to 0.6 mm, with a rather coarse papilla; ostiole c. 0.2 mm. **Peridium** strongly developed, 25–50 μm, laterally at base still more, of several layers flattened, ± irregularly pigmented cells. **Asci** almost cylindric 100–120 × 10–12 μm, 8-spored. **Spores** narrowly fusiform, (24–) 28–36 × 4–6 μm, 3–5-septate, hyaline with numerous oil droplets, when young with acute ends.

On bark (mainly?) and wood of frondose trees, also on *Dryas*.

*L. myriocarpum* is well characterized by the narrow spores, which early have more than 1 septum. It has been greatly overlooked and for a long time the type collections cited above were the only ones reported. Chesters & Bell (1970a p. 16) drew attention to the species, citing three other collections. However, they used the epithet *vigheffulensis* and were apparently ignorant of *L. myriocarpum*. We have not seen type material of *L. vigheffulense* but judging from Berlese's illustration the identity seems evident. Anyway, the epithet *myriocarpum* has priority.

Rather suprisingly, we have also come across this species on *Dryas octopetala*, on old stems, though perhaps in a somewhat deviating form.

Our collection 3761a seems to be a good match of *L. myriocarpum*, whilst no. 4061b differs by, in part, considerably larger spores (anomalous?), up to 40 × 8 μm. Our other four collections seem fairly intermediate, but are rather immature. All samples are scanty and more and better developed material is needed to permit a definite judgement of this interesting form. The collections on *Dryas* are listed separately below.

We are very much in doubt about the true generic disposition of this species, but have not better place for it, even though it seems isolated in *Lophiostoma*. The cylindric asci are indicative of *Lophiotrema*, but the peridial anatomy is not.

Material examined:

Sweden. Uppland: Dalby, Säby klint, bark of *Salix fragilis*, 21.III.1986, Holm 3959k. Västeråker, pr. Hammarén, bark of *Fraxinus*, 30.III.1985, Holm 3415k. Österlövsta, Skyttaskär, bark of *Fraxinus* 6.V.1981, holm 2370c & 29.IV.1984, 3097c.

Germany. Rheinland, Hattenheim, *Platanus* (=F. rhen. 1807) (UPS). — Bayern: pr. Augsburg, cortex indet., VI.1876, Britzelmayer, "*Zignoella dolichospora*", det. Rehm (S). Algäu, Hinterstein, lignum indet., IX.1909, "*L. crenatum*", det. et leg. Rehm (S). Ramsau, *Erica carnea*, VIII.1903, "*Metasphaeria*", det. et leg. Rehm (S). Weismain, *Populus alba* cortex, II.1910, Ade, "*L. praemorsum*", det. Rehm (S). — Franken. Sugenheim, lignum indet., IX.1869, "*Lophiostoma*", Rehm (S).

Austria. Tyrol, Hinterbärenbad, *Sambucus*, cortex and lignum, VIII.1902. "*L. praemorsum*", Rehm (S).

Switzerland. pr. Bern, cortex and lignum indet., VIII.1890, F. v. Tavel, "*L. crenatum*", det. Rehm (S).

Hungary. Transsylvania, Hunyad, lignum indet., 1873, Lojka, "*L. crenatum*" (Asc. Lojkani 2093) (S).

On *Dryas octopetala*:

Sweden. Torne lappmark, Jukkasjärvi par.: Mt Paddos, c. 600 m, 2.VII.1986, K. Holm 4047 g & A. Nogrased. Abisko, Mt Nuolja, near the upper lift station c. 1000 m, 3.VII.1986, A. Nogrased; c. 500 m S. of Nilssonjokk canyon, 20.VII.1986, A. Nogrased.

Norway. Finnmark, Porsanger, pr. Kolvik, 24.VIII.1986, Holm 4230c. Sör-Trøndelag, Oppdal, N. slope of Mt. N. Knutshö, c. 1400 m, old woody stem of *Dryas octopetala* 24.VIII.1985, Holm 3761a.

13. *Lophiostoma nuculoides* (Sacc.) Wint.

Rbh., Krypt.-Fl., *Pyrenomycetes* 306 (1885) — *Lophiotrema nucula* var. *nuculoides* Sacc., *Syll.* 2: 680 (1883) —

*Lophiopsis nuculoides* Berl., *Ic. Fung.* 1: 19 (1890) — Type: Germany, Augsburg, bark of *Populus nigra*, II.1877, Britzelmayer (=Rehm, Asc. 481 as "*Lophiostoma Nucula*") (S, UPS).

Exs.: Fckl, F. rhen. 2168 ("*L. nucula*") (S) — Rehm, Asc. 481, 1346 (S, UPS).

Figs. 42, 105.

**Ascocarps** thinly — thickly scattered, erumpent, 0.3–0.5 mm diam., papilla of varying length, 0–0.2 mm, crest blunt, up to 0.2 mm long. **Peridium** c. 40 μm broad of several layers of rather small cells, c. 10 μm, the outer layers strongly pigmented. **Asci** cylindric, 175–200 × 15 μm, 8-spored. **Spores** uniseriate, ellipsoid 25–32 × 10–12 μm, hyaline, much varying in septation: 3–5(–8) transverse septa; generally 1 or 2 of the transverse segments with 1 longitudinal (or sometimes Y-formed) septum.

In bark of *Populus* and *Salix*.

A species easily recognizable by the hyaline, muriform spores. Its true generic placement, however, is more problematic but we have no better place for it. The peridial anatomy is more suggestive of *Lophiostoma* than of *Lophiotrema*. Chesters & Bell (1970a) treated it as a variety only of *Lophiostoma compressum* because of the occasional occurrence of fully brown spores. We have never encountered such intermediate forms, but admittedly our experience of the species is not very great, as based on ten collections. It is perhaps a rare species and we have not collected it ourselves. So far it has been reported from Central Europe only, cf. Rehm (1911), but we have come across two misnamed Swedish samples:

Sweden. Uppland: Norrsunda, Rosersberg, cortex indet., 2.VI.1884, Romell ("*Lophiostoma*") (S). Uppsala, bark of *Populus nigra*, 21.VII.1884, Romell ("*L. macrostomum*") (UPS).

14. *Lophiostoma quadrinucleatum* Karst.

*Myc. Fenn.* 2:85 (1873) — Type: Finland, Tav. austr., Mustiala, wood of *Rhamnus frangula*, 25.VII.1869, Karsten (H!).

*Lophiostoma acervatum* Karst., *Myc. Fenn.* 2: 85 (1873) — Type: Finland, Tav. austr., Mustiala, corticated twig of *Prunus padus*, I.V.1867, Karsten (H!).

*Symb. Bot. Ups. XXVIII:2*

?*Lophiostoma caespitosum* Fuckel, Symb. Myc. Nachtr. 2: 29 (1873) – Type: Switzerland, pr. Neuchâtel, corticated twigs of *Crataegus oxyacantha*, II. 1872, Morthier (S, iso!).

? *Lophiostoma Starbäckii* Karst., Hedw. 26: 125 (1887) – Type: Finland, Mustiala, wood of *Betula*, VI.1887, Starbäck (HIS!).

Exs.: Syd., Myc. march. 2344 (*L. caespitosum*) (S, UPS).

Figs. 51, 87.

**Ascomata** scattered or crowded, immersed-erumpent, large, up to 0.7 mm long, papillate, with an often sharp crest ad 0.4 mm. **Asci** cylindrico-clavate, c.  $140 \times 15 \mu\text{m}$ , 8-spored. **Spores** ellipsoid, (20–)  $24\text{--}28 \times (6\text{--})7\text{--}8 \mu\text{m}$ , 3-septate, brown, guttulate.

On frondose wood and bark.

As indicated by the nomenclature above, the circumscription of the species is far from clear. Our description refers to the "typical" form which is represented by a few samples listed below, and also by the type of *L. acervatum*. The reason for Karsten's keeping the latter apart from *L. quadrinucleatum* was apparently the different mode of growth: the epithet "*acervatum*" alluding to the fact that the ascomata are seated together (in the lenticels). The synonymy has moreover been pointed out by Chesters & Bell (1970a); these authors selected the epithet *quadrinucleatum*, a choice that should be accepted (Art. 57.2).

A certainly related but probably different form is found in three samples, remarkably enough all on *Berberis*. It is characterized by more fusiform spores,  $22\text{--}29 \times 6\text{--}7 \mu\text{m}$ , often with additional septa, four or five, and even sundry muriform spores do occur. These collections are also listed below but they are referred to *L. quadrinucleatum* with express reservation only and may represent a transition to *L. macrostomoides*.

Another relative of doubtful independence is *L. caespitosum*. Its appearance is very much like that of *L. quadrinucleatum*, but it differs by cylindrical asci with smaller, almost uniseriate spores,  $16\text{--}20 \times 6\text{--}7 \mu\text{m}$ , often somewhat cuneate.

Symb. Bot. Ups. XXVIII:2

A close match of the type is Syd., Myc. march. no 2344, also on *Crataegus*! This taxon was not mentioned by Chesters & Bell, but it was recognized by Winter, whilst Rehm (1911) treated it as a var. *Rosacearum* of *L. quadrinucleatum*. We have not found it but it should be sought for on *Crataegus*.

*L. Starbäckii*, finally, is also a problem. The type material is reminiscent of *L. caespitosum* as to asci and spores, but the ascomata are plainly different, almost neckless with a poorly developed crest. Karsten (op. cit.) stated the spores to be "primitus hyalinae, deinde subflavae", but we have found the spores to be fully brown. *L. Starbäckii* may be worthy of recognition but more material is needed to assess its taxonomic value. It is noteworthy that we have never found it in spite of scanning masses of birch wood. In return we have a few times come across a herbicolous form which is very similar to *L. quadrinucleatum*. Sweden: Gotland: Sundre, Hoburgen, *Adonis vernalis*, 1.VI.1987, Holm 4534g. St. Karlsö, pr. Älmar, *Adonis v.*, 4.VI.1987, Holm 4570f. – Upland., Uppsala, pr. Ulleråker, *Centaurea scabiosa*, 19.V.1949, L. Holm.

*L. quadrinucleatum* is hardly a common fungus, at least not in the Uppsala area where we have found it only twice. Chesters & Bell cite no British record. It is possibly a northern species, as Mathiassen (1985) has several collections from Norway, Troms, all on *Salix* wood.

Specimens seen, in addition to cited types:

**Sweden.** Upland: Dalby: Dalkarlskärret, *Salix cinerea*, 24.XI.1985, Holm 3853j. pr. "Jerusalem", bark of *Acer platanoides*, 8.XI.1986, Holm 4338. Denmark, *Berberis vulgaris*, 12.VI.1927, Björkman & Nannfeldt, ("*Lophiostoma*") (aberrant form). Uppsala, *Berberis vulgaris*, 14.VII.1884, Romell (aberrant form, S).

**Norway.** Troms: Bardu, *Salix pentandra*, 15.VII.1981, Mathiassen 640/81. Målselv, *Salix glauca*, 16.IX.1982, Mathiassen 791/82.

**Finland.** Tav. austr., Mustiala, sine dato, Starbäck (S) – Nyland, Borgå, *Berberis vulgaris*, 1922, Nyberg (aberrant form, H).

**Germany.** Bayern. Augsburg, *Salix* sp., 1878, Britzelmayr (S).

**Roumania.** Transsylvania, pr. Malomviz, *Prunus spinosa*, VIII.1873, Lojka (S).

15. *Lophiostoma semiliberum* (Desm.) Ces. & De Not.

Comm. Soc. Critt. Ital. 1:220 (1863) – *Lophiotrema semiliberum* Sacc., Michelia 1:338 (1878) – *Sphaeria semiliberum* Desm., Ann. Sci. Nat. Bot. ser. 3. 6:78 (1846) – Type: France, Caen, culms of "*Bromus sylvaticus*" (= *Brachypodium* s.), Roberge (UPS, iso!).

Exs.: Berk, Brit. F. 87 ("*Sph. Arundinis*") (UPS) – Fckl, F. rhen. 1805 (S) – Moug. & Nestl., Stirp. Vog. 1172 ("*Sphaeria Arundinis*") (UPS) – (Petr., Fl. Boh. Mor. II(1): 111 = *L. Arundinis*, 112 = *Metasphaeria* cfr *coccodes*, S) – Rehm, Asc. 692 ("*L. arundinis*") (693 = *L. macrostomum*) (S) – Sacc., Myc. ven. 678, 1477 (UPS).

Figs. 2, 38, 65, 67, 101.

**Ascocarps** erumpent from the often somewhat blackened substratum, of varying size and form, 0.2–0.6 mm diam. (Often prolonged parallel to the axis of the host; sometimes even several confluent into complex dothideaceous structures up to 3 mm long). **Peridium** laterally c.  $50 \mu\text{m}$  of many layers flattened cells, up to  $12 \mu\text{m}$ , the outer layers with encrusted walls. Papilla rather strong, up to 0.2 mm high with a crest up to 0.5 mm long, sometimes fully *macrostomum*-like. **Asci** clavate,  $100\text{--}125 \times 12 \mu\text{m}$ , 8-spored. **Spores** narrowly fusiform,  $32\text{--}40 \times 5\text{--}6 \mu\text{m}$ , long 1-septate and hyaline with up to 8 oil droplets, lastly with 3 or rarely more septa, faintly brown and minutely verruculose; no terminal appendages.

On grass culms.

*L. semiliberum* seems close to *L. macrostomum*, mainly distinguished by the lack of spore appendages. In both species the spores are long 1-septate and hyaline, eventually turning 3-septate, faintly brown and minutely verruculose. In one collection (England 1846, Broome, UPS) we have seen a few pluriseptate spores.

Several authors, latest O. Eriksson (1967) have been inclined to regard *L. semiliberum* as an immature *L. arundinis*. This opinion has been vigorously contested by Chesters and Bell (1970a), and we agree with them. We have not come across any intermediates.

*L. semiliberum* is apparently a rather common species on various grasses: we have seen it on the following hosts: *Brachypodium sylvaticum*, *Des-*

*champsia caespitosa*, *Elytrigia repens*, *Elymus arenarius*, *Festuca gigantea*, *Glyceria fluitans*, *Melica ciliata*, *Nardus stricta*, *Phragmites communis*, *Secale cereale*. It is particularly well developed on reed culms, with large fruit bodies.

16. *Lophiostoma subcorticale* Fckl

Symb. Myc. 157 (1870) – *Lophiotrema subcorticale* Sacc., Mich. 1: 338 (1878) – Type: Germany, Östrich, bark of *Malus domestica* (S, iso!).

Exs.: Fckl, F. rhen. 1809 (S) – Rehm, Asc. 483 (S, UPS) – Roum., F. gall. (2685), 7040 (UPS).

Figs. 36, 102, 103.

**Ascocarps** scattered, immersed-erumpent, 0.2–0.4 mm diam. with a strong papilla, up to 0.4 mm high with a rather blunt crest up to 0.4 mm long. **Asci** clavate,  $160\text{--}170 \times 20\text{--}23 \mu\text{m}$ , with 8 spores (according to Chesters & Bell often less). **Spores** fusiform,  $60\text{--}70 \times 10\text{--}12 \mu\text{m}$ , rather thickwalled, with several distinct oil droplets, first 1-septate, but often with 3 septa when still in asci, finally with 5 or exceptionally 6 septa, first hyaline and smooth but later brownish and verrucose. no appendages.

Mainly on bark of *Malus*.

This species is well characterized by the unusually large spores which at maturity turn a definite brown. It seems distinctive also ecologically with a marked preference for bark of *Malus*, especially the inner side of old loosening bark. We have also seen a few collections on bark and wood of *Fraxinus excelsior* but otherwise we do not know of any further substrates, except for a record on *Salix* (Chesters & Bell, 1970a). This indicates an amazingly narrow host range.

*L. subcorticale* has not been much collected and was previously not known from Sweden or Scandinavia. It has not been reported from Great Britain.

Specimens seen (on bark of *Malus*, if not otherwise stated):

**Sweden.** Upland: Dalby, "Jerusalem", 22.I.1983, Holm 2808a & 5.III.1986, 3932d. 5.III.1984, wood of *Fraxinus*, Holm 3034a. Västeråker, Hammaren, bark of *Fraxinus*, 30.III.1985, Holm, 3415a.

Symb. Bot. Ups. XXVIII:2

**Germany.** Bayern, Lohr im Spessart (= Rehm, Asc. 483). – Franken: Buchheim, 1873. Gubein (?), 1867. Sugenheim, IX.1866. Windsheim, VIII.1872. (all S, leg. et det. Rehm). – Nassau, Östlich (= Fekl, F. rhen. 1809).

**France.** Montagne de Bard, wood of *Fraxinus*, V.1896, Fautrey (= Roum., F. gall. 7040).

**Hungary.** Prencov, leg. Kmet (S).

### 17. *Lophiostoma vicinum* (Sacc.) Sacc.

F. Ital. tab. 239 (1878) – *Lophiostoma montelicum* ssp. *vicinum* Sacc., Mich. 1:44 (1877) – *Schizostoma vicinum* Sacc., Mich. 1:337 (1878) – Type: Italy, Montello, oak bark, IX.1875 (PAD!).

Exs.: Rehm, Asc. 485 (S, UPS).

Figs. 57, 108.

*L. vicinum* is a little known species and the few records may partly be doubtful. It has been reported twice from Europe, viz. the type and Rehm's *exsiccatum* (Germany, Augsburg, bark of *Populus nigra*, III.1878, Britzelmayr). It was briefly dealt with by Holm and Yue (1987) on the basis of that material. We have recently made two finds of a fungus which is tentatively identified as *L. vicinum* having these characters:

**Ascomata** scattered, immersed-erumpent, 0.5–0.6 mm diam. with a strong, laterally compressed neck, up to 0.4 mm long. **Asci** almost cylindrical, 140–160 × 12–16 μm, 8-spored. **Spores** remarkably variable in size and form, broadly ellipsoid to narrowly fusiform, 1(–3)-septate, (28–)34–48 × 8–12 μm, with a marked median constriction, finally rich brown.

The variability in spore form is striking, the ratio length/width lying between 2.3 and 6.8, with a mean of 5.0. Generally the spores are narrowly fusiform but broadly ellipsoid spores do occur, very similar to those prevailing in Rehm, Asc. 485, where the ratio is 2.7–4.7, medium 3.6. The type has still smaller and broader spores, 24–30 × 8–12 μm, with a ratio of 2.4–3.1, mean 3.0. The latter figures are based on 10 spores per sample only, but they are no doubt indicative. Perhaps there is a gradient with increasing spore width towards the north.

*L. vicinum* seems to be a rare species and in any case it is seldom collected. In addition to Sac-

*Symb. Bot. Ups. XXVIII:2*

cardo's and Britzelmayr's material cited above, we have seen these collections:

**Sweden.** Uppland, Dalby: Jerusalem, bark of *Malus domestica*, 29.XII.1985, Holm 3857 & 4.III.1986, 3931a. Säby klint, old bark of *Salix fragilis*, 2.III.1984, Holm 3025a. Österlövsta, Skyttskär, bark of *Fraxinus excelsior*, 29.IV.1984, Holm 3096b.

### 18. *Lophiostoma viridarum* Cooke

Trans. Bot. Soc. Edinburgh 9:328 (1868) ("*viridaria*") – Type: England, Surrey, Shere, "on decorticated twigs of Maple", Jan. 1866, Capron" (n.v.).

*Lophiostoma Desmazierii* Sacc. & Speg., Mich. 1:411 (1878) – Types: "in ramulis Rhamni cathartici ad S<sup>e</sup> Lucie (Gallia) et ramulis Aceris campestris ad Courtrai (Belgia)".

Exs.: Rehm, Asc. 1093 (S, UPS) – West., Herb. Crypt. Belge 909, 1205 ("*Sphaeria macrostoma*") (RO).

Fig. 107.

**Ascomata** scattered, innate-erumpent, up to 0.8 mm diam. with a coarse neck with a crest ad 0.4 mm long; substrate often green-coloured. **Asci** cylindrical, c. 200 × 20 μm, 8 spored. **Spores** fusiform, 32–46 × 8–13 μm, 3-septate, with ± acute ends, cinnamon brown: outermost wall layer hyaline (gelatinous?), inner layer brown, striate from longitudinally arranged warts.

In bark and wood of frondose trees and shrubs. An extremely characteristic species, at once recognized by the striate spores and the green coloration of the substrate (but which is not always present). It is obviously not well accommodated in *Lophiostoma* but for the time being we have no better place for it. Possibly a southern species as yet not known from Sweden but it is likely to occur in Skåne, as two finds have been recorded from Denmark: Århus, on branches of *Salix* (Munk 1957 p. 426) and Sjöland, *Cornus* (Chesters & Bell 1970a p. 33).

### 19. *Lophiostoma Winteri* (Sacc.) Winter

Rbh. Krypt. -Fl., 2. Aufl., 1(2):297 (1885) – *Lophiostoma Winteri* Sacc., Michelia 1: 358 (1878) – Type: Switzerland, pr. Zürich, dead stems of *Helianthemum Chamaecistus* (= *H. nummularium*), VIII.1878, Winter (= Kze, F. sel. 340) (UPS!).

*Lophiostoma insidiosum* var. *sessile* Rehm, Hedw. 40: (104) (1901) – Type: Germany, Bavarian Alps, pr. Herzogenstand, dead stems of *Erica carnea*, IX.1900, Rehm (= Rehm Asc. 1374) (S UPS!).

"*Lophiotrema balnei-ursi* (Rehm) Rehm", Ann. Mycol. 9:98 (1911) non *Melanopsamma balnei-ursi* Rehm, Öst. Bot. Zeitschr. 53:10 (1903).

Exs.: Kunze, F. sel. 340 – Rehm, Asc. 1374.

Figs. 4, 43, 64, 66.

**Ascomarps** generally scattered, but little immersed, (0.2–) 0.4–0.6 mm diam. with a rather coarse flattened papilla, c. 0.2 mm high and the ostiole as long. **Peridium** strongly developed, laterally 75–90 μm, broad, (considerably thinner at base) composed of numerous layers of rather small often flattened thinwalled cells, the outermost layers strongly pigmented. **Asci** clavate, 110–135 × 15–18 μm, 8-spored. **Spores** elliptical – fusiform, (3–) 5–7-septate, (22–) 26–34 × (6–) 8–11 μm, with short terminal appendages, hyaline or eventually faintly brown, guttulate.

On woody stems.

*L. Winteri* is certainly a near relative of the *caulium* group and may possibly be confused with light-spored forms of that complex.

As a rule it is readily identifiable by the spores, which look rather plump and "stocky". They are mostly 5-septate, with the 3rd cell somewhat inflated, long hyaline and generally appendiculate but in three of our collections no appendages are seen (Holm 3251a, 4061a, 3690d). The taxonomic significance of this remarkable variation is unclear.

*L. Winteri* seems to have a distinctive ecology with a preference for ± creeping dwarf-shrubs (*Calluna*, *Dryas*, *Erica carnea*, *Helianthemum* spp., *Rhododendron hirsutum*, *Salix retusa*). It is apparently rather common in the Alps, as evident from several published finds, cf. Holm & Holm (1986). The occurrence on Öland's "Alvar", the vegetation of which has certain alpine elements is very interesting. Chesters & Bell (1970a) reported it on *Artemisia*, *Urtica* and *Vitis*, unexpected hostplants in our experience.

The name *Lophiostoma Winteri* was almost for-

gotten for a long time, i.a. not mentioned by Rehm (1911). This may have been due to Berlese's erroneously synonymising it with *L. praemorsum*. Rehm (l.c.) recorded the species as "*Lophiotrema balnei-ursi*", an odd name, based on his own *Melanopsamma balnei-ursi*, which is no Lophiostomataceous fungus at all, but a *Massarina*, cf. Holm & Holm (1985).

Scandinavian specimens seen:

**Sweden.** Öland: Resmo, Gyng Alvar, 17.X.1984. Sandby, Åby alvar, 12.VII.1984, Stenåsa, Lilla Brunneby alvar, 13.VII.1984. S. Möckleby, pr. Degerhamn, 15.X.1984. – All on stems of *Helianthemum oelandicum*, leg. E. Rosén. – Gotland, between Sanda and Dalhem, *Calluna vulgaris*, 13.VI.1895, Vestergrén, "*Lophiostoma* sp." (S). – Torne Lappmark, Abisko, Mt Nuolja, 900–950 m, *Dryas octopetala*, 3.VII.1986, Holm 4061a.

**Norway.** Oppland, Dovre, Grimsdalen, c. 940 m, *Dryas*, 22.VIII.1985, Holm 3690d. – Finnmark, Porsanger, pr. Kolvik, *Dryas*, 24.VIII.1986, Holm 4230b.

### *Lophiotrema* Sacc. emend. L. & K. Holm.

Mich. 1:338 (1878) – Lectotype: *L. nucula* (Fr.) Sacc. (Clements & Shear 1931 p. 286).

*Lophiotrema* s. orig. is one of Saccardo's sporological genera, erected for the lophiostomataceous "Hyalophragmicæ" and it has been widely used in that sense. With that circumscription it is highly heterogeneous, and was not accepted by Chesters & Bell (1970). However, *Lophiotrema* can appropriately be kept in a restricted sense for a group comprising the type and some apparently related species. The amended genus can be characterized as follows:

**Ascomata** small to medium-sized, ± pyriform but neck often reduced, even 0, sometimes cylindrical. **Peridium** approximately of equal thickness, 20–30 μm, composed of an outer texture angularis of uniformly pigmented cells, up to 12 μm, an inner layer of very small hyaline cells, with somewhat thickened walls. **Asci** cylindrical, **spores** hyaline, first 1-septate, at last 3-septate, with distinct guttules, often with a mucous sheath.

*Symb. Bot. Ups. XXVIII:2*

## Artificial key to the species

- |  |                         |
|--|-------------------------|
| 1. Spores with mucous sheath .....                                 | 2                       |
| Spores without mucous sheath .....                                 | 4                       |
| 2. Spores narrowly fusiform, with 3 oil drops/cell .....           | 3. <i>L. vagabundum</i> |
| Spores broadly fusiform, with 2 oil drops/cell .....               | 3                       |
| 3. Spores with obtuse ends, thickened above and below septum ..... | 4. sp. 1                |
| Spores with pointed ends, thickened above septum .....             | 5. sp. 2                |
| 4. Spores about ellipsoid .....                                    | 1. <i>L. nucula</i>     |
| Spores about oblong, inflated above septum .....                   | 2. <i>L. boreale</i>    |

1. *Lophiotrema nucula* (Fr.: Fr.) Sacc.

Mich. 1: 338 (1878) — *Sphaeria nucula* Fr.: Fr., Syst. Myc. 2: 466 (1823); K. V. A. Handl. 1817 p. 266 — *Lophiostoma Nucula* Ces. & De Not., Comm. Soc. Critt. Ital. 1: 220 (1863) — Lectotype prop.: Fr., Scl. succ. 238 (UPS!).

*Lophiostoma duplex* Karst., F. fenn. exs. no. 970 (1870) — *Lophiotrema duplex* Sacc., Mich. 1: 338 (1878) — Type: Finland, Mustiala, decorticated wood of *Sorbus aucuparia* (UPS, iso!).

Exs.: Fr., Scl. succ. 238 (UPS) — Karst., F. fenn. 970 (UPS) — Rehm, Asc. 382 (“*Trematosphaeria corticivora*”) (UPS, S), (481 = *L. nuculoides*, S, UPS) — (Syd., Myc. march. 2053 = ? *L. macrostomum* UPS, S). — ?Wartm. & Schenk, Schw. Krypt. 16 (S, vetustus).

Figs. 30, 31, 60, 62, 110.

**Ascomata** very variable as to size and shape, a variation that evidently is to some extent correlated with the substrate: on *wood* the ascomata are generally densely scattered, erumpent from the often strongly darkened substratum, usually 0.2–0.3 mm diam. but often prolonged to 0.4 mm parallel to the grain of the host, **neck** up to 0.1 mm high but often insignificant or even almost lacking, ostiole up to 0.2 mm long; in *bark*, the ascomata are often more thinly scattered, generally more pyriform and smaller, often not more than 0.1 mm diam., the **neck** is usually distinct, cylindrical or apically flattened into a short crest. **Asci** cylindrical, 120–130 × 8–11 μm, 8-spored. **Spores** elliptico-fusiform, 18–21 (–24) × 5–6 (–7) μm, long 1-septate with 2 oil droplets per cell, eventually often 3-septate, wall hyaline or finally turning faintly brown and minutely verruculose, without gelatinous sheath.

On many kinds of frondose wood, less common in bark.

Symb. Bot. Ups. XXVIII:2

*Lophiotrema nucula* is generally readily recognized microscopically by the rather plump, obtuse spores with four globules whereas the macroscopic appearance is quite variable. One extreme is a conical fruit body with a cylindrical neck, another a semiglobose, neckless fruit body with a slot. As indicated above, the former type is (mainly) corticolous, the other one mainly lignicolous. This condition was noticed by Karsten who thought that two different taxa are involved, a corticolous *L. nucula* and a lignicolous *L. duplex*. We have ourselves been inclined to recognize these taxa at varietal rank but are now convinced that such a distinction is impracticable and also unjustified. This being so is evidenced by a recent very rich collection: Uppsala, Bot. Garden, bark of *Crataegus Douglasii*, 29.X.1986, 4334. A wide variety of ascoma types are found in this sample. *L. nucula* and *L. duplex* were synonymized by Berlese (1890) — without discussion — and he has been followed by most later authors. The species is probably common and widespread all over Scandinavia, especially on (frondose) wood, i.e. the “*duplex*-form”. Mathiassen (1985) has many records from Troms.

## NOTE ON THE TYPIFICATION OF SPHAERIA NUCULA FR.: FR.

Certainly Fries notion of his *Sphaeria nucula* was not very clearcut and he apparently changed his mind over the years. The original description (1817 p. 266) hardly referred to a lophiostomataceous fungus at all, as the ascomata are said to be “tvärstypade, utan papill, med naflad öppning”, i.e. truncate, epapillate, umbilicate. In Syst. Myc. (1823 p. 466) the description is, however, considerably modified, and is probably

based also on other elements: it is thus stated, i.a. “ostiololo minuto brevi subcylindrico l. *compresso!* ut in *Lophiis*”. It is noteworthy, though, that Fries did not refer the species to the tribe *Platy-stomae* but to the *Pertusae*. This he also did in Summa Veg. Scand. (1849 p. 390) where the name *Sphaeria nucula* is printed in italics, meaning that Fries considered it a variable species, among the “maxime proteae”. Probably he had the variable papilla in mind, the more so as the gave a reference to Berkeley (1836 p. 266) who stated l.c. that “the ostiolum is sometimes of exactly the same nature as in the following division” (i.e. *Platystomae*).

Returning to the Systema, we see that Fries cited there his *exsiccatum* Scler. Suec. no. 238 (“230”) which seems to be a good candidate for a lectotype (neotype?). The Uppsala copy consists of three small pieces of bark (*Quercus*?) with thinly scattered ascomata corresponding to the description of 1823 insofar as the neck is variable, cylindrical or slightly compressed.

Fries’s own concept permitted inclusion of various material as is evident from some other samples in UPS:

1. “*Sphaeria nucula* Fr. Femsjö” scr. Fries. — Three pieces of bark (oak?) with *Acrocordia gemmata* det. R. Santesson. In addition sparse apothecia of the lichen *Bacidia accedens* det. R. Moberg.
2. “*Sphaeria S. nuculae affinis*, Femsjö” scr. Fries. — Six small pieces of bark, with rather abundant *Bacidia accedens*, and also *Karschia lignyota*. Perhaps part of same collection as no. 1?
3. “*Sphaeria nucula*, (S. atriseda e Reften prope Lund in Quercu affinis, sed infidel crustae atrae), Scan. Lund.” scr. Fries. — the collection was examined in 1965 by Bell who supplied this note: “Appears to be a mixed collection of fungi. Some do not have slot-like ostioles. That which does, has large brown dictyospores (see slide)”. We can confirm these observations: the sample is a mixture of *Lophiostoma compressum* and *Massarina* cfr. *corticola*.
4. “*Sphaeria nucula* Fr. Vitulfsberg 19.8.1852. E. P. Fries” scr. E. P. Fries. — Four small pieces of

bark. Rather abundant *Arthopyrenia* sp. + a few ascomata of *Navicella pileata*.

5. “*Sphaeria Nucula* Fr.? Gallia. Lyon n. 210 Montagne.” scr. Fries. This is *Trematosphaeria pertusa*.

6. “*Sphaeria nucula* in cortice *Quercus*” scr. Mougeot, except for the word “*nucula*” which may have been added by Fries. — Two small pieces of bark with *Acrocordia gemmata*.

2. *Lophiotrema boreale* G. Math. ined.

Type: Norway, Troms, Harstad, *Salix nigricans*, 7.VII.1981, G. Mathiassen no. 218/81.

Figs. 32–33, 109.

Similar to *L. nucula* but distinctive mainly by the smaller spores, which are almost oblong, 14–16 × 3 μm, 1-septate, somewhat inflated above the septum. They are rather reminiscent of *L. Fuckelii* but lack terminal appendages. Asci cylindrical, generally 80–90 × 7–8 μm. In our material the wood is less blackened than is mostly the case in *L. nucula*; the ascomata are less gregarious with a strong tendency to reduction of the neck.

This species was recently distinguished, but not yet effectively published by G. Mathiassen (1985), on the basis of six collections from northernmost Norway, all on *Salix* wood. Apparently the same fungus has been found by us in Central Sweden, mainly on wood and (the inner side of) bark of birch.

## Material examined:

**Sweden**, Uppland: Dalby: c. 500 S. W. of “Jerusalem”, bark of *Betula verrucosa*, 8.IV.1977, Holm 960c. Tunaskog, wood of *Betula*, 16.IV.1980, Holm 2018c. pr. Björkdal, *Betula* bark, 17.III.1985, Holm 3414b. Dalby gård, *Betula* bark, 21.IV.1985, Holm 3445a. pr. “Jerusalem”, bark of *Fraxinus*, 23.II.1984, Holm 3010e. Dannemora, pr. Ekvik, *Corylus* bark and wood, 5.VII.1984, Holm 3163a & 3164b. Skokloster, pr. Bortorp, bark of *Betula*, 11.III.1980, Holm 1967b. — Torne Lappmark: Jukkasjärvi, Abisko, birch wood: 1.VII.1927, Nannfeldt 737, “*Lophiostoma*”. 4.VII.1928, Nannfeldt 1067, “*Zignoella*”.

**Norway**. Sör-Trøndelag, Oppdal, Stölegge, decorticated twig of *Alnus incana*, 24.VIII.1985, Holm 3742b.

3. *Lophiotrema vagabundum* (Sacc.) Sacc.

Mich. 1: 338 (1878) — *Lophiostoma vagabundum* Sacc.,

Symb. Bot. Ups. XXVIII:2



Hedw. 14:70 (1875) – Syntype: Italy, Treviso, *Melittis melissophyllum*, Saccardo (S!).

*Lophiotrema Origani* Kunze ex Sacc., Syll. 2:584 (1883) – Type: Germany, pr. Eisleben, *Origanum vulgare*, IX.1875, Kunze (= Kze, F. sel. 97) (UPS!).

*Lophiotrema rubidum* Sacc., Bomm. & Rouss. ap. Sacc., Atti Ist. Veneto ser. 6. 2:452 (1883) saltem sensu auct. mult. – Type: Belgium, “in sarmentis Rubi” (n.v.).

?*Lophiostoma pusillum* Fckl, Symb. Myc., App. 2:29 (1873) – Type: Germany, pr. Budenheim, *Calamagrostis epigejos* (G).

Exs.: Krieg., F. sax. 1465, 2210 (S) – Kze, F. sel. 97 (“*L. Origani*”) (S, UPS) – Petr., Fl. Bohem. Mor. II:1, 970 (S) – Rehm, Asc. 950 (“*L. rubidum*”) (S) – Roumeg., F. gall. 7231 (“*L. rubidum*”) (UPS) – Sacc., Myc. ven. 921 (UPS) – Syd., Myc. germ. 322 (S, UPS); Myc. march. 747 (non 1934) (S, UPS).

Figs. 3, 28, 61, 63, 111.

**Ascocarps** ± densely scattered, often in large numbers, immersed–erumpent from the substratum (which is often darkened, sometimes reddened), generally 0.2–0.3 mm diam, often elongated parallel to the long axis of the host substrate, neck short with an ostiole, 0.1–0.2 mm long. **Peridium** c. 20 μm broad, outer layers forming a textura angularis of pigmented cells up to 10 μm, inner layers of very small, hyaline cells with somewhat thickened walls. **Asci** cylindric, 100–110 × 7–8 μm, 8-spored. **Spores** fusiform, 24–30 × 6–7 μm, long 1-septate, somewhat inflated on each side near the septum, with 3 oil droplets in each cell, hyaline with a thick mucous sheath; eventually often 3-septate and faintly brown, minutely verruculose.

Mainly on herbaceous stems, also common on *Rubus idaeus*.

*L. vagabundum* is characterized by the thick mucous sheath around the spores; this feature, however, is often difficult to observe without Indian Ink, and is moreover often lost in old herbarium material. Nevertheless it is surprising that this important character has generally been overlooked. A trace of it may be hidden behind a statement of Cehsters & Bell (1970a p. 22): “A hyaline appendage may be seen at each end of the spores”. An-

Symb. Bot. Ups. XXVIII:2

other diagnostic spore character is the number of oil globules, of which there are three in each cell, whereas there are two in our other *Lophiotrema* species. The globules are larger than in *nucula*, almost filling the lumen, which gives the spores a characteristic torulose appearance.

The aspect of *L. vagabundum* is similar to *Lophiostoma caulium*, also a common species on herbaceous stems, which, however, often has a stronger papilla and crest.

We have included *L. Origani* in the synonymy, following Berlese (1890), in spite of Chesters & Bell's keeping it as a separate taxon, characterized by larger spores. In any case, the type material of *L. Origani* agrees well with ordinary *vagabundum*. On the other hand, it would be no surprise if an older epithet could be found for this common species.

*L. vagabundum* is widespread and found on numerous herbaceous dicotyledons, rarely on grasses. It is common on raspberry canes, but apparently rare on truly woody plants, as we have found it only twice on such hosts: Sweden, Uppland, Dalby: Gräna, on twigs of *Lonicera xylosteum*, 9.X.1984, 3355. pr. Älvesta, twigs of *Berberis vulgaris*, 20.IX.1986, Holm 4320b. Sheila Francis collected it i.a. on *Clematis vitalba* and *Hedera* (Chesters & Bell 1970a p. 22.) In all these cases the substrate is young shoots and to the best of our knowledge *L. vagabundum* has not been met with on old wood. It has never been reported on grasses, as far as we know, though *Lophiostoma pusillum* Fckl might be a graminicolous *vagabundum*. The type material seen by us is unfortunately in poor condition. In any case, a fungus occurs (?rarely) on grasses which seems indistinguishable from *L. vagabundum*:

**Sweden.** Gotland, Bro, 23.VI.1920, *Agropyron repens*, Vestergren, “*Lophiostoma* sp.” (S). – Uppland, Dalby pr. “Jerusalem”: *Calamagrostis arundinacea*, 14.IX.1984, Holm 3333c. gramin indet., 5.X.1984, Holm 3351. *Phalaris arundinacea*, 30.V.1986, Holm 4013a. **Norway.** Sör-Trøndelag, Oppdal, pr. Stölensättra, ?*Poa nemoralis*, 24.VIII.1985, Holm 3749a.

#### 4. *Lophiotrema* sp. 1

Fig. 34.

**Ascomata** scattered, erumpent from a blackened substrate, up to 0.4 mm long with a crest attaining 150 μm. **Asci** cylindric, 120–140 × 12–15 μm. **Spores** 20–25 (–30) × 6–7 (–8) μm, ellipsoid with obtuse ends, 1-septate, constricted at septum, with 2 large oil globules in each cell, and a thick (up to 20 μm) diffuse mucous sheath.

The spore type seems quite characteristic: the spores are broad and obtuse, inflated a little above and below the septum. They are in a way intermediate between *nucula* and *vagabundum*, looking rather much like the former but with the slime coat of the latter. We refrain from a formal description on account of the limited material, three samples only, on three different hosts, all from approximately the same area:

**Norway.** Hedmark, Folldal, c. 2 km NW. of Dalen church, on dead and still attached twigs of *Myricaria germanica*, 23.VIII.1985, Holm 3741k. – Sör-Trøndelag, Oppdal, E. of Stölensetra, grass culm, 24.VIII.1985, Holm 3766. – Oppland, Dovre, Tverråidalen, c. 1200 m., dead stems of *Aconitum septentrionale*, 22.VIII.1985, Holm 3684d.

#### 5. *Lophiotrema* sp. 2

Fig. 29.

Another probably undescribed taxon is represented by two finds on *Salix*. It seems distinctive by the large, often pointed spores, 26–33 × 8–

#### Key to “lophiostomataceous” species

- |  |                          |
|--|--------------------------|
| 1. On woody plants .....                                 | 1. <i>M. alpigena</i>    |
| On herbaceous plants .....                               | 2                        |
| 2. Spores mostly 11-septate, with 2 inflated cells ..... | 2. <i>M. grandispora</i> |
| Spores mostly 8-septate, without inflated cell .....     | 3. <i>M. sp.</i>         |

#### 1. *Massariosphaeria alpigena* (Fckl) L. & K. Holm

*Lophiostoma alpigenum* Fckl, Symb. Myc. 157 (1870) – *Lophiotrema alpigenum* Sacc., Mich. 1:338 (1870) – Type: Switzerland, pr. Neuchâtel, twigs of *Lonicera alpigena*, X.1869, Morthier (S, iso!).

?*Lophiotrema Cadubriae* Speg., Dec. Mycol. no 96 (1879) – Type: Italy, Cadore, “in culmis, caulibus, at-

–10 mμ, 1-septate with two large globules in each cell; they are surrounded by a thick rather diffuse mucous sheath. The substrate is indicative of *L. nucula* but not the aspect: the ascomata have a distinct papilla, and the wood surface is not blackened.

Material examined:

**Sweden.** Uppland, Dalby: pr. Ännesta, bark and wood of cut branches on *Salix cinerea*, 5.XII.1984, Holm 3378g. pr. “Odlingen”, bark from cut logs of *Salix caprea*, 4.V.1985, Holm 3493b & 25.V.1985, 3539.

#### *Massariosphaeria* (Müll.) Crivelli

Ueber die heterogene Ascomycetengattung *Pleospora* Rabh. p. 141 (1983) – *Leptosphaeria* sect. *Massariosphaeria* Müller, Sydowia 4:206 (1950) – Type *M. phaeospora* (Müll.) Crivelli.

This genus, originally distinguished as a separate taxon by E. Müller, has been considerably enlarged and remodeled during recent years by Müller's pupils Crivelli (1983) and Leuchtmann (1984). Its principal characteristics are the gelatinous spore wall and the tendency towards formation of a red pigment, especially in mycelial cultures. The genus mainly comprises species formerly referred to *Leptosphaeria*, *Metasphaeria* or *Pleospora* but embraces also lophiostomataceous elements. Thus Leuchtmann (op. cit.) included *Lophiotrema microthecum* in the group (as *M. grandispora*) and we follow this course by transferring also *Lophiostoma alpigenum* to the genus.

que ramulis dejectis putrescentibus ad ripas Lacus di Alege” (UPS, iso!).

Exs.: ?Cav., F. long. 182 – ?Speg., Dec. myc. 96. Figs. 46, 112.

**Ascocarps** scattered, erumpent, 0.3–0.4 mm diam., with a short papilla, surmounted by a rath-

Symb. Bot. Ups. XXVIII:2

er blunt crest, up to 0.2 mm long. **Peridium** 15–25  $\mu\text{m}$  broad, of  $\pm$  flattened cells, up to 10  $\mu\text{m}$ , the outer ones heavily pigmented. **Asci** clavate, 135–150  $\times$  15–18  $\mu\text{m}$ , 8-spored. **Spores** fusiform 40–45  $\times$  10  $\mu\text{m}$ , 10–12-celled, median cells largest, hyaline, with a large guttule in each cell, eventually faintly brown, minutely verruculose. Spore wall laminated, the outer membrane bursts and the adjacent wall layer dissolves into a mucous sheath surrounding the spore.

In bark and wood of *Lonicera* spp., probably also other hosts.

The description above is based on two collections, on *Lonicera*, the type and Holm 2103c. A gathering by Britzelmayer on "Faschinen", vide infra, matches these specimens very well. We are much in doubt, however, whether the range of variation is so great that it will include also *L. Cadubriae* Speg. which has larger spores, attaining 50  $\times$  12  $\mu\text{m}$ , with up to 14 cells. It was said by Spegazzini to have a wide host spectrum, the isotype in UPS is on grass culms. A close match of this fungus is represented by another Britzelmayer sample in S ("*L. Cadubriae*", det. Rehm) listed below. Cavara's exsiccatum seems to be the same fungus, too. It was studied by Chesters and Bell (1970a) who referred it to *L. alpigenum* without reservation. Another possible synonym is *M. grandispora*.

Material examined (beside the types cited):

**Sweden.** Uppland, Harbo, Kalvnäset, *Lonicera xylosteum*, 5.V.1980, Holm 2103c.

**Germany.** Augsburg, Lechufer, "Faschinen", 1878, Britzelmayer, "*L. alpigenum*", det. Rehm (S), cf. Rehm 1911 p. 101. Ibid., "Weiden-Faschinen", 1878, Britzelmayer, "*L. Cadubriae*", det. Rehm (S), cf. Rehm 1.c.

**Italy.** Pavia, *Salix alba*, "*L. massarioides*" (= Cav. F. long. 182) (S).

## 2. *Massariosphaeria* cfr *grandispora* (Sacc.) Leuchtman

Sydowia 37:172 (1984) – *Leptosphaeria grandispora* Sacc., Mich. 1:341 (1878) – *Metasphaeria grandispora* Sacc., Syll. Fung. 2: 181 (1883) – Type: Italy, Colfosco, decaying leaves of *Typha latifolia*, IX.1877 (n.v.). ?*Lophiotrema microthecum* Vgr., Bot. Not. 1899 p. 158

*Symb. Bot. Ups. XXVIII:2*

(1899) – Type: Sweden, Gotland, Visby, *Arrhenatherum elatius*, VII.1898, Vestergren (S) (= Micr. 43).

*Exs.*: Vgr., Micr. rar. sel 43 (S, UPS).

*Figs.*: 45, 113.

**Ascocarps** scattered, sometimes rather densely, immersed, c. 0.2 mm broad and 0.3 mm long, with an erumpent papilla, c. 0.1 mm high with a crest up to 150  $\mu\text{m}$  long. **Asci** claviform, 105–120  $\times$  15–18  $\mu\text{m}$ , 8-spored. **Spores** cylindricofusiform, 32–36  $\times$  7–8  $\mu\text{m}$ , mostly 11-septate, with 4th and 5th cells broadest, hyaline, with a large guttule in each cell; spore wall slightly broader at the largest cells, long hyaline and smooth, later dilute brown, verruculose. No mucous sheath?

In grasses.

The description is based on authentic material of *Lophiotrema microthecum*. That name was synonymized with *Leptosphaeria grandispora* by Leuchtman (l.c.), an identification, however, that may be open to some slight doubt. According to Saccardo's description his material had considerably larger spores, 45  $\times$  8  $\mu\text{m}$ , with 9–10 septa. A fact calling for caution is, in any case, the very different ecology of the hostplants: the aquatic *Typha* and the xerophilous *Arrhenatherum*. Unfortunately, neither Leuchtman nor we have had access to type material of *L. grandispora*. More material from the pertinent host is desirable in order to settle the problem definitely.

A characteristic trait for *Massariosphaeria* is, as already mentioned, that the outermost spore membrane eventually bursts, liberating a mucous sheath that will surround the spore. We have not observed, however, the phenomenon in this species, in the old material at hand; the spore wall is remarkably thick, especially around the inflated cells, but no mucous sheath can be seen. On account of the enlarged cells, the spore form is somewhat different from the preceding and the following species: with some exaggeration the spores can be said to be reminiscent of a kite.

Eriksson (1967) cited some further samples, which we have scrutinized but without success. A

very interesting collection is Nannfeldt 1537b, on *Carex*, cf. below. The spores are 8-septate, only, but otherwise a good match of *Lophiotrema microthecum*.

Specimens seen:

**Sweden.** Gotland, Visby, *Arrhenatherum elatius*, Vestergren, VII.1898 (type) and VI.1899 (S). – Torne Lappmark, Jukkasjärvi par., Nissontjåkko, *Carex Lachenalii*, 1100 m, 15.VII.1927, Nannfeldt 1527b, det. B. Andersson (UPS).

## 3. *Massariosphaeria* sp.

? *Lophiotrema alpigenum* Fckl f. *juncinum* Mout., Bull. soc. Bot. Belg. 39: 49(1900) – Type: Belgium, pr. Liège, "in calamis Junci conglomerati" (n.v.).

*Fig.* 114.

**Ascomata** scattered, immersed in the sometimes reddened substrate,  $\pm$  pyriform, c. 150  $\mu\text{m}$  diam., with a protruding neck 60–80  $\mu\text{m}$  high, which is cylindric or compressed to a small crest. **Asci** clavate, 110–120  $\times$  15  $\mu\text{m}$ , 8-spored. **Spores** fusiform, with somewhat pointed ends, 30–36  $\times$  5–6  $\mu\text{m}$ , hyaline, finally faintly yellowish brown, 8(–9)-septate, with a mucous sheath.

In culms of rushes (and other marsh plants?).

We have three collections of this species which closely agree with each other. The lophiostomataceous character is easily overlooked, and truly cylindric papillae are, in fact, as common as flattened ones. Hence the species might well have been described as a *Leptosphaeria* or *Metasphaeria*. It is indeed tempting to identify it as *Metasphaeria Roumegueri*, at least sensu Eriksson (1967) and Leuchtman (1984, as *Massariosphaeria roumegueri*). This species is said, though, to have mostly 7-septate spores with obtuse ends, and with truly cylindric necks. No material has been available. Another possible synonym is *Metasphaeria monilispora* (Fckl) Sacc. The type is on *Juncus lampocarpus* and was distributed in the Fungi rhenani no. 1777. We have scrutinized the copy in G, as well as in S, but without finding any fungus matching the description.

Specimens seen:

**Sweden.** Uppland: Dannemora, lake Dannemorasjön,

*Scirpus lacustris*, 2.IX.1967, B. Andersson, "*Lophiotrema microthecum*". Hällnäs, Vavd, *Juncus conglomeratus*, 15.IX.1982, Holm 2740c. Uppsala-Näs, pr. Högbý, *J. conglomeratus*, 2.X.1982, Holm 2745a.

## *Navicella* Fabre

Ann. Sci. Nat. Bot. ser. 6. 9:96 (1879) ("1878") – Type: *N. Julii* Fabre (= *N. pileata* fide Eriksson 1981).

*Navicella* has been included in *Lophiostoma* by most authors but seems well distinguished, particularly on account of the peculiar spore type that has been thoroughly described by O. Eriksson (1981). The septa are heavily thickened at the periphery, with correspondingly reduced, approximately lenticular lumina. The terminal septa are strongly and uniformly darkened, whilst the others appear striped on account of an uneven encrustation with pigment. The mid septum is the first to form, but the sequence of the others has been variously interpreted. Chesters and Bell (1970a p. 29) state that "the next septa are those delimiting the polar cells, and the rest form in succession, those nearest the polar cells being formed first". According to Eriksson (1981 Fig. 99 E), the submedian septa are laid down prior to the terminal ones. In fact conditions may vary, as we have observed both modes.

It seems doubtful whether *Navicella* is close to *Lophiostoma*, it may be a separate offspring from the *Trematosphaeria* group. Possibly related is *Lophiostoma (Schizostoma) montelicum*, cf. Holm and Yue (1987).

## *Navicella pileata* (Tode: Fr.) Fabre

Ann. Sci. Nat. Bot. ser. 6. 9:97 (1879) ("1878") – *Lophiostoma pileatum* (Tode:Fr.) Fckl, Symb. Myc. p. 158 (1870) – *Sphaeria pileata* Tode:Fr., Syst. Myc. 2:468 (1823) – *Sphaeria pileata* (Tode) Pers., Disp. Meth. Fung. p. 4 (1797) – *Sphaeria macrostoma* Tode & *pileata* Tode, F. Meckl. 2: 13 (1791) – Neotyp. prop.: Rehm, Asc. 238 (UPS).

*Lophiostoma excipuliforme* (Fr.) Ces. & De Not., Comm. Soc. Critt. Ital. 1 p 219 (1863) – *Sphaeria excipuliformis* Fr.: Fr., Syst. Myc. 2:469 (1823); Fr., Obs. Myc. 1:177 (1815) – Lectotype: Scl. succ. no. 88 (UPS).

*Lophiostoma balsamianum* (De Not.) Ces. & De Not., Comm. Soc. Critt. Ital. 1:219 (1863) – *Sphaeria Balsa-*

*Symb. Bot. Ups. XXVIII:2*

*miana* De Not., Mem. Acc. Sci. Torino ser. 2. 13:112 (1854) — Coll. orig.: Italien, Pr. Milano, *Populus pyramidalis* & *Ulmus* sp., X.1838 (n.v.).  
*Lophiostoma macrostomum* sensu auct. plur., cfr p. 9.

Exs.: All. & Schnabl, F. bav. 336 — Fr., Scl. suec. 88 — Moug. & Nestl., Stirp. 1164 — Petr., Fl. Bohem. Mor. 2:1 no. 760 — Rehm, Asc. 238 — Sacc., Myc. ven. 778, 1156 — (Syd., Myc. march 1366) — Wartm. & Schenk, Schweiz. Krypt. 529.

Figs. 7, 8, 70, 71, 118, 119.

**Ascocarps** scattered, erumpent, 0.6–1 mm diam., with a strong neck, of varying shape, cylindrical at base, sometimes also at top, but more often flattened at apex in different ways, either compressed from above, with a  $\pm$  elliptic outline (“ostiole figura ovalis est”, Fries 1823 p. 468) or laterally compressed forming a crest up to 0.5 mm long. **Asci** cylindrical, attaining  $350 \times 25 \mu\text{m}$ , mostly 8-spored. **Spores** narrowly ellipsoid,  $50\text{--}80 \times 12\text{--}20 \mu\text{m}$ , 7–11-septate, terminal cells almost hyaline, the others rich brown with lenticular lumen.

In bark of frondose trees, (?) especially *Quercus*.

*Navicella pileata* is generally recognizable already on sight by the large ascocarps with the strong, basally cylindrical neck. The identification with Tode's *Sphaeria macrostoma*  $\epsilon$  *pileata* is traditional, without support of authentic material. As far as known nothing is left of Tode's herbarium. When sanctioning the name, Fries (1823 p. 468) also cited Persoon's Synopsis, p. 54, and according to Art. 7.17 a Persoonian specimen could be selected as type. Unfortunately there is none, fide Chesters and Bell (1970a p. 29). Certainly these authors refer to a specimen in Persoon's herbarium, no. 910. 267 — 105, which, however, is of little help, as labelled by Chaillet (see further L. Holm, 1986 p. 195). Finally, there is no material in herb. Fries, designated as *Sphaeria pileata*. Obviously a neotype has to be selected and as such we propose the good and widely distributed material in Rehm, Asc. 238.

*N. pileata* is probably a rare species today, possibly disappearing. We have never found it, and

Symb. Bot. Ups. XXVIII:2

the most recent collection seen by us dates from 1928. On the other hand, the old mycologists apparently repeatedly collected it. In S are some twenty samples from Central Europe and Italy. It is not reported by Munk (1957).

Nordic material seen:

**Sweden.** Skåne, “*Sphaeria diminuens*”, scr. Fries. — Småland, Femsjö (?), Scl. suec. 88. — Bohuslän, Skaftö, Quercus bark. 3.VIII.1928, Degelius, “*L. cfr macrostomum*”, det. Nannfeldt. — Uppland, Vaksala, — Vittulsberg, bark, ?19.VIII.1852, “*Sphaeria nucula* Fr.”, leg. et scr. E. P. Fries.

**Norway.** Akershus, Baerum, bark of *Fraxinus*, X.1825, Sommerfelt, “*Sphaeria excipuliformis*” (O).

**Finland.** Ab, Runsala pr. Åbo: *Quercus* bark, 2.VI.1857, Nylander, “*Sphaeria excipuliformis*” det. Karsten (H). ditto VI.1869, Karsten (Herb. Karst. 2713). bark of *Tilia*, sine dato, Karsten, “*S. macrostoma*” (H. K. 2708), ditto, Karsten, “*S. excipuliformis*” (H. K. 2710). (Karsten, 1873, also recorded “*L. macrostomum*” from bark of *Salix fragilis*; his material, however, belongs to *L. macrostomoides*).

### Trematosphaeria Fckl

Symb. Myc. 161 (1870) — Type: *T. pertusa* (Pers.: Fr.) Fckl (selected by Clements & Shear 1931).

*Trematosphaeria* has been often used in a very wide sense, including a heterogeneous, vaguely defined assemblage of lignicolous, bitunicate, phragmosporous Pyrenomycetes. Some authors have put the name into synonymy with *Melanomma* (Samuels & Müller 1979). However, in a natural classification it might be kept for the type and some allied species which form a group that seems distinctive by the cinnamon brown spores with paler ends (end cells) cf. Boise (1985). A good member of this group is *T. hydrela* (Rehm) Sacc., cf. below.

It is interesting that the lophiostomataceous ascoma type is represented also here, by the following species. Moreover, as pointed out to us by Dr. R. Shoemaker (in litt.) there is another example, viz. *T. heterospora* (De Not.) Wint. on *Iris* rhizomes: ascomata with a compressed neck are often seen in this species.

### Trematosphaeria wegeliniana n. sp.

Exs.: Rehm, Asc. 1021 (“*Lophiostoma elegans*”) (S, UPS).

Figs: 56, 115, 116.

**Ascomata** sparsa, innata-erumpentia, 0.3–0.4 mm longa, papilla brevi, crista 0.1–0.2 mm longa. **Asci** clavati, c.  $150 \times 25 \mu\text{m}$ , breve pedicellati, plerumque octospori. **Sporae** fusiformes,  $36\text{--}50 \times 8\text{--}10 \mu\text{m}$ , vulgo 3–5-septatae, cuprobrunneae, cellulis terminalibus subhyalinis.

Typus: Helvetia, Hemiswyl, “an faulen Fichtenbretten in Wassergräben”, X.1888. Wegelin (= Rehm, Asc. 1021, S holo!)

The above description is based on the type collection. We have seen two further samples which seem conspecific, cf. below. Britzelmayr's material is a very close match of the type, whilst Nannfeldt's deviates by larger ascomata, up to 0.8 mm diam, with a stronger papilla which is cylindrical or laterally somewhat compressed. Both collections

### Appendix. Notes on some dubious species

#### Lophiostoma anaxaeum (Sacc)

Hedwigia 14: 69 (1875) — *Lophiosphaera anaxaea* Trev., Bull. Soc. Bot. Belg. 16: 20 (1877) — Type: Italy, “in caule ramisque *Artemisiae camphoratae* in alveo fluminis Piave (Anaxi) a Narvesa (Treviso) Aug. 1873” (S, iso!).

Exs.: Speg., Dec. Myc. Ital. 95 (PAD, S, UPS).

Fig. 100.

*L. anaxaeum* is but little known, not even mentioned by authors like Winter, Rehm and Chesters & Bell. It was taken up, however, by Müller & von Arx (1962) who provided a full description (based on type material?) which agrees well with our concept of the species, founded on the material in S, viz. two packages both labelled by Saccardo: 1. “in alveo Piave (Treviso). In *Artemisia camphorata*. Saccardo”. 2. “in *Artem. camph. Treviso Saccardo*”.

Both samples are probably parts of the type col-

Symb. Bot. Ups. XXVIII:2

were discussed by L. Holm (1957 p. 167), but he did not pay attention to the sometimes lophiostomataceous papilla. He emphasized the kinship to *Trematosphaeria hydrela*, and certainly rightly so: the cinnamon brown spores with hyaline end cells are indicative, as is also the substrate, i.e. waterlogged wood.

Rehm tentatively referred the type to *Navicella elegans* Fabre whilst Chesters & Bell (1970a) included it in *Lophiostoma macrostomum*, as circumscribed by them, because of the light end-cells.

Specimens seen, beside the type:

**Sweden.** Uppsala, Kungsängen, on coniferous poles in the River Fyrisån, 10.IV.1925, Nannfeldt (UPS).

**Germany.** Bayern, Augsburg am Lech, “Fichtenplancken”, III. 1878, Britzelmayr, “*Trematosphaeria vindelicorum*”, det. Rehm (S).

In 1. we have only found a *Pleospora* sp., but in no. 2 the actual fungus is present. The material is immature but sufficiently developed, though, to permit the conclusion that it is conspecific with the fungus distributed in Speg., Dec. no. 95: Italy, “ad ramulos emortuos decorticatos *Cytisi hirsuti*, *Globulariae cordatae*, *Artemisiae camphoratae* in alveo torrentium Cadubriae”. Spegazzini's material is also fairly young but indicates that *L. anaxaeum* may be a species of its own, characterized by relatively broad spores,  $20\text{--}26 \times 6\text{--}7 \mu\text{m}$ , hyaline 1-septate, with terminal appendages, the size and form of which cannot be safely determined in the old material. Obviously *L. anaxaeum* is very close to *L. Fuckelii*; fresh material is needed to assess its taxonomic status. It should be sought for on *Artemisia* stems.

*L. anaxaeum* has been designated lectotype of *Lophiosphaera*, and we will add some remarks on this name.

NOTE ON THE TYPIFICATION OF  
*LOPHIOSPHAERA* TREV.

The genus was established by Trevisan (1877 p. 20) with the diagnosis: "Sporae transverse uniseptatae, apicibus muticis vel raro appendiculatis, incolores". It included four species, *Sphaeria pachythele* Berk. & Br., *S. schizostoma* Mont., *Lophiostoma subcorticale* Fckl, and *L. anaxaeum* Sacc. The third species, *L. subcorticale*, was designated as lectotype by Clements & Shear (1931), a selection that was rightly criticised by Müller and von Arx (1962) who pointed out that this phragmosporous species is no good match of the generic description. They chose instead *L. anaxaeum*, which, in our opinion, will make little difference as both species should be referred to *Lophiostoma*. However, one can object also to their typification, as *L. anaxaeum* is not a good representative of *Lophiosphaera*, having appendiculate spores. The first species listed by Trevisan, i.e. *Sphaeria pachythele* (= *Schizostoma pachythele* Sacc., cf. Holm & Yue, 1987) should be out of consideration as dark-spored. That would leave us with *Sphaeria schizostoma* Mont. (= *Schizostoma montagnei* Ces. & De Not.) as ultimate candidate. This is, however, a doubtful name that should not be used, unless it can be typified by original material.

***Lophiostoma pinastri* Niessl**

Verh. Naturf. Ver. Brünn 14: 209 (1876); Hedw. 16:13 (1877) — Type: Moravia, Lautschitz, coniferous wood, V.1862, Niessl (M!).

Exs.: (Rbh., F. eur. 2422, see below).

Figs. (58, 117.)

*L. pinastri* is somewhat of a nomen cofusum as Niessl's description apparently is based on two different fungi. Particularly emphasized is the heavily blackened substrate: „Die bei den meisten *Lophiostoma*-arten vorkommende Schwärzung oder Bräunung des Substrates tritt hier in

ausserordentlicher Entwicklung auf, indem die Holzoberfläche mit einer papierdicken Kruste überzogen ist, welche man beim ersten Anblick fast für das Stroma einer *Eutypa* halten möchte." This crust, however, is caused by *Trimmatostroma* cfr. *scutellare* (det. O. Constantinescu). Sparsely intermixed is an ascigerous fungus, which on the whole corresponds well with Niessl's description and can be considered as the true *L. pinastri*. It is characterized by immersed ascospores, 0.2–0.3 mm long, without distinct neck but with a long slitlike ostiole. Spores variable in shape, fusiform or often  $\pm$  cuneate, 3–5-septate,  $22\text{--}28 \times 7\text{--}8$  (–10)  $\mu\text{m}$ , brown.

Niessl's fungus seems to represent a species of its own, which otherwise is unknown to us. The type material is scanty and many spores seem to be more or less abnormally developed. In any case, *L. pinastri* should be sought for on coniferous wood. Rehm (1911) reported two finds from the Austrian Alps, on pine wood, but the material (S) belongs to *L. macrostomoides*, cf. p. 20.

Chesters & Bell (1970a) have identified *L. pinastri* with *L. macrostomum*, see further p. 9.

There is another sample from Niessl's herbarium (M) that is of interest in this connection: "*Lophiostoma pinastri* v. *erumpens* Nssl Notizen p. 49", scr. Niessl. No data are given but the substrate is oak wood (det. E. Åberg) and the material completely agrees with that distributed in Rbh., F. eur. 2422 and is very probably part of the same collection.

This fungus is widely different from *L. pinastri* and seems to be a good *Massariosphaeria* with almost neckless ascocarps, c. 0.5 mm diam., with a c. 0.2 mm long ostiolar slit. It is distinctive by the large, broadly ellipsoid spores,  $38\text{--}44 \times 12\text{--}14$   $\mu\text{m}$ , 5(–6)-septate, with a thick, verrucose, finally chestnut brown wall, end cells often paler. Cf. Figs. 58, 117.

We know this species solely from the cited exsiccata, Rbh., F. eur. 2422: Italy, Parma, wood of *Quercus*, Passerini.

## ACKNOWLEDGEMENTS

Our sincere thanks are due to the curators and staffs of the Herbaria consulted. We are also greatly obliged to Prof. O. Hedberg for accepting this paper for publishing in *Symbolae*, to Dr. Inga

Hedberg for editorial work, to Dr. Yue Jing-zhu for Figures 1–8, to Mrs. Ulla Hedenquist for typing, and to Mrs. Ulla-Britt Sahlström for photographic work.

## REFERENCES

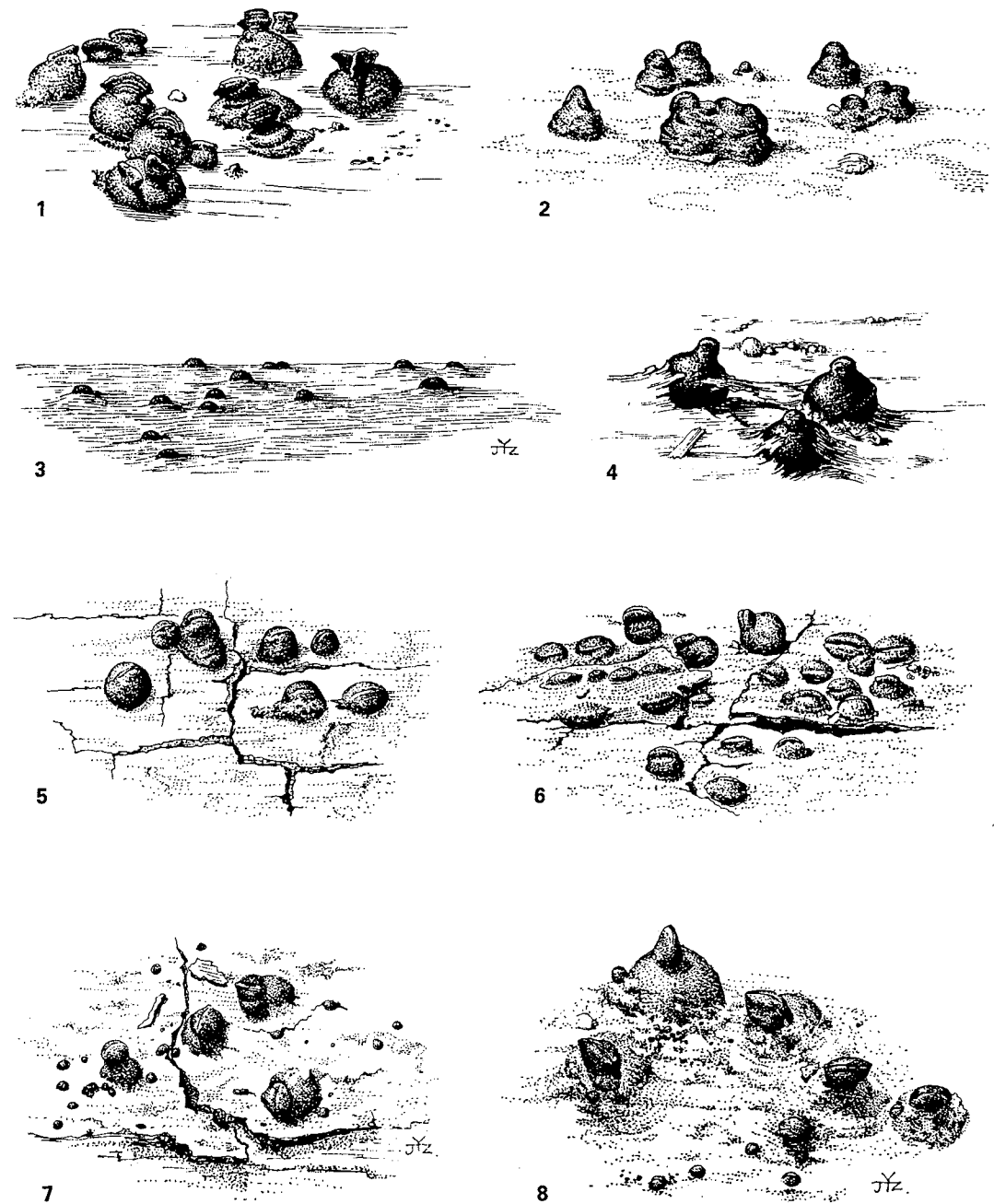
- Berkeley, M. J. 1836. Fungi. — Smith, J. E., The English Flora 5:2. — Glasgow.
- Berlese, A. N. 1890–1894. Icones Fungorum 1. Patavii.
- Boise, J. 1985. An amended description of Trematosphaeria. — Mycologia 77:230–237.
- Cesati, V. & De Notaris, G. 1863. Schema di classificazione degli Sferiacei italici aschigeri. — Comm. Soc. Critt. Ital. 1:177–240.
- Chesters, C. G. C. 1938. Studies on British pyrenomycetes II. — Trans. Brit. Myc. Soc. 22: 116–150.
- Chesters, C. G. C. & Bell, A. 1970a. Studies in the Lophiostomataceae. — Mycol. Pap. 120.
- 1970b. Pseudothecium development in the Lophiostomataceae. — Trans. Brit. Myc. Soc. 54: 27–34.
- Clements, F. E. & Shear, C. L. 1931. The Genera of Fungi. — New York.
- Corlett, M. 1981. A taxonomic survey of some species of *Didymella* and *Didymella*-like species. — Can. J. Bot. 59:2016–2042.
- Crivelli, P. G. 1983. Ueber die heterogene Ascomycetengattung *Pleospora* Rabh.; Vorschlag für eine Aufteilung. Diss. ETH Nr. 7318. — Zürich.
- Desmazières, J. B. H. J. 1841. Huitième notice sur quelques plantes Cryptogames . . . — Ann. Sci. Nat. Bot. ser. 2. 15: 129–146.
- Fabre, J. H. 1879 ("1878"). Essai sur les Sphériacées du département de Vaucluse 1. — Ann. Sci. Nat. Bot. ser. 6. 9: 66–118.
- Eriksson, O. 1967. On graminicolous pyrenomycetes from Fennoscandia 2. — Ark. Bot. ser. 2. 6 (9): 381–440.
- 1981. The families of bitunicate ascomycetes. — Opera Bot. 60.
- Fries, E. 1817. Uppställning af de i Sverige funne Vårtsvampar (Scleromyci). — K. Vet.-Acad. Handl. 1817.
- 1823. Systema Mycologicum 2:2. — Lundae.
- 1849. Summa Vegetabilium Scandinaviae 2. — Upsaliae.
- Gareth Jones, E. B., Johnson, R. G. & Moss, S. T. 1983. Taxonomic studies of the Halosphaeriaceae: *Corlospora* Werdermann. — Bot. J. Linn. Soc. 87 (2): 193–212.
- Holm, L. 1957. Etudes taxonomiques sur les Pléosporacées. — Symb. Bot. Upsal. XIV:3.
- 1975. Nomenclatural notes on Pyrenomycetes. — Taxon 24: 475–488.
- 1986. A note on *Byssolophis ampla*. — Windahlia 16: 49–52.
- Holm, L. & Holm, K. 1978. Some pteridicolous Ascomycetes. — Bot. Not. 131: 97–115.
- 1979. Swedish pteridicolous Mycosphaerellae. Ibid. 132: 211–219.
- 1985. Kleinpilze auf *Dryas*-Stämmchen. — Sydowia 38: 136–145.
- Holm, L. & Nannfeldt, J. A. 1962. Fries's "Scleromyceti Sueciae". A study on its editorial history with an annotated check-list. — Friesia 7: 10–59.
- Holm, L. & Yue, Jing-zhu. 1987. Notes on some fungi referred to *Schizostoma* Ces. & De Not. ex Sacc. — Acta Myc. Sinica Suppl. 1.: 82–89.
- Karsten, P. A. 1873. Mycologia fennica. 2. Pyrenomycetes. — Bidr. Kännedom Finl. Nat. Folk 23.
- Lehmann, F. 1886. Systematische Bearbeitung der Pyrenomyceten-Gattung *Lophiostoma* (Fr.) Ces. & De Not. . . . — Nova Acta Acad. Caes. Leop.-Carol. Nat. Curios. 50(2).
- Leuchtman, A. 1984. Über *Phaeosphaeria* Miyake und andere bitunicate Ascomyceten mit mehrfach querseptierten Ascosporen. — Sydowia 37: 75–198.
- 1985. Kulturversuche mit einigen Arten der Gattung *Lophiostoma* Ces. & De Not. — Sydowia 38: 158–170.
- Mathiassen, G. 1985. Pyrenomyceter (Ascomyceter) på *Salix* i Troms. — Hovedfagsoppgave, Univ. Tromsø.
- Munk, A. 1957. Danish Pyrenomycetes. — Dansk Bot. Ark. 17 (1).
- Müller, E. & von Arx, J. A. 1962. Die Gattungen der didymosporen Pyrenomyceten. — Beitr. Krypt.-Fl. Schweiz 11(2).
- Niessl, G. von. 1875. Ueber *Sphaeria caulium* Fries. — Hedwigia 14: 21–24.
- Nitschke, T. 1869. Grundzüge eines Systems der Pyrenomyceten. — Verh. naturhist. Ver. Rheinl. Westf. 26, Corr. -B1. 2: 70–77.
- Persoon, C. H. 1801. Synopsis methodica fungorum — Goettingiae.
- Petrak, F. 1940. Beiträge zur Kenntnis der Pilzflora der Umgebung von Lunz am See und des Dürrensteins in Niederdonau. — Ann. Myc. 38: 121–180.
- Pirozynski, K. A. & Morgan-Jones, G. 1968. Notes on microfungi. III. — Trans. Brit. Myc. Soc. 51: 185–206.
- Rehm, H. 1907. Ascomycetes novi. — Ann. Myc. 5: 516–546.
- 1911. Zum Studium der Pyrenomyceten Deutschlands, Deutsch-Oesterreichs und der Schweiz. III. — Ann. Myc. 9: 94–111.
- Saccardo, P. A. 1878. Fungi italici tab. 161–320 commentarium. — Michelia 1: 326–350.
- 1882. Fungi gallici. Ser. IV. — Michelia 2: 583–648.
- 1883. Sylloge Fungorum 2. — Patavii.
- Saccardo, P. A. & Sydow, P. 1899. Sylloge Fungorum 14. — Patavii.
- Samuels, G. J. & Müller, E. 1979. Life-History Studies of Brazilian Ascomycetes 3. — Sydowia 31: 142–156.
- Starbäck, K. 1887. Bidrag till Sveriges Ascomycetflora — Bot. Not. 1887: 206–210.
- 1889. Ascomyceter från Öland och Östergötland. — Bihang K. Sv. Vet.-Akad. Handl. 15:3:2.
- Trevisan, V. 1877. Note sur la tribu des Platystomées de la famille des Hypoxylacées. — Bull. Soc. Bot. Belg. 16: 14–20.
- Vestergren, T. 1897. Anteckningar till Sveriges ascomycetflora. — Bot. Not. 1897: 255–272.
- Winter, G. 1884–1887. Pilze, 2. — Rabenhorst, L., Krypt.-Fl. Deutschl., Oesterr. Schweiz 1(2). — Leipzig.

## INDEX OF SPECIES

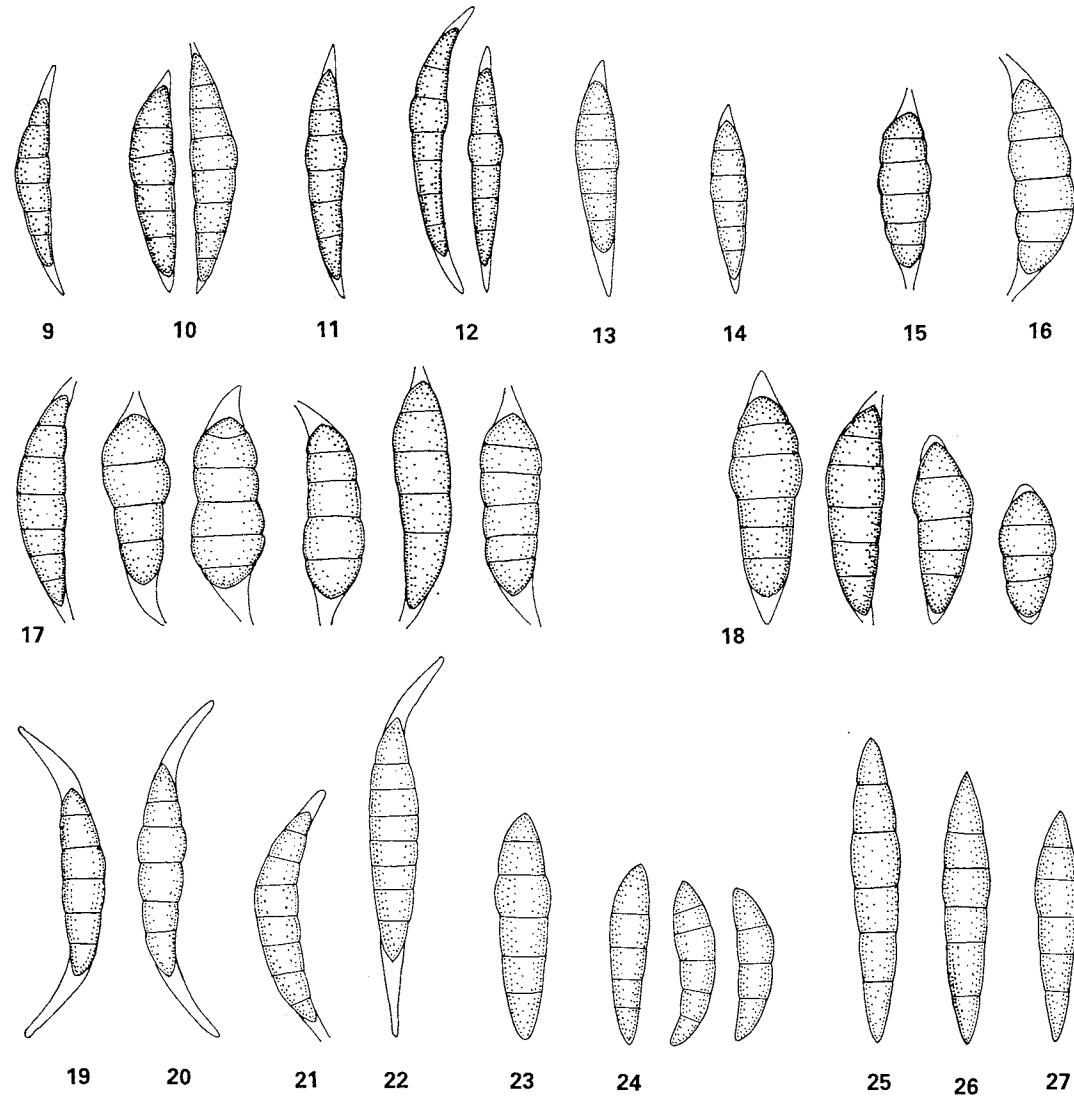
The taxa are referred to by specific epithets only. Synonyms are given in italics.

*acervatum* 21  
*alpigena* 29  
*anaxaeum* 33  
*angustatum* 15  
*angustilabrum* 6  
*appendiculatum* 10  
*Arundinis* 10  
*balnei-ursi* 25  
*balsamianum* 31  
*boreale* 27  
*Cadubriae* 29  
*caespitosum* 22  
*caudatum* 11  
*caulium* 11  
*compressum* 15  
*crenatum* 6  
*curtum* 16  
*dacryosporum* 11  
*deflectens* 16  
*diminuens* 15  
*duplex* 26  
*excipuliforme* 31  
*Fuckelii* 17  
*glaciale* 18  
*grandispora* 30  
*Hederae* 6  
*hypoxyloides* 18  
*insidiosum* 11  
*lophosporum* 17  
*macrostomoides* 18

*macrostomum* 6  
*massarioides* 20  
*mendax* 17  
*microstomum* 6  
*microthecum* 30  
*myriocarpum* 20  
*niessleanum* 14  
*nucula* 26  
*nuculoides* 21  
*Origani* 28  
*pileata* 31  
*pinastri* 34  
*praemorsum* 6  
*pseudomacrostomum* 18  
*pulveraceum* 17  
*pusillum* 28  
*quadrinucleatum* 21  
*rubidum* 28  
*semiliberum* 22  
*sex-nucleatum* 6  
*simillimum* 12  
*Starbaeckii* 22  
*subcompressum* 16  
*subcorticale* 23  
*vagabundum* 27  
*vicinum* 24  
*vigheffulense* 20  
*viridarium* 24  
*wegeliniana* 33  
*Winteri* 24

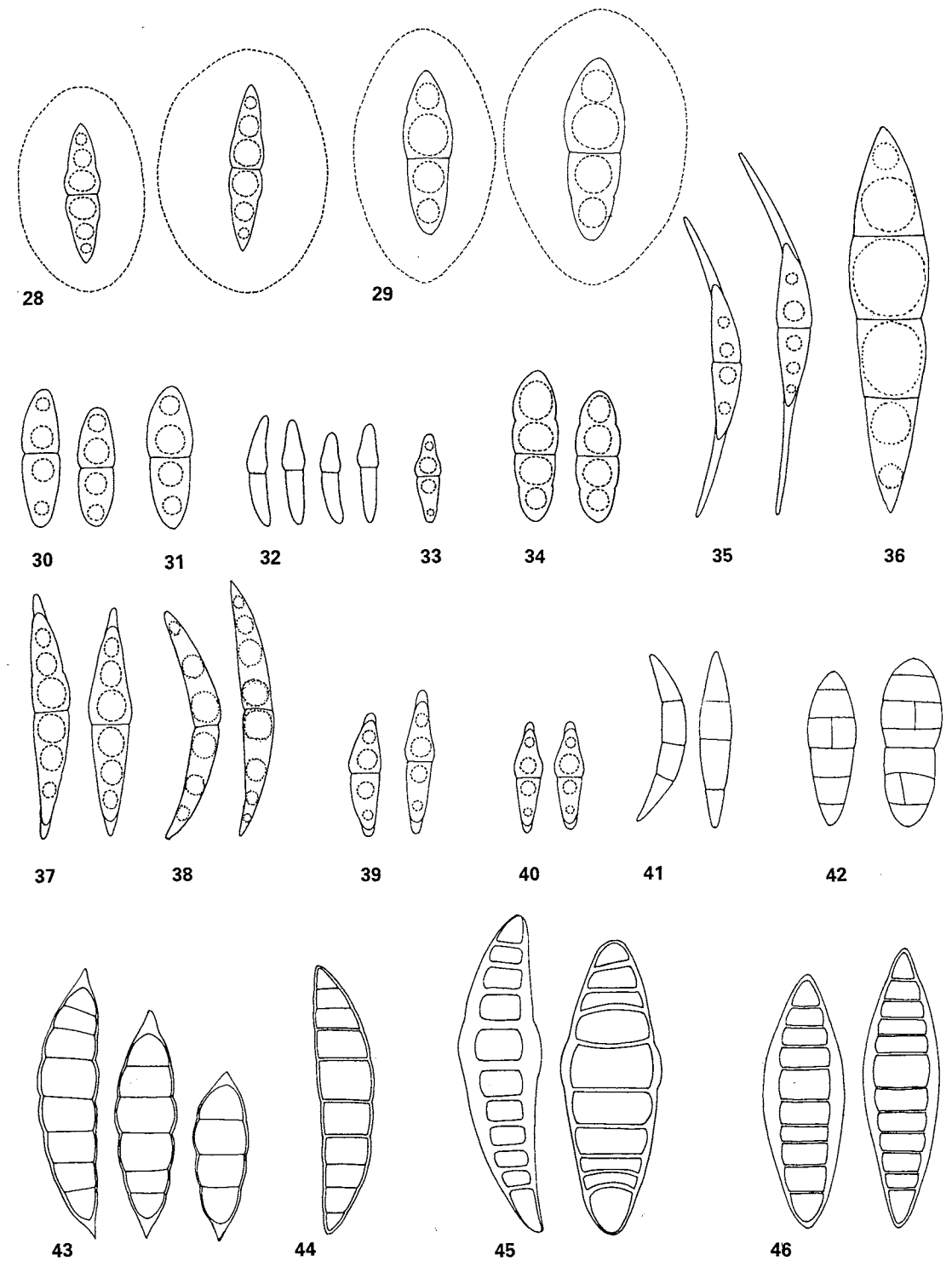


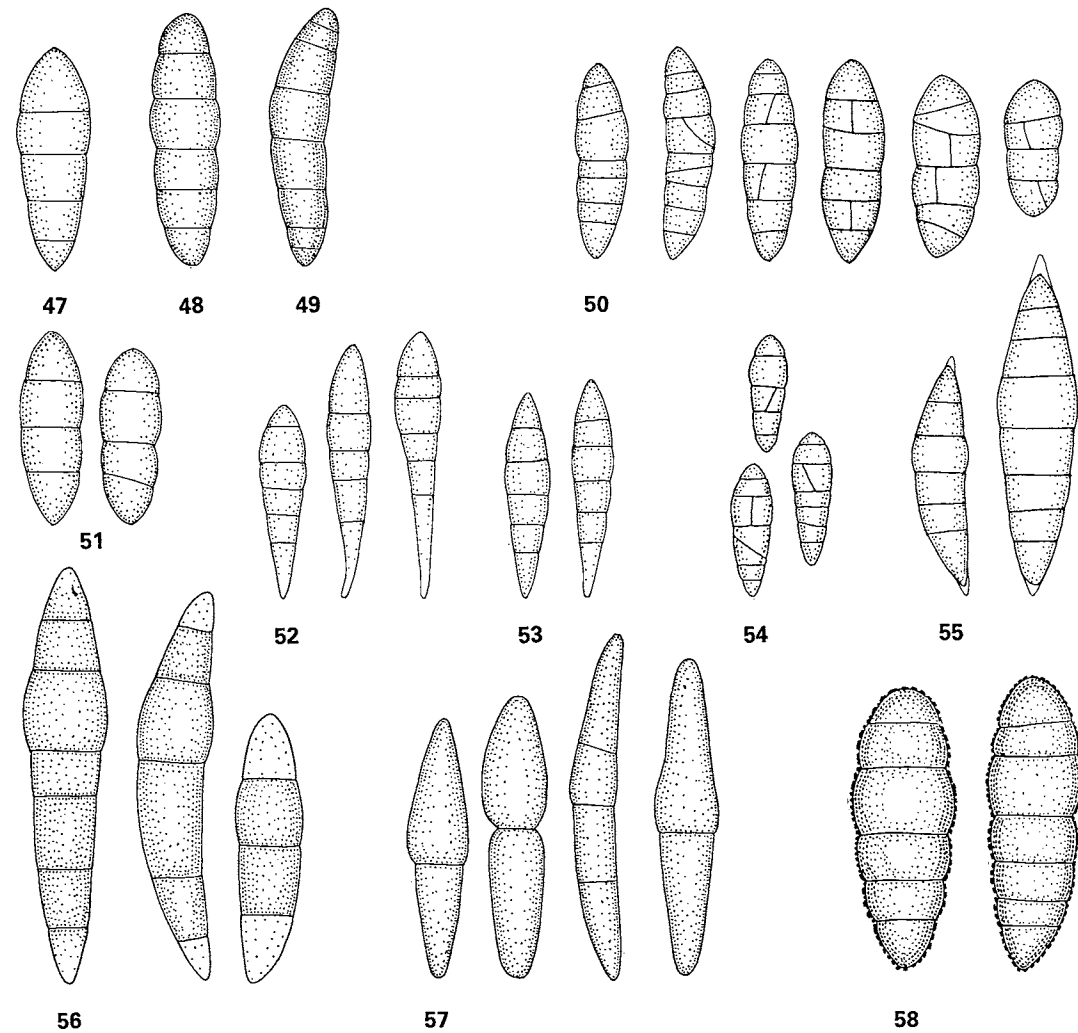
Figs. 1-8. Ascomata, c.  $\times 20$ . 1. *Lophiostoma macrostomum* (Syd., Myc. march. 2551), 2. *L. semiliberum*. 3. *Lophiotrema vagabundum* (Holm 2899b). 4. *Lophiostoma Winteri* (Holm 3251a). 5. *L. curtum* (Herb. Karsten, type of *L. deflectens*). 6. *L. curtum* (Herb. Karsten, 2717, "*Mytilostoma subcompressum*"). 7. *Navicella pileata* (herb. Karsten 2710). 8. *N. pileata* (Herb. Karsten 2708).



Figs. 9-27. Spores,  $\times$  c. 1000. 9-24: *Lophiostoma caulium*. 9-14: var. a. 15-18: var. b. 19-20: var. c. 21-22: var. d. 23-24: var. e. 25-27: *L. arundinis*. 9. Syd., Myc. march. 3645, *Erigeron annuus*. 10. Petr., Fl. Bohem. Mor. 2270a, *Sambucus ebulus*. 11. Sweden, Åre, *Epilobium angustifolium*, Eliasson. 12. ibid., *Rubus idaeus*, El. 13. O. Eriksson 1252h, *Elymus arenarius*. 14. Petr., Fl. Bohem. Mor. 736. 15. Syd., Myc. germ. 387, *Artemisia campestris*. 16. Holm 3321 a, *Art. campestris*. 17. Holm 1268b, *Lonicera xylosteum*. 18. Sweden, Vänersborg, *Ribes grossularia*, Eliasson. 19. Holm 3349a, *Serratula tinctoria*. 20. Holm 2590a, *Geum rivale*. 21. Sweden, Bro, *Galium mollugo*, Vestergren. 22. Holm 3051, *Centaurea jacea*. 23. Rehm, Asc. 484, *Artemisia campestris*. 24. Holm 2834a, *Arctium tomentosum*. 25. Linh., F. hung. 169. 26. Sweden, Upland, Danmark, Nannfeldt. 27. Petr., Fl. Bohem. Mor. 111.

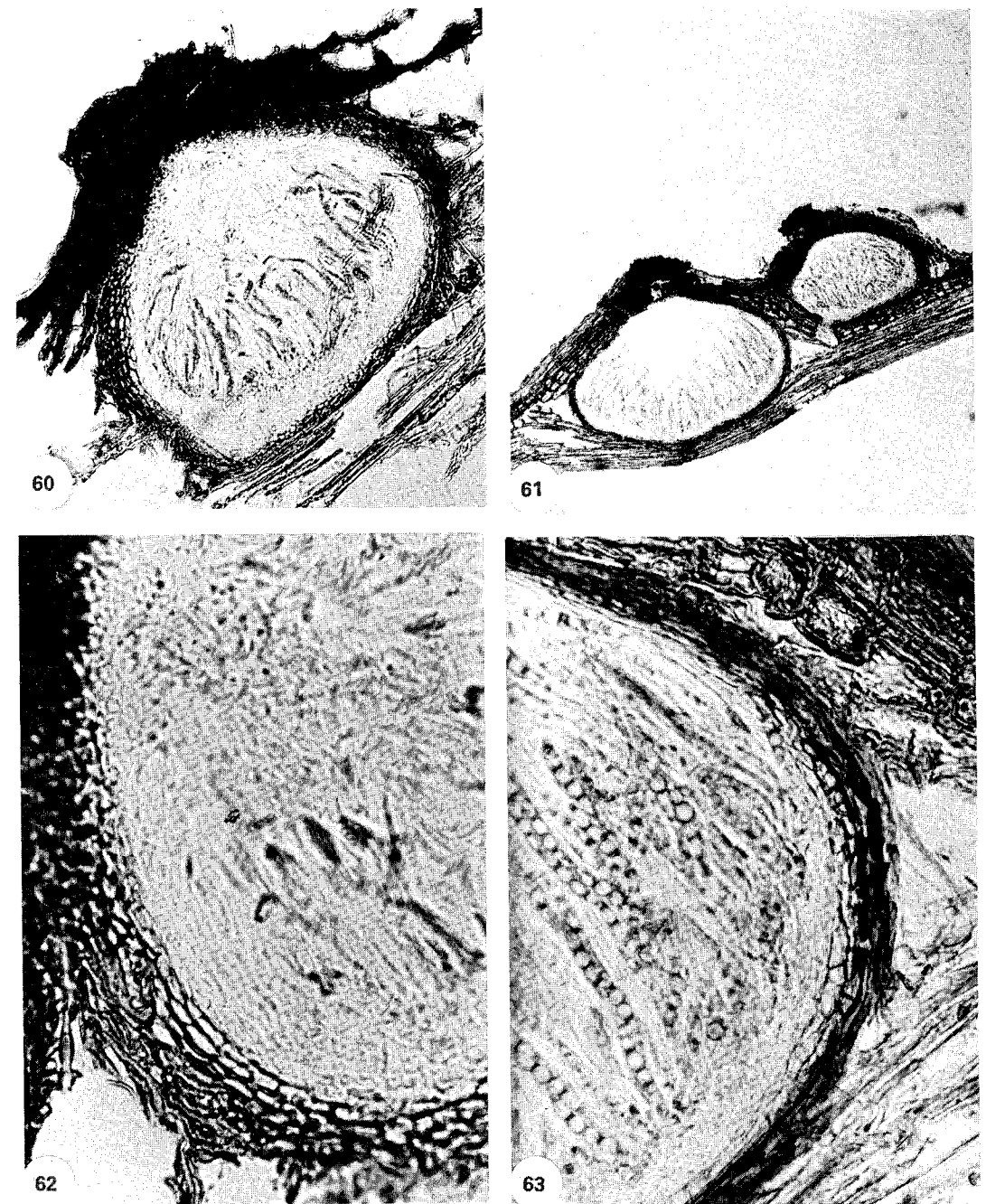
Figs. 28-46. Spores,  $\times$  c. 1000. 28. *Lophiotrema vagabundum*, (Holm 2742f). 29. *L. sp. 2* (Holm 3378g). 30. *L. nucula* (Holm 2062a). 31. *L. nucula* (Holm 2031b). 32. *L. boreale* (Holm 3163a). 33. *L. boreale* (Holm 3742b). 34. *L. sp. 1*. (Holm 3378g). 35. *Lophiostoma glaciale* (Holm 3736). 36. *L. subcorticale* (Holm 3034a). 37. *L. macrostomum* (Syd., Myc. march. 155). 38. *L. semiliberum* (Holm 3334a). 39. *L. Fuckelii* (Holm 3802). 40. *L. Fuckelii* (IMI 111 105). 41. *L. myriocarpum* (isotype). 42. *L. nuculoides* (Rehm, Asc. 481). 43. *L. Winteri* (Holm 3316e). 44. *L. massarioides* (Sweden, Bro, Vestergren). 45. *Massariosphaeria* cfr *grandispora* (type of *L. microthecum*), immature spore to the left. 46. *M. alpigena* (isotype), immature spore to the left.





Figs. 47–58. Spores  $\times$  c. 1000. 47. *Lophiostoma macrostomoides* (Romell 15368). 48. *L. macrostomoides* (Germany. Dechbetten. Rehm). 49. *L. macrostomoides* (Holm 275). 50. *L. compressum* (Rehm, Asc. 182). 51. *L. quadri-nucleatum* (type). 52. *L. caudatum* (O. Eriksson 1041m). 53. *L. caudatum* (Sweden, Värmdö, Starbäck). 54. *L. curtum* (type). 55. *L. appendiculatum* (Rehm, Asc. 1647). 56. *Trematosphaeria wegeliniana* (type). 57. *L. vicinum* (Holm 3931a). 58. "*L. pinastri*" (Rbh., F. eur. 2422).

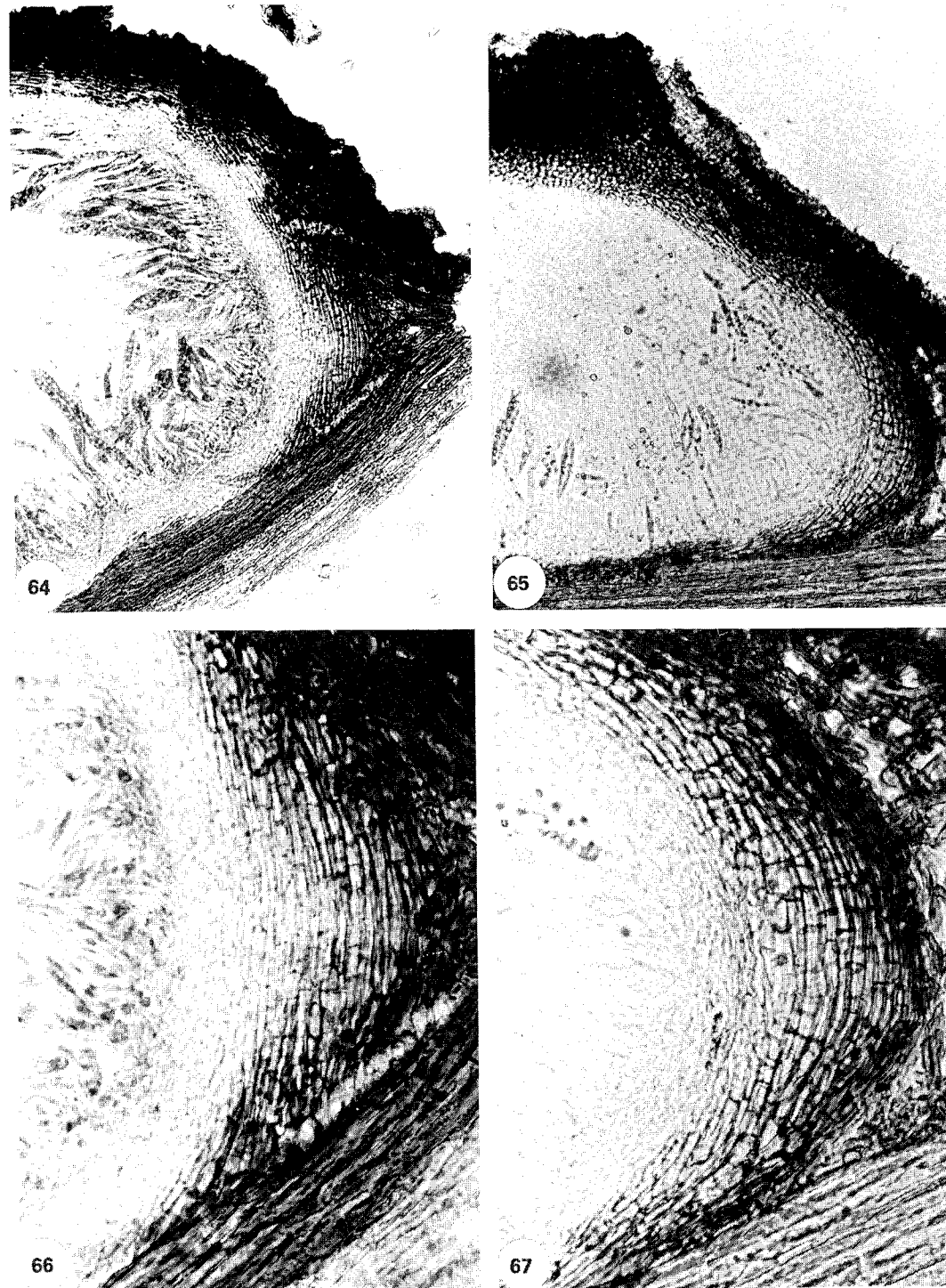
*Symb. Bot. Ups. XXVIII:2*



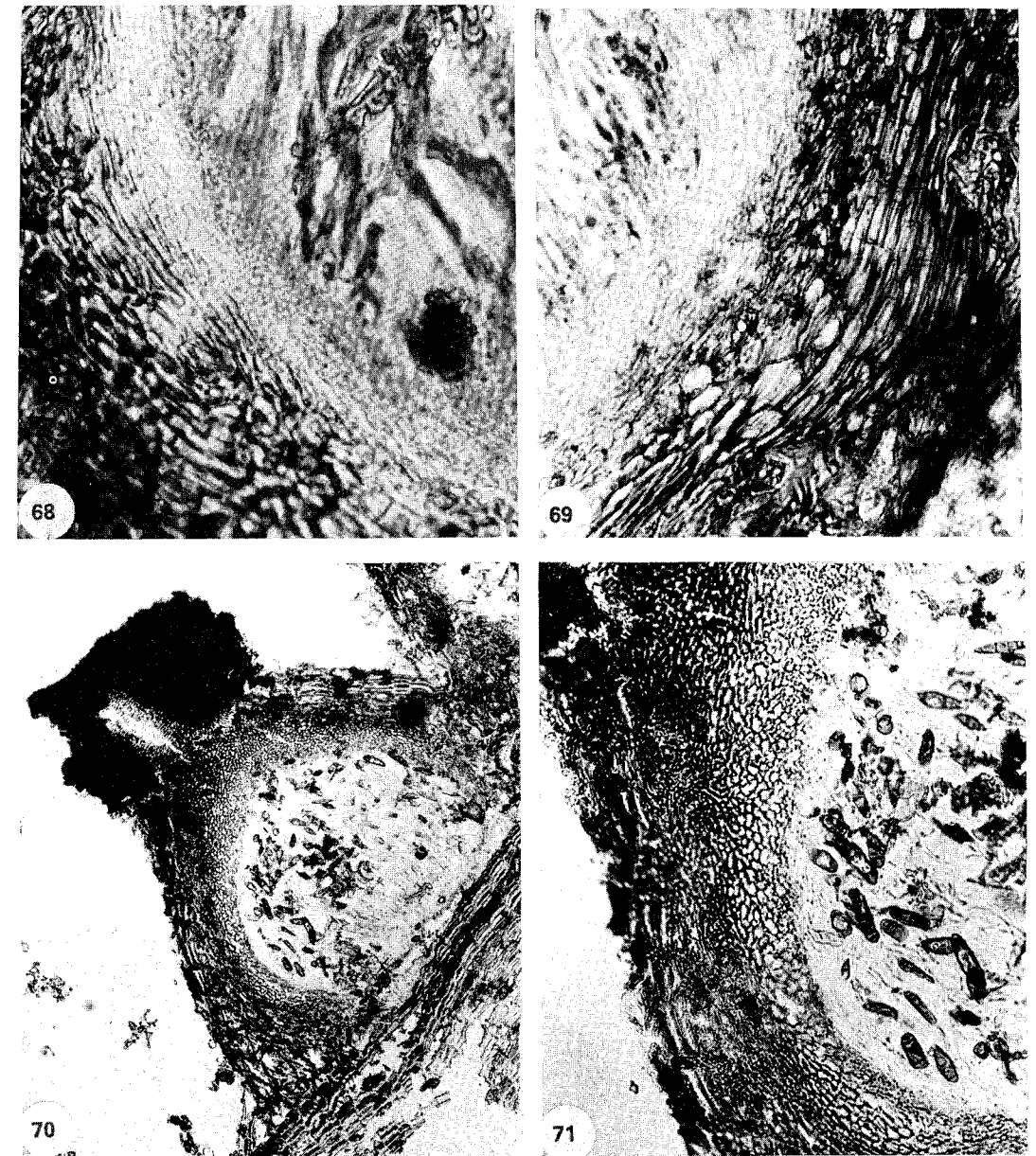
Figs. 60–63. *Lophiotrema*, sections of ascomata. 60. *L. nucula* (Holm 578)  $\times$  210. 61. *L. vagabundum* (Holm 1894a)  $\times$  80. 62. *L. nucula* (= 60)  $\times$  530. 63. *L. vagabundum* (= 61)  $\times$  530.

*Symb. Bot. Ups. XXVIII:2*

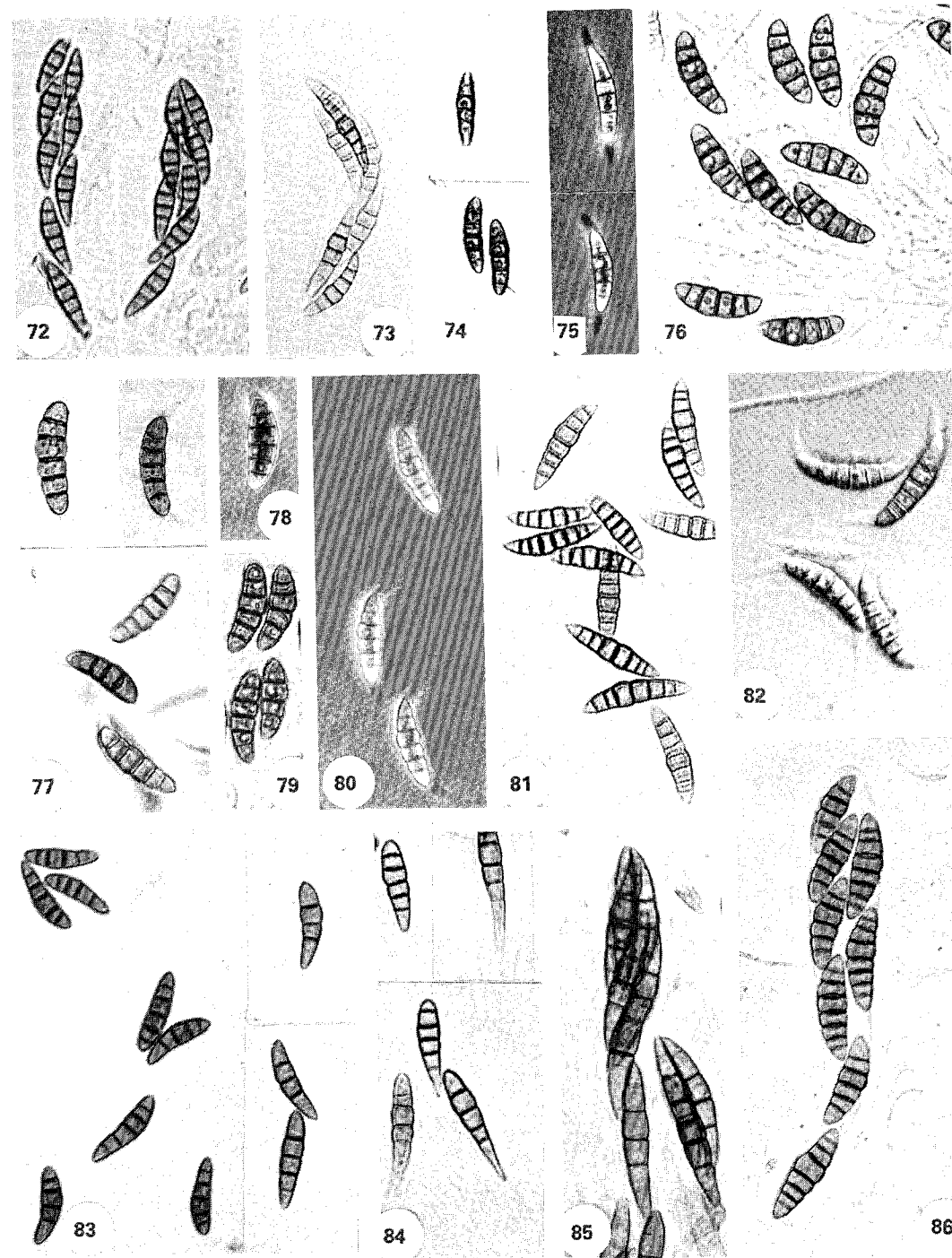




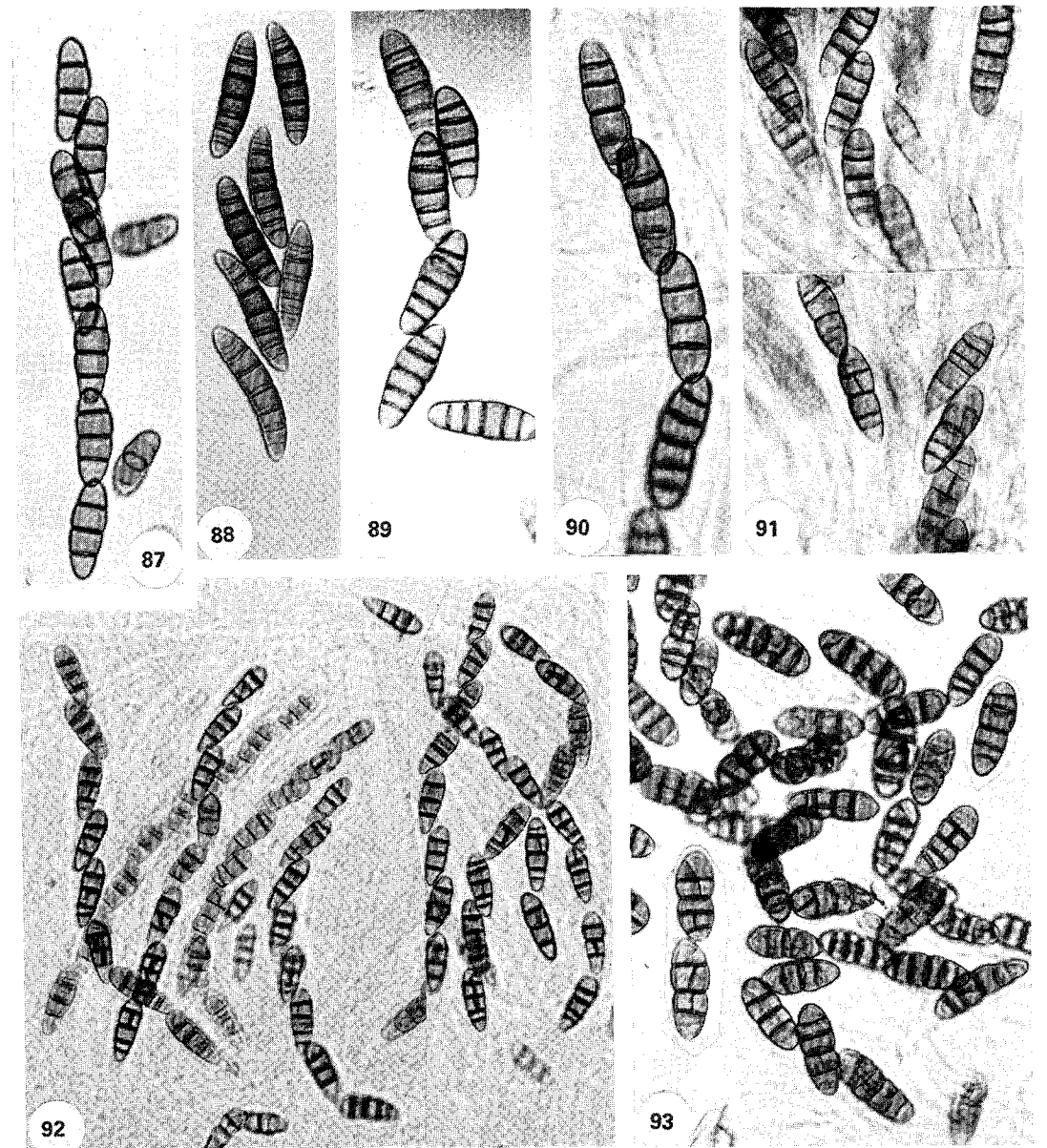
Figs. 64-67. *Lophiostoma* spp., sections of ascomata. 64. *L. Winteri* (*Calluna*, Vestergren)  $\times 210$ . 65. *L. semiliberum* (Holm 2955)  $\times 210$ . 66. *L. Winteri* (= 64)  $\times 530$ . 67. *L. semiliberum* (= 65)  $\times 530$ .



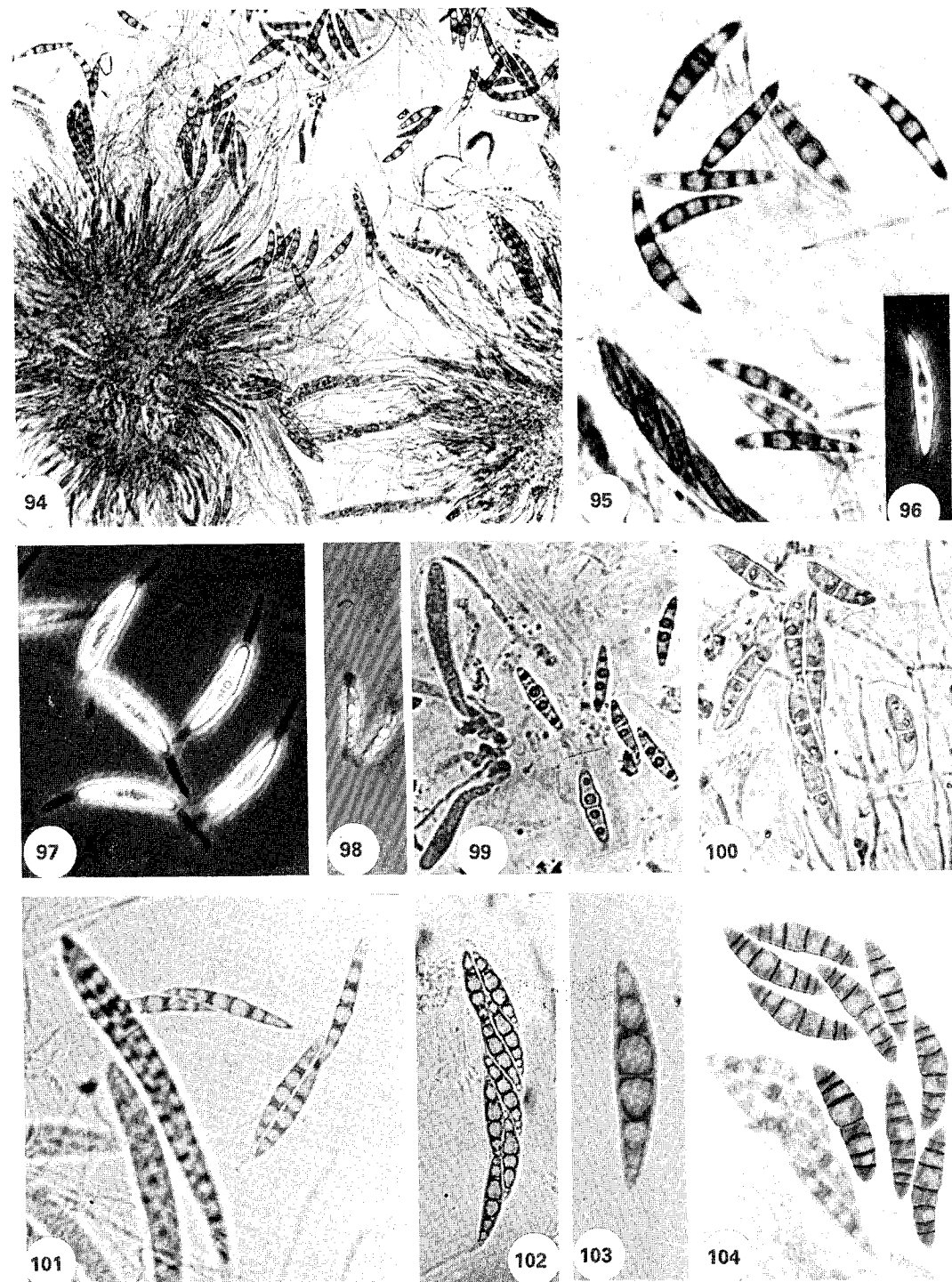
Figs. 68-71. Sections of ascomata. 68. *Lophiostoma macrostomum* (Rbh., F. eur. 2234)  $\times 530$ . 69. *L. macrostomoides* (Holm 275)  $\times 530$ . 70. *Navicella pileata* (Rehm, Asc. 283)  $\times 80$ . 71. ditto,  $\times 210$ .



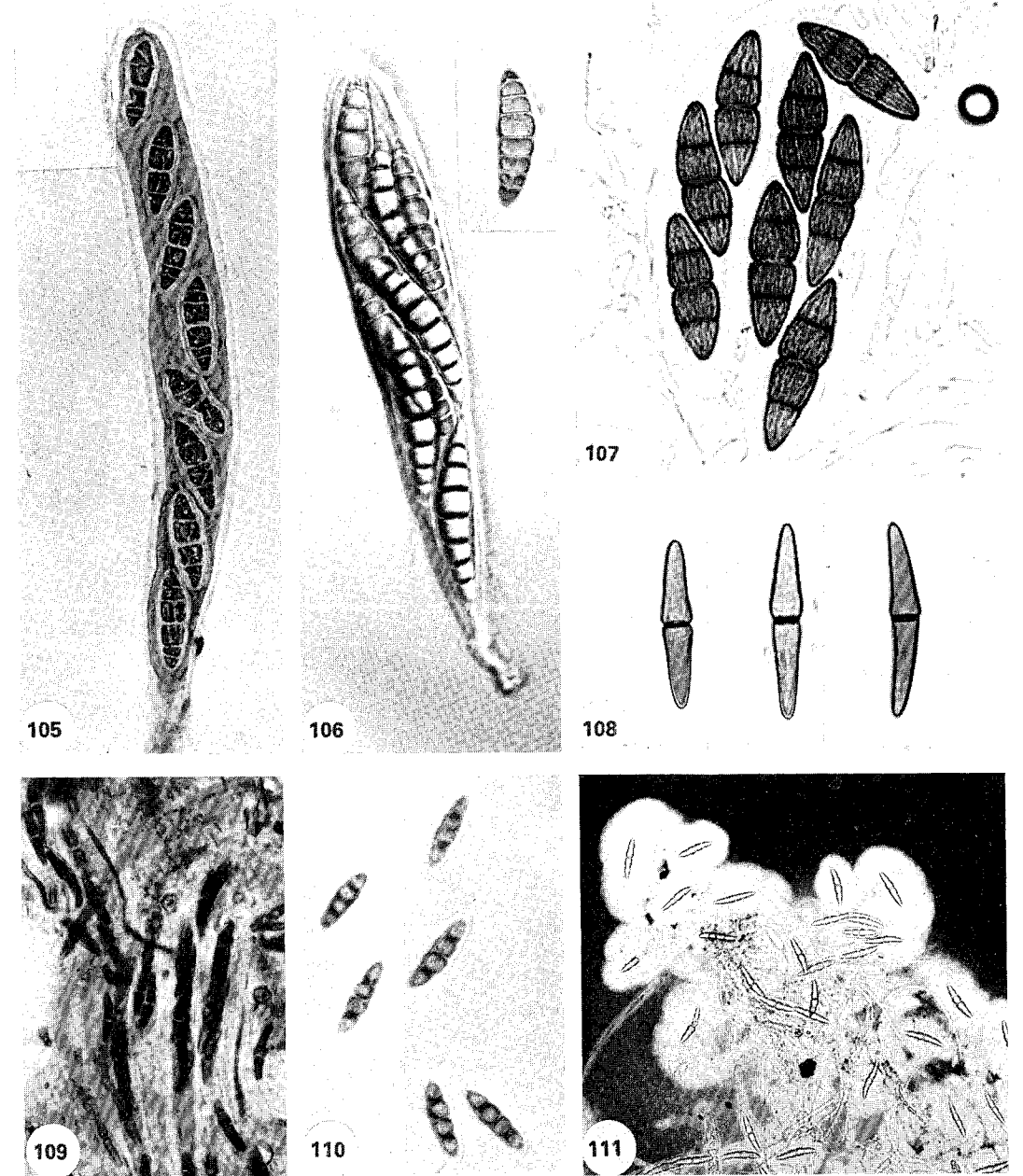
Figs. 72-86. *Lophiostoma* spp., spores  $\times 1000$ . *L. caulium* s. lat. 72-83, 86. 72-75: var. a. 76-79: var. b. 80: var. c. 81, 82, 86: var. d. 83: var. e. 72. Desm., Pl. Crypt. Fr. I: 1825. 73. Åre, *Rubus idaeus*, Eliasson. 74. Rehm, Asc. 1175, *Lactuca saligna*. 75. ditto. 76. Holm 2366b, *Lonicera xylosteum*. 77. Holm 3321a, *Artemisia campestris*. 78. Vänersborg, *Ribes grossularia*, Eliasson, phase contr. 79. = 78, without phase contrast. 80. Holm 3349a, *Serratula tinctoria*. 81. Holm 3051, *Centaurea jacea*. 82. ditto, phase contrast. 83. (left) Holm 2834a, *Arctium tomentosum*. (right) Holm 3333a, *Calamagrostis arundinacea*. 84. *L. caudatum* (O. Eriksson 1041m, *Elymus arenarius*). 85. *L. arundinis*, (Linh., F. hung. 169). 86. *L. caulium* var. d. (Gtl, Bro, *Galium mollugo*, Vestergrén).



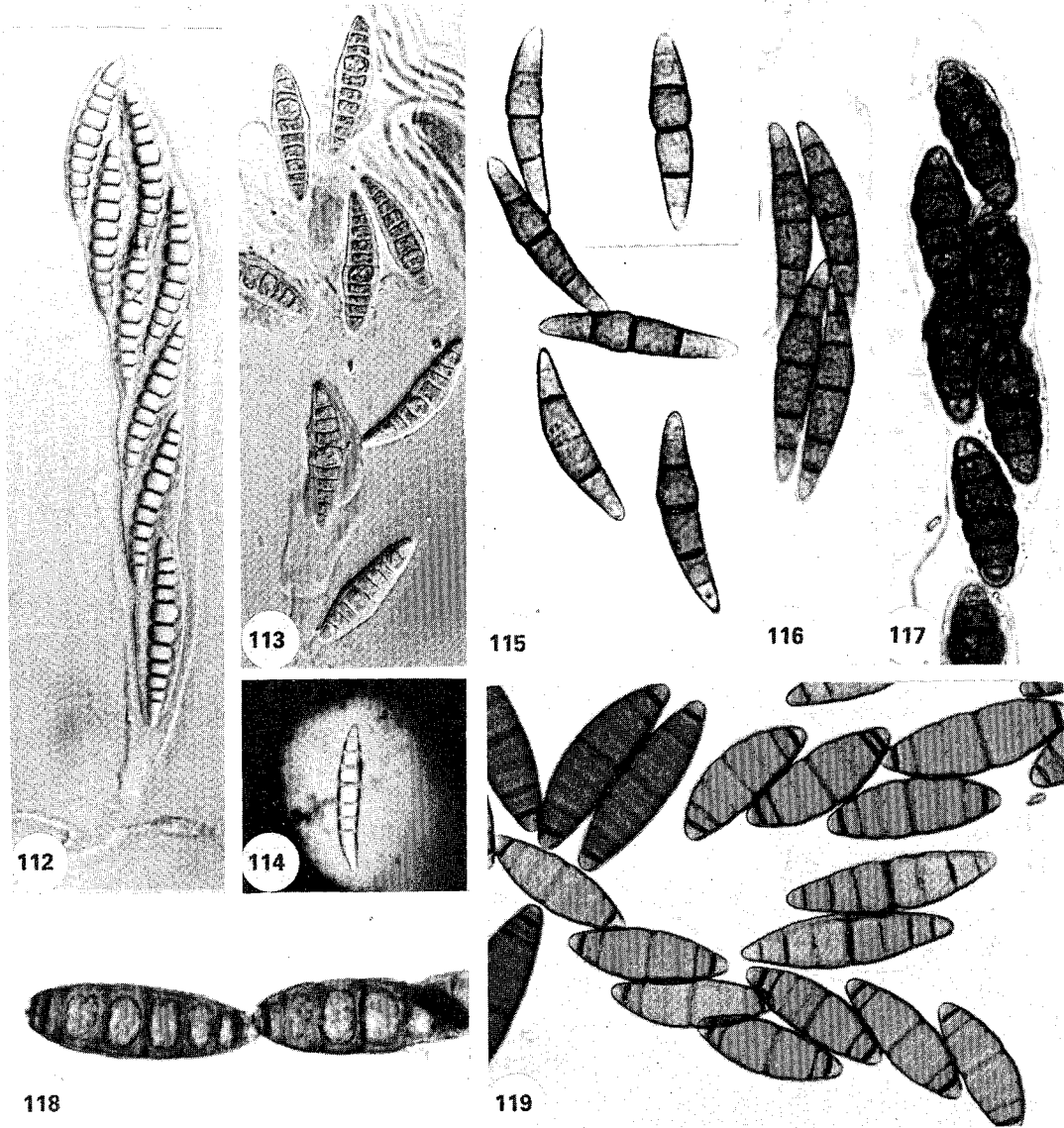
Figs. 87-93. *Lophiostoma* spp., spores,  $\times 1000$ . 87. *L. quadrinucleatum* (type). 88. *L. macrostomoides* (Holm 275). 89. *L. macrostomoides* (type). 90. *L. macrostomoides* (Germany, Dechbetten, Rehm). 91. *L. compressum?* (Almby, Sernander, "*L. pseudomacrostromum*"). 92. *L. curtum* (Mustiala, Starbäck). 93. *L. compressum* (Rehm, Asc. 182).



Figs. 94-104. *Lophiostoma* spp., spores, 94.  $\times 210$ ; 102.  $\times 530$ . 95-101; 103-104  $\times 1000$ . 94-95. *L. macrostomum* (Holm 3393c). 96. *L. macrostomum* (Holm 3811a) phase contrast. 97. *L. glaciale* (Holm 3736a) phase contrast. 98. *L. Fuckelii* (Holm 3802a) phase contrast. 99. ditto, not phase contr. 100. *L. anaxaeum* (Speg. Dec. 95). 101. *L. semiliberum* (Holm 2955a). 102. *L. subcorticale* (Holm 2808a) 103. ditto. 104. *L. appendiculatum* (Rehm, Asc. 1647).



Figs. 105-111. Spores (and asci). 105-110.  $\times 1000$ ; 111.  $\times 210$ . 105. *Lophiostoma nuculoides* (Regensburg, Rehm). 106. *L. massarioides* (Rehm, Asc. 1019). 107. *L. viridarium* (Rehm, Asc. 1093). 108. *L. vicinum* (Holm 3025a). 109. *Lophiotrema boreale* (Holm 3163a). 110. *L. nucula* 111. *L. vagabundum* (Holm 2742), Indian ink.



Figs. 112–119. (Asci and) spores,  $\times 1000$ . 112. *Massariosphaeria alpigena* (Holm 2103c). 113. *M. cf. grandispora* (*L. microthecum*, type). 114. *M. sp.* (Holm 2740c). 115. *Trematosphaeria wegeliniana* (type). 116. *idem* (Nannfeldt). 117. "*Lophiostoma pinastri*" (Rbh., F. eur. 2422). 118. *Navicella pileata* (Herb. Karsten 2708), water mounted. 119. *idem*, (Degelius), lactophenol.

*Symb. Bot. Ups. XXVIII:2*

U. B. HEIDELBERG