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STUDIES IN THE *LOPHIOSTOMATACEAE* SACC.

By

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INTRODUCTION

This study has been based upon freshly collected material and collections preserved in the following Institutions: the Botanisches Museum, Berlin-Dahlem (B); the Botanical Museum & Herbarium, Copenhagen (C); the Commonwealth Mycological Institute, Kew (IMI); the Mycological Herbarium, Plant Research Institute, Ottawa (DAOM); the Botanical Museum, Helsinki (H); the Rijksherbarium, Leiden (L); the Herbarium & Library, Kew (K); the Instituto de Botanica C. Spegazzini, La Plata (LPS); the New York Botanical Garden (NY); the Muséum National d'Histoire Naturelle, Paris (P); the Instituto Orto Botanico dell'Universita, Padova (PAD); the Botanischer Garten und Institut für Systematische Botanik, Zürich (Z); and the Institut für Spezielle Botanik, Zürich (ZT).

The *Lophiostomataceae* Sacc. are quite distinct within the Pyrenomycetes because they possess a laterally compressed ostiole, which at maturity is grooved horizontally by a slot-like opening. The family comprises a number of species all having bitunicate asci, containing hyaline or brown, transversely septate or muriform ascospores which may or may not bear hyaline appendages at their extremities. So far as evidence shows, they are saprophytes occurring on herbaceous and woody materials.

The earliest accounts of the family are to be found in Tode (1791), who placed the species together under the name *Sphaeria macrostoma*, in which he was able to distinguish five " kinds " (considered to be equivalent to species; see fig. 1). In 1823 Fries adopted Persoon's tribe name Platistomae, stating it to be synonymous with *Sphaeria macrostoma* Tode, and the *Lophium* tribe which he himself had introduced in 1815. With the increasing number of additions extreme uncertainty arose as to the limits of the genus *Lophium*, hence Fries later restricted this name to hysteriform species. Influenced by the ideas of de Notaris, Fries, in Summa Vegetabilium Scandinaviae, 1849, pt 2, p. 391. established the new name *Lophiostoma* to include those Pyrenomycetes with simple globose fruit bodies and slot-like ostioles.

In 1878 Trevisan drew attention to the fact that the generic name *Platisphaera* Dumortier (1822) had priority over the generic names *Platistoma* Bonord. (1851), and *Lophiostoma* Ces. & de Not. (1863), but he made no mention of Fries' publication of 1849.

7. SPHAERIA *macroſtoma.*

S. ſimplex, aggregato-ſparſa, globoſa; orificio largo, labiato.

α. nigra.

Seminis papaveris magnitudine gregatim e ligno extuberat, colore nigrescente: externe lævis; interne non niſi vacuam conſpexi. Orificium umbonatum, in formam oblongam criſtæ, ſeu lobi, extenſum, nitidum, atrum, primum e ligno emergit; capſula ipſa tunc temporis adhuc plane demerſa; at paulatim ad medium usque protruditur. Criſta, initio integra, poſtmodum in bina labia finditur; fiſſura hac mucilagini erumpenti exitum dante. In ligno ipſo rami cujusdam, putredine admodum jam exeſi, obſervavi Aprili menſe vegetantem.

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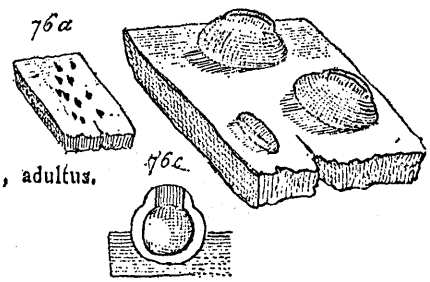
Figurae explicatio.
Tab. IX fig. 76.

a. Fungi aggregati ligno inſixi.

b. c. Fungus, ut lente auctus apparet.
b. Fungi tres, erumpens, adolescens, adultus.
c. Fungus e vertice ſectus.



β. fusca.

Admodum cum varietate α congruit, ſed hac eſt minor & capſulæ color fuscus, at osculum æque atrum nitidumque. Detexi ramuli cujusdam putrescentis, cortice exuti, ſuperficiei ſparſim gregatimque immerſam. Majo.

γ. nigro-fusca.

A varietate præcedente in eo discrepat, quod capſula nigra ſub microscopio nigro-fusca ac ſubtomentoſa appareat, osculo ſpadiceo, lævi, nitido. Color capſularum interna ſuperficie idem eſt, ſed dilutior: non niſi inanes vidi. Obvenit ſparſim crescens in Hederæ terreſtris & Lonicerae Periclymeni ſtipitibus aridis Aprili & Majo.

δ. libera.

Magnitudine varietatem α æquat. Figura ſphærica; cortex exaſperatus, niger, durus; osculum atrum, laeve, nitidum, ſubhians. Sparſim crescit, ligno haud immerſa. Capſulas omnes inanes inveni: vidi autem in fruſtulo ligni quercini, humi jacentis.

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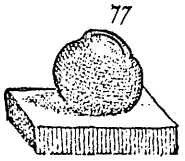
Figurae explicatio.
Tab. IX fig. 77.

Fungus, uti lente admota ſub aſpectum venit.



ε. pilcata.

Cum varietate α omnino fere convenit, figura nempe ſola oſtioli, quæ hic eſt ferme ovalis, excepta; complanatur id ſcilicet ſuperne, lateribus ad verticem capſulæ contractis: unde cono truncato, inverſo quodammodo ſimile fit. In ramulis aridis tum cortici, tum libro, immerſam reperi primo vere. Cortex durus & friabilis.

Figurae explicatio.
Tab. IX fig. 78.

Fungus augmentatus ligno exſculptus.

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Fig. 1. From: 'Fungi Mecklenburgensis' (1790).

Spore septation and colour were used as characters for distinguishing genera and species of this family by many mycologists, principally Saccardo, who erected 9 separate genera using these criteria. Other authors, including Rabenhorst, Fabre, Ellis and Berlese, to a greater or lesser degree all followed the Saccardian system.

Mention must be made of the monograph on the genus *Lophiostoma* Fries by Lehman in 1886. Despite the vast amount of research which must have been involved, his ideas have not been accepted (they were completely discredited by Berlese), because his classification of the family was based upon host relationships. As the majority of species are largely ubiquitous, Lehman's classification only led to the multiplication of synonyms.

Within broad limits, both septation and colour can be used to distinguish the species of the Lophiostomataceae. It is doubtful whether either character alone could be used for generic distinctions. The dictyosporous species seem to be fairly clearly separated from those with transversely septate ascospores and it would appear convenient (although not strictly natural) to place those with dictyosporous ascospores in a separate genus.

In what follows the date for nomenclatural priority is taken to be the 1846–49 publication " Summa vegetabilium Scandinaviae " by Fries. Hence *Lophiostoma* Fr. (1849) is applied to those species having hyaline or brown transversely septate ascospores, while *Platystomum* Trev. (1878) is applied to the dictyosporous species. *Platystomum* has priority over *Lophidium* Saccardo (1883).

Hedberg (1958) suggested that a discontinuity between at least two independent characters was necessary for the maintenance of two species. Although he was referring to angiosperms of the Afro-Alpine flora, the use of such requirements has proved useful in defining the species limits of the Lophiostomataceae. A modification of Hedberg's theory has been applied. Instead of a discontinuity in two characters, a clear discontinuity in one character has been recognised for the maintenance of two species. This modification is thought to be justified as there are fewer morphological characters to measure in fungi than in angiosperms. Use of this method has resulted in the combination of many species or the reduction of other species to varieties. Based on the evidence provided both by herbarium and freshly collected material, the following synoptic key to the family has been devised:

SYNOPTIC KEY

A. Spores with horizontal septa only (*Lophiostoma*) . . . . . B.
  B. Spores hyaline, but often ripening to a dilute brown . . . . . C.
    C. Spores filiform . . . . . *L. vermisporum*, (p. 52)
    CC. Spores greater in length than width, but never filiform . . . . . D.
      D. Majority of spores 1 septate . . . . . E.
        E. Asci clavate with tapering stalk . . . *L. fuckelii* group (p. 5)
        EE. Asci cylindrical with a button-like stalk . . *L. nucula* group (p. 21)
      DD. Spores 3 septate whilst still within ascus . . *L. hysterioides* group (p. 13)
  BB. Spores more or less a uniform brown . . . . . F.
    F. Spores with conspicuous projections arranged in ridges . . *L. viridarium* (p. 32)
    FF. Spores with more or less smooth walls, or only delicately punctate . . G.
      G. Spores with 1 median septum . . . . *L. pachythele* group (p. 25)
      GG. Spores with more than 1 septum . . . . . H.

H. Spores 3–5 septate, not pyriform or clavate . . *L. quadrinucleatum* (p. 35)
HH. Spores normally 5–8 septate, oval, pyriform or clavate *L. caulium group* (p. 38)
BBB. Spores brown with polar cells remaining hyaline or subhyaline . . . . I.
I. Spores 5–6(8) septate, (27)30–40(46)μ long, constricted at the septa *L. macrostomum* (p. 33)
II. Spores (6)7–9(10) septate, (35)40–60(66)μ long, not constricted at the septa *L. pileatum* (p. 29)
AA. Spores with vertical septa or pseudosepta in most samples . . *Platystomum* (p. 46)

THE FUCKELII GROUP

This group is represented by four species and two varieties. Placing them together is not intended to indicate any inter-relationship. In the construction of the synoptic key it was found convenient to group these species together. It is probable that *Lophiostoma arundinis*, which is not included in this group, is closely related to *Lophiostoma semiliberum*, which is included. There are characters other than septation common to the species of this group: *L. fuckelii*, *L. angustilabrum* and *L. semiliberum* are most frequently found upon herbaceous material; *L. angustilabrum* and *L. semiliberum* are often found on *Urtica* and have spore sizes differing by a narrow margin. Culturally, however, the two species are very distinct.

KEY TO THE SPECIES

(1) Spores less than 20μ long . . . . . (2)
(1) Spores more than 20μ long . . . . . (3)
(2) Spores 11–18×3–5μ . . . . . *L. fuckelii* (p. 5)
(2) Spores 15–21×4–5·5μ . . . . . *L. fuckelii* var. *pulveracea* (p. 7)
(3) Spores less than 35μ long . . . . . (4)
(3) Spores more than 35μ long . . . . . (5)
(4) Spores 24–30×4–5·5μ . . . *L. angustilabrum* (p. 8) & var. *crenatum* (p. 11)
(4) Spores 30–35×6–7μ . . . . . *L. angustilabrum* var. *parasiticum* (p. 9)
(5) Spores 30–43×5·5–8μ . . . . . *L. semiliberum* (p. 11)
(5) Spores 45–60×8–10μ . . . . . *L. subcorticale* (p. 12)

A scatter diagram (Fig. 3) illustrates the variation in ascospore length (and septation) in three species and one variety of this group.

Lophiostoma fuckelii Sacc., 1878, *Michelia*, **1**:336.
?*Sphaeria diminuens* Pers., 1801, *Synop. method. Fung.* :57.
?*Lophiostoma diminuens* (Pers.) Fuck., 1870, *Symb. mycol.* :156.
Lophiosphaera fuckelii Sacc., 1883, *Syll. Fung.*, **2**:678.
Lophiosphaera rubicolum Nits., 1886, in Lehm. *Syst. Bearb. Pyr. Loph.* :58, Fig. 39 (fide Berl.).

Pseudothecia gregarious; frequently in groups semi-immersed or quite superficial on the host substrate, (in the latter instance due to the loss of the host's periderm): dull black with slightly rough walls, globose or sub-globose, 0·16–0·12 mm diam., surmounted by a small strongly compressed ostiole (Fig. 2).

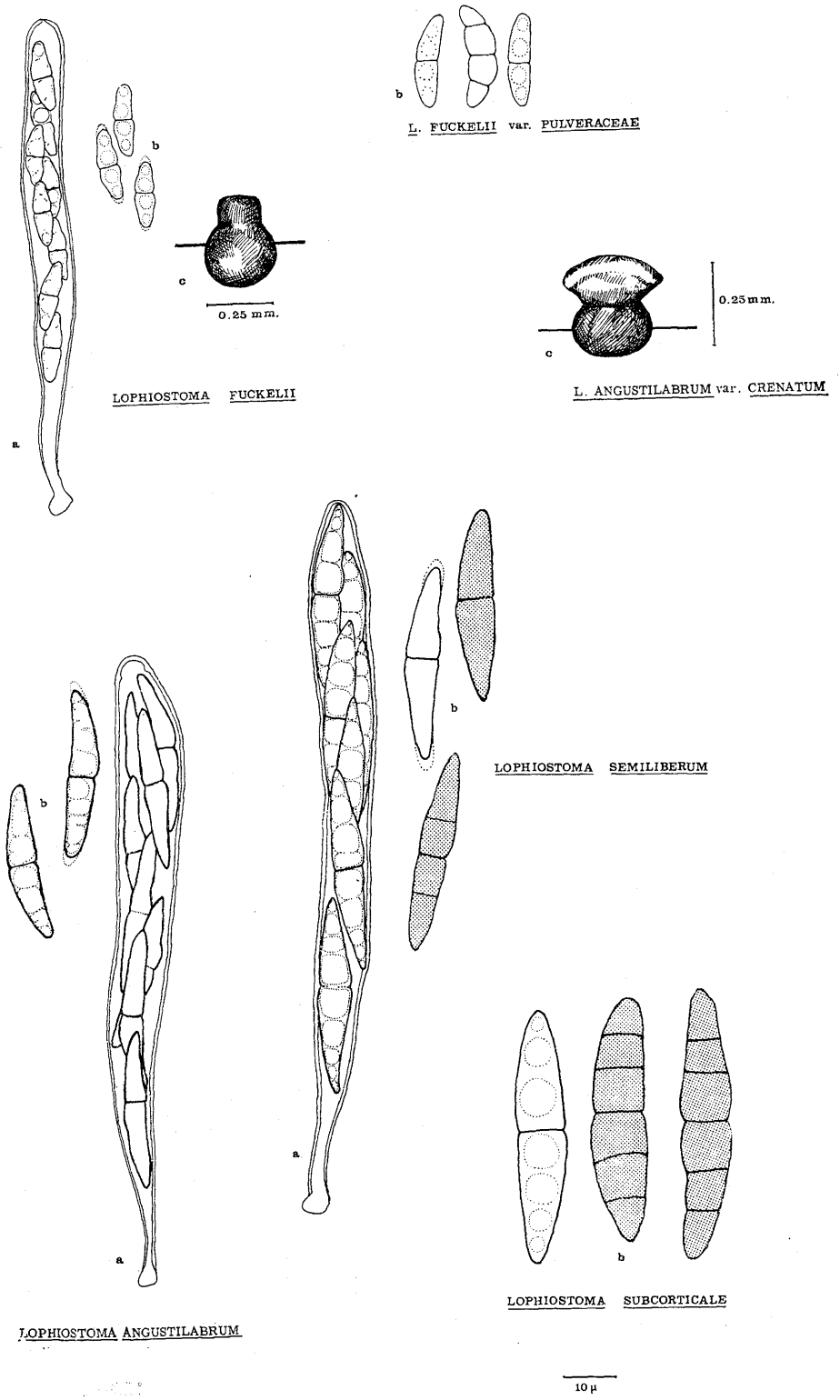

FIG. 2. a=asci, b=ascospores, c=pseudothecia.

Asci clavate, tapering basally into a short stalk, 60–80μ long (including the stalk), and approx. 8μ at their widest point. Ascospores hyaline, biseriate, 8 per ascus; spores straight or slightly curved, shortly spindle-shaped, with a single constricted central septum, a hyaline appendage occasionally visible at both ends of the spore, 11–18 × 3–5μ, each usually containing 4 large guttules; outer spore wall constricted between these guttules, suggesting the addition of septa at these points. Spores may become sub-hyaline or fuliginous with age. Branched septate pseudoparaphyses present. Found on herbaceous material, particularly *Rubus* spp.

The above account agrees with the diagnoses of Rabenhorst and Saccardo. Fuckel stated that the ascospores were 2- or indistinctly 4-celled, although Rabenhorst on seeing Fuckel's herbarium material stated that this was an error, and that the spores were uniformly 2-celled. Saccardo lists Fuckel's sample with obscurely 3-septate spores as "Forma Rubi."

Many collections contained only 2-celled ascospores, but a more extensive collection of this species population may show Fuckel's diagnosis to be the more correct. A few 4-celled spores have been seen. The asci and ascospores are illustrated in Fig. 2.

It has not been possible to authenticate *Lophiostoma diminuens* (Pers.) Fuckel. A specimen from Persoon's herbarium at Leiden (No. 910.270–616) labelled *Sphaeria diminuens* is probably *Lophiostoma angustilabrum*.

Specimens Examined

Ex Herb. K.
Lophiosphaera fuckelii Sacc., exsicc. Cooke. *Lophiostoma diminuens* Pers., on *Rubus fructicosa*.
Ex Herb. IMI.
Lophiosphaera fuckelii, on *Rubus*, coll. W. G. Bramley, det. S. M. Francis, IMI 111159.
Ex Herb. B.
Lophiostoma rubicolum Nits., on *Rubus*, leg. P. Sydow, 1893, No. 3944, Herb. sheet: 2131

L. fuckelii var. **pulveracea** (Sacc.) Chesters & Bell, comb. nov.
Lophiostoma pulveraceum Sacc., 1878, *Michelia*, **1**:336.
Lophiosphaera pulveracea (Sacc.) Sacc., 1883, *Syll. Fung.*, **2**:678.
Lophiostoma heterostomum Ell. & Ev., 1886, *Journ. Mycol.*, **2**:99.
Lophiosphaera heterostoma (Ell. & Ev.) Berl. & Vogl., 1891, in Sacc., *Syll. Fung.*, **9**: 1075.

Habit and dimensions of the pseudothecia in all respects comparable with *L. fuckelii*. Ascospores range from 15 to 21μ in length, and from 4 to 5·5μ in width.

The illustration in Fig. 2 shows how similar this fungus is to *L. fuckelii*. The range of the ascospore lengths of *L. fuckelii* and *L. fuckelii* var. *pulveracea* overlap. It was considered that the similarity between these two fungi did not warrant specific distinction, but since they are distinguishable there is insufficient evidence for reducing them to synonymy. Berlese described *L. fuckelii*, *L. pulveracea* and *L. heterostomum* as distinct species.

SPECIMENS EXAMINED

Ex Herb. PAD.

Lophiosphaera pulveracea Sacc., (part of type?), No. 18, exsicc. Sacc., hand-written note reading: "*L. diminuens.*"

Ex Herb. NY.

L. pulveraceum Sacc., leg. Langlois. *L. heterostomum* Ell. & Ev., type coll., No. 478, leg. Langlois, June 8, 1886.

Lophiostoma angustilabrum (Berk. & Br.) Cooke, *Trans. Bot. Soc. Edinb.*, 1868, **9**: 330.

Sphaeria (*Platystomae*) *angustilabra* Berk. & Br., 1859, *Ann. & Mag. Nat Hist.*, **3**, 3, No. 881, Fig. 27: 372.

Sph. (*Platystomae*) *jerdoni* Berk. & Br., 1861, *Ann. & Mag. Nat. Hist.*, **3**, 7, No. 957, Fig. 28: 453 (fide Berl.).

Sph. praemorsa Lasch., 1868, *Herb. Mycol.*: 1249.

Lophiostoma hederae Fuck., 1870, *Symb. mycol.*: 157 (fide Berl.).

Lophiostoma praemorsum (Lasch.) Fuck., 1870, *Symb. mycol.*: 157.

Lophiostoma microstomum Niessl, 1870, Rabenh. Fungi Europ. (fide Berl.).

Lophiostoma sex-nucleatum Cooke, 1871, *Handb. Br. Fung.*, No. 2543, Fig. 392 (fide Berl.).

Lophiotrema praemorsum (Lasch.) Sacc., 1879, *Michelia*, **1**: 513.

Lophiotrema hederae (Fuck.) Sacc., 1883, *Syll. Fung.*, **2**: 678.

Lophiotrema emergens Karst., 1883, *Hedwigia*, **3**: 42.

?*Lophiosphaera anaxaea* (Sacc.) Trev., 1883, *Syll. Fung.*, **2**: 677.

Lophiostoma cookeri Nits., 1886, in Lehman, *Syst. Pyr. Loph.*: 66, Fig. 2 (fide Berl.).

Pseudothecia generally found in large groups remaining either submerged within the host, the ostioles alone erumpent, or semi-immersed with only the basal portion of the pseudothecium hidden: globose or sub-globose, black, surmounted by wide and often truncated ostioles. Ostioles usually arranged with their long axes parallel to the grain of the host material. Asci clavate with a slender stalk 90–120 × 8–12μ, each containing 8 biseriately arranged ascospores (Fig. 2). Spores hyaline, fusiform, straight or slightly curved, with one median septum, the spore wall being somewhat constricted at this point (Fig. 2), 24–30 × 4–5·5μ; each cell of the ascospores contains 3–6 guttules. Terminal appendages may or may not be visible at the ends of the spores.

A few spores may have an additional tranverse septum whilst still in the ascus. Genetic segregation for colour has been observed in one locally collected sample. The mature ascospore becomes 3-septate prior to germination. At germination, as in *L. fuckelii*, changes in the outer hyaline tunic render the ascospores punctate. This species is frequently found on herbaceous material, particularly *Urtica*.

SPECIMENS EXAMINED

Ex Herb. Lugd. Bot. (Herb. L)
Sphaeria diminuens Pers., on *Rubus*, No. 910.270–616; this specimen is not considered to be the type of *Sph. diminuens* Pers. *Sphaeria media* Pers., note underneath reading: " *Sph. caulium* Fries., Syst. 2.", No. 910.263–1092. *Sphaeria compressa* Pers. No. 910.270–356.
Ex Herb. PAD.
Lophiostoma praemorsum (Lasch.) Sacc., on *Rubus idaeus*, exsicc. Rabenh. Herb. myc. No. 1249, No. 535 in Herb. Sacc.
Ex Herb. ZT.
Lophiosphaera anaxaea, on *Spartina juncea*, Alpes Maritime, France, leg. E. Müller.
Ex Herb. NY.
Lophiotrema aequivocum (Ell. & Ev.) Berl., on *Broussonetia*, leg. G. W. Carver, 1897. *Lophiosphaera schizostoma* Mont. var. *minor*, on petioles of *Cycas revoluta*, leg. Langlois, July 1886. *Lophiotrema duplex* Sacc., on *Viburnum opulus*, leg. P. Sydow, No. 2059, June 1888.
Ex Herb. UPS.
Sphaeria macrostomum signed E. Fries.
Ex Herb. B.
Sphaeria angustilabra B. & Br. (Lophiostomae), on *Ulex*, three parts (type coll.). *Lophiostoma sedi* Fuck., on *Aconitum*, exsicc. Rehm. Ascomy., leg. Lojka, Aug. 1872. *Lophiotrema hederae* Fuck., on *Hedera helix*, Schoenberg, Berlin, exsicc. Mycotheca Germanica No. 2550, leg. P. Sydow, 1889. *Lophiostoma hederae* Fuck., on *Hedera helix*, exsicc. Kunz. Fungi selecti No. 99, 1875 [this is the specimen which Rabenhorst cites for his *L. hederae* (Fuck.) Rabenh.]. *Lophiostoma diminuens* (Pers.) Fuck., on *Rubus idaeus*, exsicc. Flora Bohemiae No. 164, leg. F. Petrak, 1912. *Lophiotrema praemorsum* (Lasch.) Sacc., on *Viburnum opulus*, leg. Kirschstein, 1914. *Lophiotrema crenatum* (Pers.) Sacc., on *Viburnum opulus* leg. Kirschstein, 1943. *Lophidium compressum* f. *microsporum* Sacc., leg. P. Sydow, 1888 (this is a mixed collection).
Ex. Herb. IMI.
Lophiostoma microstomum, on *Epilobium hirsutum*, leg. S. M. Francis, 1958, IMI 111420. *Lophiostoma microstomum*, on *E. hirsutum*, leg. S. M. Francis, 1958, IMI 111486. *Lophiostoma microstomum*, on *E. hirsutum*, leg. S. M. Francis, 1958, IMI 111560. *Lophistoma* sp., on *Fagus*, leg. S. M. Francis, IMI 14028. *Lophiotrema rubidum*, on *Filipendula ulmaria*, leg. S. M. Francis, 1958, IMI 111529. *Lophiotrema hederae*, on *Hedera*, leg. S. M. Francis, 1956, IMI 111086. *Lophiotrema* sp., on *Hedera helix*, leg. S. M. Francis, 1957, IMI 111145. *Lophiotrema* sp., on *Hedera*, leg. S. M. Francis, 1957, IMI 111148. *Lophiotrema* sp., on *Hedera*, leg. S. M. Francis, 1958, IMI 111409. *Lophiostoma* sp., on *Quercus*, det. S. J. Hughes, IMI 62201. *L. angustilabrum*, on *Rumex*, leg. S. M. Francis, 1956, IMI 111079. *Lophiotrema vagabundum* & *Lophiotrema*?, on *Rumex*, leg. S. M. Francis, 1956, IMI 111098 (mixed material, but some is *Lophiostoma praemorsum*). *Lophiotrema angustilabrum*, on *Rumex*, leg. S. M. Francis, 1957, IMI 111152. *Lophiotrema angustilabrum*, on *Rumex*, leg. S. M. Francis, 1959, IMI 111703. *Lophiotrema praemorsum*, on *Ulex*, IMI 17608. *Lophiotrema sex-nucleatum*, on *Urtica*, leg. S. M. Francis, 1958, IMI 111407. *Lophiostoma angustilabrum*, on bare wood, leg. S. M. Francis, 1957, IMI 111137.

L. angustilabrum var. **parasiticum** (Peck) Chesters & Bell, comb. nov.
Lophiotrema parasiticum Peck, 1892, in Ell. & Ev., *N. Am. Pyrenom.*: 228.

Two slight differences were observed between this species of Peck and *L. angustilabrum* Berk. & Br. One was in host material, *L. parasiticum* being present on the old dead fruit-bodies of an *Hypoxylon* sp.; the other was of spore size, spores of *L. parasiticum* being 28–34(39)μ in length. In all other respects, *L. angustilabrum* and *L. parasiticum* are indistinguishable. Using the scatter diagram technique, these two species do not show a clear-cut discontinuity: for these reasons, *L. parasiticum* has been reduced to a variety of *L. angustilabrum* (Fig. 3). Only one sample (the type) has been seen; more collections may prove *L. parasiticum* to be widespread and therefore worthy of specific rank.

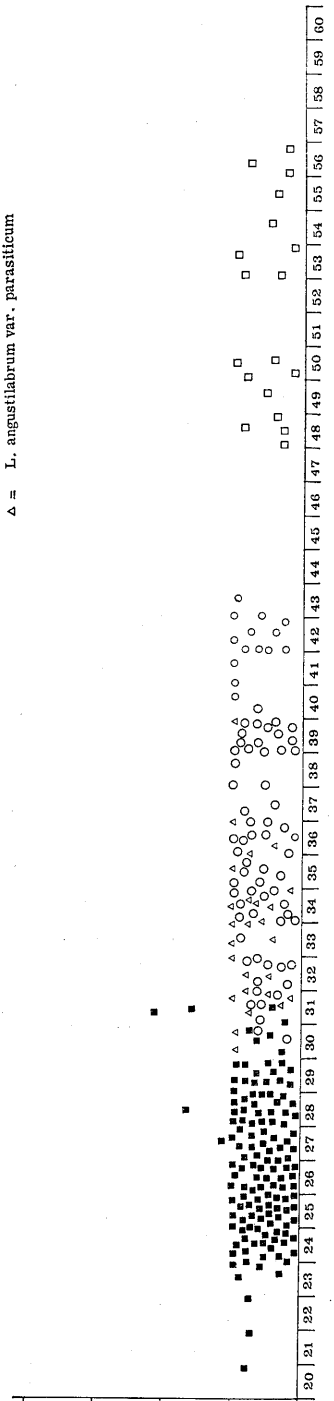

FIG. 3. Scatter diagram illustrating the variation in spore length and septation in three species of *Lophiostoma*.

SPECIMEN EXAMINED

Ex Herb. NY.
Lophiotrema parasiticum Peck, on *Hypoxylon*, leg. C. H. Peck, Sept.? (no year indicated).

L. angustilabrum var. **crenatum** (Pers. ex Fr.) Chesters & Bell, comb. nov.
?*Sphaeria crenata* Pers., 1801, *Synop. method. Fung.*: 54.
?*Sphaeria crenata* Pers. ex Fr., 1823, *Syst. mycol.*, **2**: 469.
Lophiostoma crenatum (Pers.) Fuck., 1870, *Symb. mycol.*: 157.
Lophiotrema crenatum (Pers.) Sacc., 1883, *Syll. Fung.*, **2**: 680.
Lophiostoma crenatum (Pers.) Rabenh., 1885, *Krypt. Fl.*, Bd. 1, **2**: 294.

Because of their unusual ostioles there are only two Lophiostomataceae which can be distinguished macroscopically. One of these is *L. angustilabrum* var. *crenatum*. This species is unlikely to have been greatly confused in the past (Fig. 2). The asci and spores are identical with those of *L. angustilabrum*. A section taken through the broad axis of the ostiole shows its extraordinary width to be due to a very much thickened outer wall. In all other respects the ostiole is very similar to that of *L. angustilabrum*. Berlese was doubtful of giving *L. crenatum* specific rank.

SPECIMENS EXAMINED

Ex Herb. B.
Lophiotrema crenatum (Pers.) Sacc., on *Cornus*, leg. Kirschstein, 1904, on Herb. Sheet No. 2132/13. *Lophiotrema crenatum* (Pers.) Sacc., on *Ligustrum vulgare*, leg. P. Sydow, No. 1555. *Lophiotrema crenatum* Pers., on *Robinia pseudoacacia*, 1930, on Herb. Sheet No. 2132/13. *Lophiotrema crenatum* (Pers.) Sacc., on *Vitis vinifera*, leg. W. Krieger, No. 2209.

Lophiostoma semiliberum (Desm.) Ces. & de Not., 1863, *Schem. Sfer.*: 46.
Sphaeria semilibera Desm., 1846, *Ann. Sc. nat.*, **6**: 78.
Lophiotrema semiliberum (Desm.) Sacc., 1878, *Michelia*, **1**: 338.
Lophiostoma hungaricum Rehm., 1883, *Hedwigia*, **22**: 58.
Lophiostoma meridionale Ell. & Ev., 1892, *N. Am. Pyrenom.*: 232.

Pseudothecia frequently found in small groups either submerged within the host material or semi-erumpent; ovoid or elliptical, 0·7–1 mm diam., surmounted by a broad ostiole which may reach 0·5 mm diam. Ostioles aligned parallel to the long axis of the host material. Asci clavate with slender stalks, 100–140μ long, each containing 8 (or sometimes less) ascospores (Fig. 2). Spores hyaline or dilute brown, fusiform, 30–43 × 5·5–8μ. A thin, hyaline tunic surrounds each spore, and this is observable in freshly collected specimens as an appendage at each end of the spore.

As in *L. fuckelii* and *L. angustilabrum*, the punctate surface seen in germinating spores is due to changes within the tunic. Each mature spore is uniseptate, the outer wall of the spore being constricted in the region of the septum. Very occasionally spores may have two septa. The large numbers of guttules in each cell suggests that further septation might take place, but upon germination the spores only have three septa (Fig. 2).

Branched pseudoparaphyses are present in the mature pseudothecium. *L. semiliberum* is most frequently found on graminaceous hosts. An interesting connection occurs between *L. semiliberum* and *L. arundinis* Fr. Both occur on *Phragmites communis*, sometimes growing on the same portion of material. Both have ascospores of similar sizes, those of *L. arundinis* being 5-septate and brown. However, even when growing in such close proximity, no pseudothecia have yet been found containing the two kinds of ascospores. On a scatter diagram, *L. semiliberum* and *L. arundinis* are separated by a clear discontinuity.

In his species *L. semiliberum* forma *arundinis*, Lehman described a pycnidial state, the pycnidia containing 3-septate stylospores, 30–51 × 5–6μ. No such state has been seen by the present writers either on collected material or in culture.

Specimens Examined

Ex Herb. K.
Lophiotrema culmifragum Speg., Exsicc. Pollaci Fungi Longobardiae, No. 288. *Sphaeria semilibera* Desm., on *Bromus sylvatica*, leg. Roberge, 1879.
Ex Herb. B.
Lophiostoma (*L/trema*) *hungaricum* Rehm., type coll., on *Aconitum napelli*. *Lophiostoma microstomum* Niessl., on *Epilobium hirsutum* leg. G. Winter, No. 168, 1874. *Lophiotrema semiliberum* Sacc., on grass culms, exsicc. de Thümen Mycotheca Universalis, leg. M. A. Libert. *Lophiotrema semiliberum* on *Phragmites*, leg. Kirschstein, 1936. *Lophiostoma arundinis* (Fr.) Ces. et de Not., on *Phragmites communis*, leg. Kirschstein, 1932.
Ex Herb. NY.
Lophiotrema semiliberum (Desm.) Sacc., on *Bromus sylvatica*, leg. Roberge, 1896. *Lophiotrema semiliberum* (Desm.) Sacc., on *Elymus*, leg. Dearness, 1923, (mixed with *Leptosphaeria* sp.). *Lophiostoma elymi* Dearn. sp.nov., on *Elymus virginicus*, 1923, exsicc. Sydow, Fungi selecti. *Lophiostoma microstoma* Niessl., on *Epilobium hirsutum*, exsicc. Rabenh. Fung. Europ., leg. G. Winter. *Lophiostoma semiliberum* (Desm.) Sacc., on *Glyceria aquatica*, exsicc. Sacc. Mycotheca Venetia, No. 1477, 1880. *Lophiostoma meridionale* Ell. & Ev., on *Xanthium*?, 1888.
Ex Herb. CP.
Lophiotrema semiliberum (Desm.) Ces. et de Not., on *Phragmites*, Ganløse, det. & leg. A. Munk, 1965. *Lophiotrema microstomum* Niessl., on *Urtica*, Ørholm, 1965, leg. A. Munk.
Ex Herb. IMI.
Lophiotrema semiliberum on ? *Agropyron*, leg. S. M. Francis, 1957, IMI 111116. *Lophiotrema* sp., on *Centaura nigra*, 1957, IMI 111232. *Lophiostoma arundinis*, on *Phragmites*, leg. M. B. Ellis, 1947, IMI 15532. *Lophiostoma arundinis*, on *Phragmites*, leg. S. M. Francis, 1958, IMI 111647, (this specimen contains both *L. semiliberum* and *L. arundinis*). *Lophiostoma arundinis*, on *Phragmites*, leg. S. M. Francis, 1957, IMI 111160. *Lophiostoma arundinis*, on *Phalaris arundinacea*, leg. M. B. Ellis, 1948, IMI 27598.

Lophiostoma subcorticale Fuckel, 1870, *Symb. mycol.*: 157.
Lophiosphaera subcorticalis (Fuck.) Trev., 1877, *Bull. Soc. bot. Belg.*, **16**: 20.
Lophiostoma simile Nits., 1878, in *Rehm Ascom.* ex. n. 483.

Pseudothecia scattered or in groups, immersed or semi-immersed within the host substrate. Ostioles up to 0·5 mm in length, the long axis aligned parallel to the grain of the host. Asci clavate, tapering to a short basal stalk, 180 × 25μ (approx.). Many asci contain less than 8 ascospores. Spores hyaline, fusiform, 1-septate, 45–60 × 8–10μ, finally ripening to a dilute brown (Fig. 2).

Four additional septa are added at full maturity; some spores seen at this stage are a definite brown. The spore wall may appear punctate, particularly on the fuliginous or brown spores, this being due to a transparent tunic surround-

ing the spore, similar to that in the other species described in this group. Branched pseudoparaphyses are present in great numbers in the mature pseudothecium and the ostiole is lined with periphyses. It has been found on the bark of *Pyrus malus* and *Salix* sp.

Specimens Examined

Ex Herb. K.
Lophiostoma subcorticalis Fuck., (part of type), on *Pyrus malus*, exsicc. Fuck. Fung. Rh., No. 1809, purchased 1884. *Lophiostoma subcorticale* Fuck., (syn. *L. simile* Nits.), on *Pyrus malus*, exsicc. Rehm. Ascomy., No. 483.
Ex Herb. B.
Lophiostoma subcorticale Fuck., on *Pyrus malus*, leg. W. Kirschstein, 1931. *Lophiosphaera schizostoma* (Mont.) Trev., on decorticated wood, exsicc. Rehm. Ascomy. No. 1688, leg. Prof. Rick.
Ex Herb. NY.
Lophiostoma fleychhakii, ex Herb. de Thümen, 1865. *Lophiosphaera subcorticalis* Fuck., on *Salix amygdaloides*, No. 234. *Lophiosphaera schizostoma* (Trev.) Mont., leg. G. Smith, 1896.

THE HYSTERIOIDES GROUP

Five species and two varieties are included in this group. All have hyaline or sub-hyaline pleuriseptate ascospores. Since this is the only character they have in common the group is highly artificial and constructed for convenience only. Until more information is collected, discussion upon their relationships, either with one another or with species not included in this group, must remain highly speculative, but present information suggests that *Lophiostoma hysterioides* Schw. and *L. vigheffulensis* Pass. are very similar and are only just separable using the scatter diagram technique. With more herbarium material available, *Lophiostoma appendiculatum* Fuckel and *L. appendiculatum* var. *littorale* may be reduced to synonymy.

Key to the Species

(1) Asci cylindrical, spores 3 septate . . . . . (2)
(1) Asci clavate, spores with more than 3 septa . . . . . (3)
(2) Spores 14–20 × 3μ . . . . . *Lophiostoma hysterioides* (p. 13)
„ 15–20 × 4–5μ . . . . . var. *oenotherae* (p. 14)
(2) Spores 20–25 × 3μ . . . . . *L. vigheffulensis* (p. 16)
(3) Spore with 4–5 septa. . . . . (4)
(3) Spores with more than 5 septa . . . . . (5)
(4) Spores 24–30 × 4–5·5μ . . . . . *L. winteri* (p. 16)
(4) Spores 29–38 × 7–8μ . . . . . *L. appendiculatum* var. *littorale* (p. 19)
(5) Spores 30–42 × 7–8μ with (5)7–8 septa . . . . *L. appendiculatum* (p. 18)
(5) Spores 40–50 × 7–8μ with 10–13 septa . . . . . *L. alpigenum* (p. 19)

Lophiostoma hysterioides (Schw.) Sacc., 1883, *Syll. Fung.*, **2**: 709.

Sphaeria (*Platystomae*) *hysterioides* Schw., 1832, *Syn. Amer. Bor.*exs., n. 1610.

Lophiostoma hysterioides Ell. & Langl., 1888, *Journ. Mycol.*, **4**: 76.

Lophiotrema hysterioides (Ell. & Langl.) Berl., 1890, *Icon. Fung.*, **1**: 4, Tab. III, Fig. 4.

?*Lophiostoma hysterioides* (Schw.) Ell. & Ev., 1892, *N. Am. Pyrenom.*: 228.

The pseudothecia are aggregated in clusters, submerged or superficially developed on the surface of the host. Necks are short and extend across the upper surface of the lenticular shaped pseudothecia as a narrow ridge. Asci cylindrical, 60–80 × 5–6μ, each containing 8 irregularly uniseriate ascospores (Fig. 4). Ascospores are 14–20 × 3μ, narrowly fusiform, straight, with 3 equidistant transverse septa. Each ascospore cell contains a single nucleus. Numerous branched pseudoparaphyses are present.

The specimens examined were collected on *Kalmia, Quercus, Hicoria, Abies,* and *Rubus idaeus.*

The specific epithet *hysterioides* was first applied by Schweinitz in 1832. In 1888, Ellis and Langlois gave the specific epithet *hysterioides* to what they thought was a new species. In 1892, Ellis and Everhart made reference to both *Lophiostoma hysterioides* Schw. and *L. hysterioides* Ell. & Langl., stating that they were separate species (i.e. homonyms). Investigations by us of type material of Schweinitz and of Ellis show these to belong to the same species. This extraordinary coincidence of two independent observers giving the same fungus the same specific epithet is without doubt due to the fact that the pseudothecium with its very long, low ostiole simulates an hysteriaceous fungus.

SPECIMENS EXAMINED

Ex Herb. K.
Lophiostoma hysterioides (Schw.), on *Kalmia,* ex Schweinitz, (part of type).
Ex Herb. NY.
Lophiosphaera velata Ell. & Ev., on *Hicoria,* coll. F. S. Earle, 15/1/1897—this specimen was renamed *Mytilidion. Lophiostoma* (*L. trema*) *hysterioides* Ell. & Langl., on rotten stump of *Quercus,* leg. Langlois, 6/7/1888.
Ex Herb. IMI.
Lophiotrema sp., on cone scales, Pakistan, leg. S. Ahmad, 1948, IMI 81979. *Lophiotrema praemorsum* ?, on *Rubus idaeus,* Pickering, leg. W. G. Bramley, 18/3/1957, IMI 68868.

L. hysterioides var. **oenotherae** (Ell. & Ev.) Chesters & Bell
Lophiotrema oenotherae Ell. & Ev., 1897, *Bull. Torrey bot. Club,* **24**: 128.

The type material on *Oenothera biennis* did not fit the description of this species as given by Ellis and Everhart. A later specimen (*Lophiostoma oenotherae* Ell. & Ev. N.1539, 1897) was examined which did agree with their diagnosis, and is illustrated in Fig. 4. The only measurable difference between this specimen and *Sphaeria hysterioides* Schw. is that of spore width. The relationship between *Lophiostoma hysterioides* and *L. hysterioides* var. *oenotherae* is open to doubt. Only two specimens of the latter have been seen, but on the basis of morphology of the asci and ascospores it seems reasonable to place it temporarily as a variety until further evidence should prove otherwise.

SPECIMENS EXAMINED

Ex Herb. NY.
Lophiostoma vagabundum Sacc., on *Oenothera biennis,* Newfield, 1895. *Lophiotrema oenotherae* Ell. & Ev., on *Oenothera biennis,* Newfield, leg. J. B. Ellis, No. 1539, 1897.

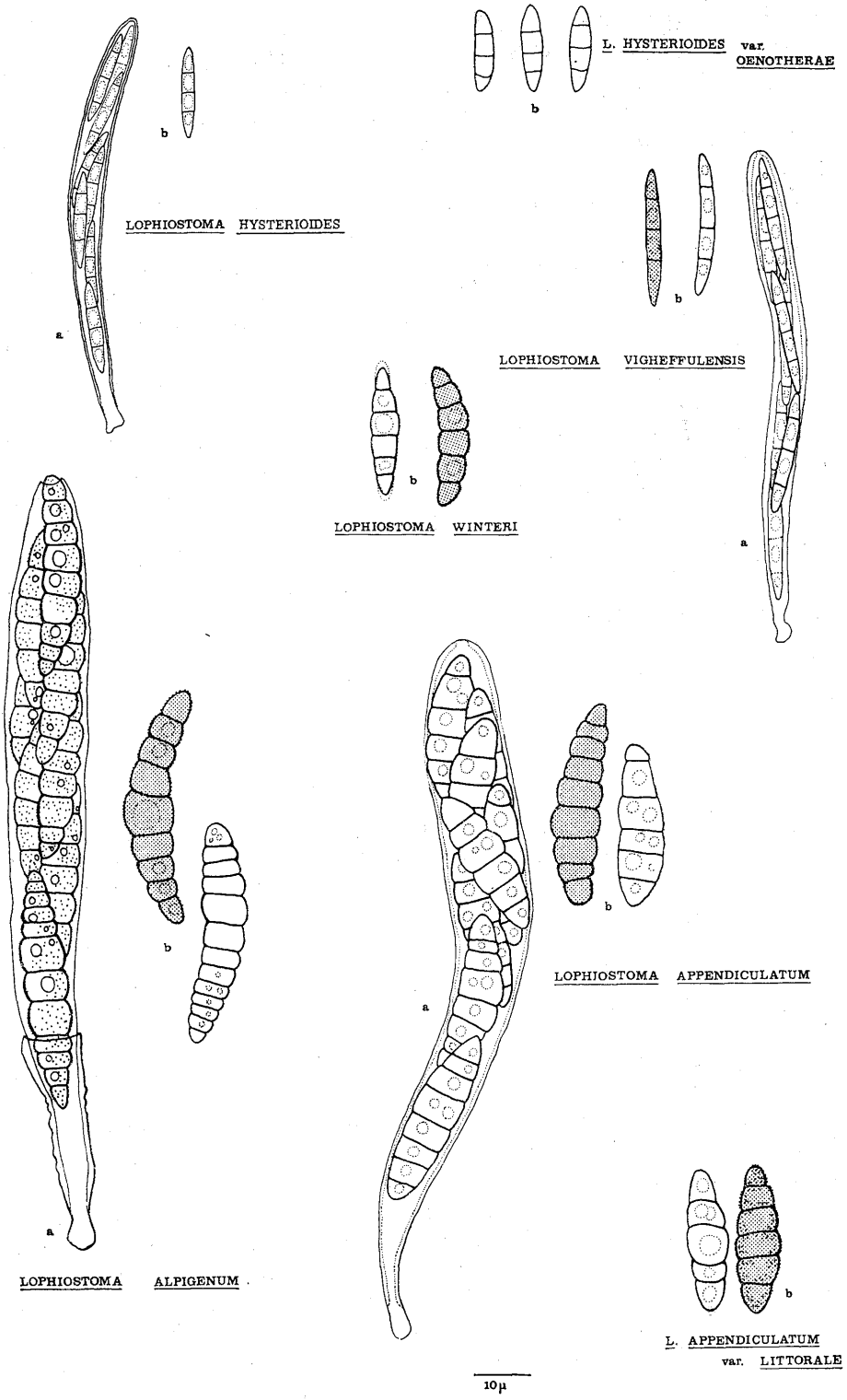

FIG. 4. a=asci, b=ascospores.

Lophiostoma vigheffulensis (Pass.) Chesters & Bell, comb. nov.
?Lophiotrema lonicerae Fab., 1878, *Spher. Vaucl.*: 91, Fig. 42.
Lophiosphaera vigheffulensis Pass., 1883, *Erb. Critt. Ital.*, Ser. **2**: 1373.
Lophiotrema vigheffulense (Pass.) Berl., 1890, *Icon. Fung.*, **1**: 4, Table I, Fig. 5.
Lophiostoma vagabundum var. *stenocarpum* Ell. & Ev., 1892, *N. Am. Pyrenom.*: 229.
Lophiostoma stenostomum Ell. & Ev., 1892, *N. Am. Pyrenom.*: 226.

The pseudothecia may be superficial or submerged. The slot-like ostioles are linearly arranged parallel to the long axis of the host substrate. The asci are cylindrical with a small, knob-like base and contain 8 biseriately arranged ascospores (Fig. 4). Ascospores are 17–25×3μ, hyaline, fusiform, the outer wall not constricted at the junctions of the 3 transverse septa. Branched pseudoparaphyses are abundant, periphyses line the ostiole.

The spore lengths of *Lophiostoma hysterioides* and *L. vigheffulensis* are close but just separable (see scatter diagram Fig. 5). The measurements of the herbarium samples seen to date fall into either one or the other of the two categories, therefore there is no valid reason for reducing them to synonomy although they are so close. Material examined was on *Vitis vinifera* and *Salix*.

In his description of *Lophiosphaera vigheffulensis*, Passerini stated that his species resembled *Lophiotrema lonicerae* Fab. Unfortunately Fabre's material has not been obtainable, but if *L. lonicerae* is found to match *Lophiostoma vigheffulensis* Pass., Fabre's specific epithet must be used since it is older.

SPECIMENS EXAMINED

Ex Herb. NY.
Lophiosphaera vigheffulensis Pass., No. 1373, leg. G. Passerini, 1883, (part of type). *Lophiostoma vagabundum* var. *stenocarpum* Ell. & Ev., June 1878 (type material). *Lophiostoma stenostomum* Ell. & Ev., on *Vitis vinifera* bark, Newfields, Feb. 1884, (type material).
Ex Herb. B.
Lophiotrema vigheffulensis Pass., on *Salix*, leg. Grummann, 18/10/1921.

Lophiostoma winteri (Sacc.) Rabenh., 1885, *Krypt. Fl.*, Bd. 1, **2**: 297.
Lophiotrema winteri Sacc., 1878, *Michelia*, **1**: 358 & 1883, *Syll. Fung.*, 2: 688.

This species has been found on dead material of *Helianthemum*, *Cistus*, *Artemisia vulgaris*, *Urtica dioica* and *Vitis vinifera*. The pseudothecia are scattered or gregarious, submerged or semi-immersed, with small compressed necks. The asci are cylindrical, tapering to a short basal stalk, approx. 100×12μ, containing 8 biseriately arranged ascospores. The spores are hyaline whilst within the ascus, 5 (rarely 6) septate (Fig. 4). The second or third cell from the apex of the spore is often slightly swollen and a small hyaline appendage is visible on some spores. When fully ripe the spores are 23–30×4·5μ and may become dilute brown. Walls of tinted spores frequently appear punctate, a feature attributed to the hyaline tunic which, although not visible, probably surrounds most of the spores. The spore wall may become constricted at the

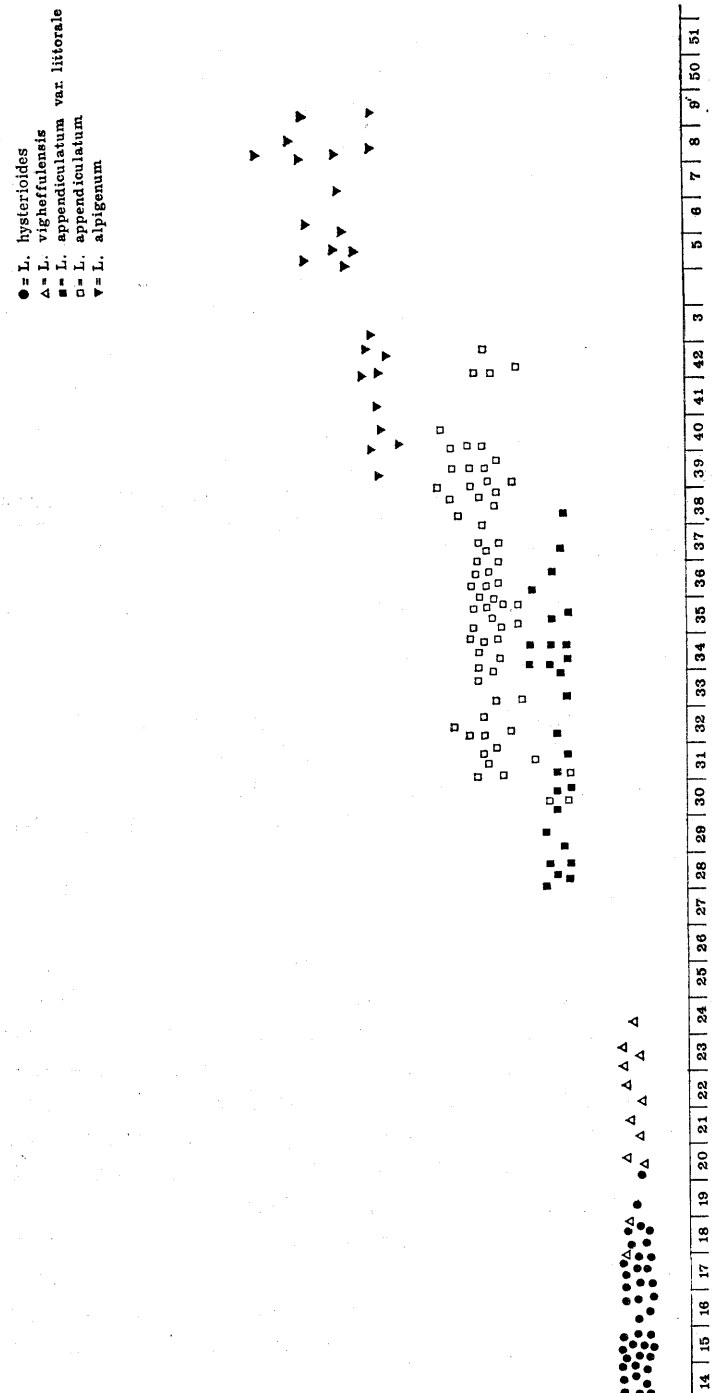

FIG. 5. Scatter diagram illustrating the variation in spore length and septation in four species and one variety of *Lophiostoma*.

junctions of the transverse septa. Numerous branched, septate pseudoparaphyses surround the asci and unbranched periphyses line the ostiole.

Saccardo stated that *Lophiotrema winteri* was similar to *L. praemorsum* (Lasch.) Sacc. and *L. sex-nucleata* (Cooke) Sacc. Berlese ventured further, declaring all 3 of the above-mentioned species to be synonyms and collectively he called them *Lophiotrema praemorsum* Lasch. (*L. angustilabrum*). However, it is the type material of *Lophiotrema winteri* which is illustrated in Fig. 4 and this is easily distinguished from *Lophiostoma angustilabrum* in Fig. 2. Even when fully mature the ascospores of *L. angustilabrum* are mostly 3-septate.

Specimens Examined

Ex Herb. B.
Lophiotrema artemisiae Fabr., on *Artemisia vulgaris*, leg. Kirschstein, 11/10/1905. *Lophiostoma winteri* Sacc., on *Helianthemum chamaecistus*, exsicc. Kunze Fungi Selecti, No. 340, leg. G. Winter, August 1878, (part of type).
Ex Herb. NY.
Lophiostoma stenostomum Ell. & Ev., on *Vitis vinifera*, London, Canada, No. 1792, 25/3/1892.
Ex Herb. K.
Lophiotrema sex-nucleatum Cooke, on *Urtica*, (no date).

Lophiostoma appendiculatum Fuckel, 1873, *Symb. mycol.*, Nact. 2: 29.

Lophiotrema massarioides Sacc., 1878, *Michelia*, **1**:412.

Lophiotrema auctum Sacc., 1883, *Syll. Fung.*, **2**: 688.

Lophiotrema recedens Schulz & Sacc., 1884, *Revue Mycol.*, **6**, (fide Berl. & Vogl.).

Lophiotrema fraxini Ell. & Ev., 1897, *Bull. Torrey bot. Club*, **24**: 128.

Lophiostoma appendiculatum is found most frequently on *Salix*, but other hosts include *Quercus*, *Fraxinus*, *Lonicera* and *Vitis*. The pseudothecia are gregarious, submerged or semi-erumpent, the ostioles aligned parallel to the grain of the host wood. The asci (Fig. 4) are clavate, short stalked, 120–150 × 15μ (approx.), and contain 8 ascospores. These are biseriate, elliptical with obtuse ends, hyaline or very pale " straw yellow " (Ridgeway's colour terminology). Spores are within the range 30–42 × 7–8μ and (5) 7–8 septate. No hyaline tunic or appendages have been seen, but since some of the fully ripened spores are punctate, it is assumed that a tunic was present when the specimen was fresh. Ascospores are conspicuously constricted at the septa, each spore cell containing one or more guttules. Pseudoparaphyses and periphyses are present. As the type material is scanty, the pseudothecial section was taken from another matching specimen.

Saccardo suspected that his *Lophiotrema auctum* matched *Lophiostoma appendiculatum* Fuckel. Study of the type material of both species confirms his suspicions.

SPECIMENS EXAMINED

Ex Herb. PAD.
Lophiotrema massariodes Sacc., on *Ailanthus* No. 111, 13/5/1877, (handwritten note on packet reads: " =No. 2305". *Lophiostoma auctum* Sacc., on *Rumex*, No. 2305, handwritten note: " *Lophiotrema appendiculatum* ". This is not the type, but it fits Saccardo's diagnosis of the species.
Ex Herb. NY.
Lophiotrema fraxini Ell. & Ev., on *Fraxinus*, No. 2101, 30/3/1896 (type). *Lophiostoma appendiculatum*, on *Salix* (*fragilis?*), leg. Fuckel, 1894, (type). *Lophiotrema massariodes* Sacc., on *Salix*, Burgdorf, No. 1019, 1899, (no signature). *Lophiostoma macrostomum* Tode, on *Salix*, Burgdorf, No. 19, July (no year), leg. ?, note stating " ×*massariodes* of Saccardo ". *Lophiotrema auctum* Sacc., on *Vitis* sp., Rockport, Ks., leg. Bartholomew, 7/2/1898. *Lophiostoma auctum* Sacc., London, Canada, No. 2088, (no signature).
Ex Herb. B.
Lophiotrema alpigenum (Fuckel) Sacc., on *Lonicera nigra*, leg. Kirschstein, 19/7/1910, Herb. sheet No. 2132/17. *Lophiotrema auctum* Sacc., on *Populus*, leg. Kirschstein, 14/8/1904, Herb. sheet No. 2132/14. *Lophiotrema auctum* Sacc., on *Quercus*, leg. Kirschstein, 26/6/1910. *Lophiostoma appendiculatum* Fuckel, on *Salix*, exsicc. Rehm Ascom. No. 1647, 13/9/1904. *Lophiostoma salicum* (Fabr.) Sacc., on *Salix*, leg. Kirschstein, No. 43, 1904, Herb. Sheet No. 2132/6. *Lophiotrema massarioides* Sacc., on *Salix*, leg. O. Jaap, 15/6/1917.

L. appendiculatum var. **littorale** (Speg.) Chesters & Bell, comb. nov.
?*Lophiotrema littorale* Speg., 1878, *Michelia*, **1**:466 & Sacc. 1883, *Syll. Fung.*, **2**: 681.

The type specimen of *Lophiotrema littorale* Speg. has not been seen, but the specimen from the Ellis Herbarium NY, illustrated in Fig. 4, fits the description given by Saccardo for *Lophiotrema littorale* Speg. The host wood is *Salix*, the pseudothecia are submerged with the necks piercing the surface. The asci are clavate, short-stalked, each ascus containing 8 biseriate or irregularly arranged ascospores. Spores are hyaline or fuliginous, elliptical, 29–38 × 7–8 µ, 5 septate, and very similar morphologically to those of *Lophiostoma appendiculatum*. Many of the spores are punctate (Fig. 4). Using the scatter diagram technique for the separation of species, this fungus cannot be separated by a clear discontinuity from *Lophiostoma littorale*, hence it has been reduced to the status of a variety (Fig. 5).

SPECMIENS EXAMINED

Ex Herb. NY.
Lophiotrema littorale Speg., on *Salix*, Lyndonville, leg. Fairman, No. 1003, 2/5/1895.
Lophiotrema cercocarpi n. sp., on *Cercocarpus*, leg. Baker, No. 5753, 18/3/1899.
(Two packets of this species were seen, both with the same date and on the same host—one packet having the additional label " No. 31 in part." As it did not match the above sample, it has been included elsewhere.)

Lophiostoma alpigenum Fuckel, 1870, *Symb. mycol.*: 157.
Lophiostoma thümenianum Speg., 1878, in *Thüm. Pilze des Weinst.*: 119.
Lophiotrema alpigenum (Fuck.) Sacc., 1883, *Syll. Fung.*, **2**: 685.
Lophiostoma spiraeae (Peck) Ell. & Ev., 1892, *N. Am. Pyrenom.*: 233.

This species has been found on woody material including *Lonicera*, *Salix* and *Spiraea*. Asci are clavate, tapering gradually to a basal stalk, each ascus

containing 8 hyaline or dilute brown punctate ascospores (Fig. 4). The spores are narrowly fusiform, 40–50×7–8μ, with 10–13 transverse constricted septa. The cells near the ends of the spores are smaller, each spore cell being guttulate. Pseudoparaphyses are present, branched periphyses line the ostiole.

The type material of *Lophiotrema spiraeae* (Peck) Ell. & Ev. was immature, the ascospores appearing narrower than those illustrated in Fig. 4. Allowing for some increase in width on maturity, it was decided that there would be little (if any) morphological difference between this species and *Lophiostoma alpigenum*. The scatter diagram shows *L. alpigenum* to be clearly separated from *L. appendiculatum* and *L. appendiculatum* var. *littorale* (Fig. 5).

Specimens Examined

Ex Herb. LPS.
Lophiotrema thümenianum Speg., on *Vitis vinifera*, leg. C. Spegazzini, No. 7570 (type).
Ex Herb. PAD
Lophiotrema alpigenum (Fuckel) Sacc., No. 2305, 29/11/1906.
Ex Herb. NY.
Lophiotrema massariodes Sacc., on *Salix alba*, exsicc. Cavara, Fung. Longob., No. 182.
Lophiotrema alpigenum Fuckel, on *Salix*, Burgdorf, No. 9 (no date or signature).
Lophiotrema spiraeae (Peck) Sacc., on *Spiraea opulifolia* leg. C. H. Peck (type).

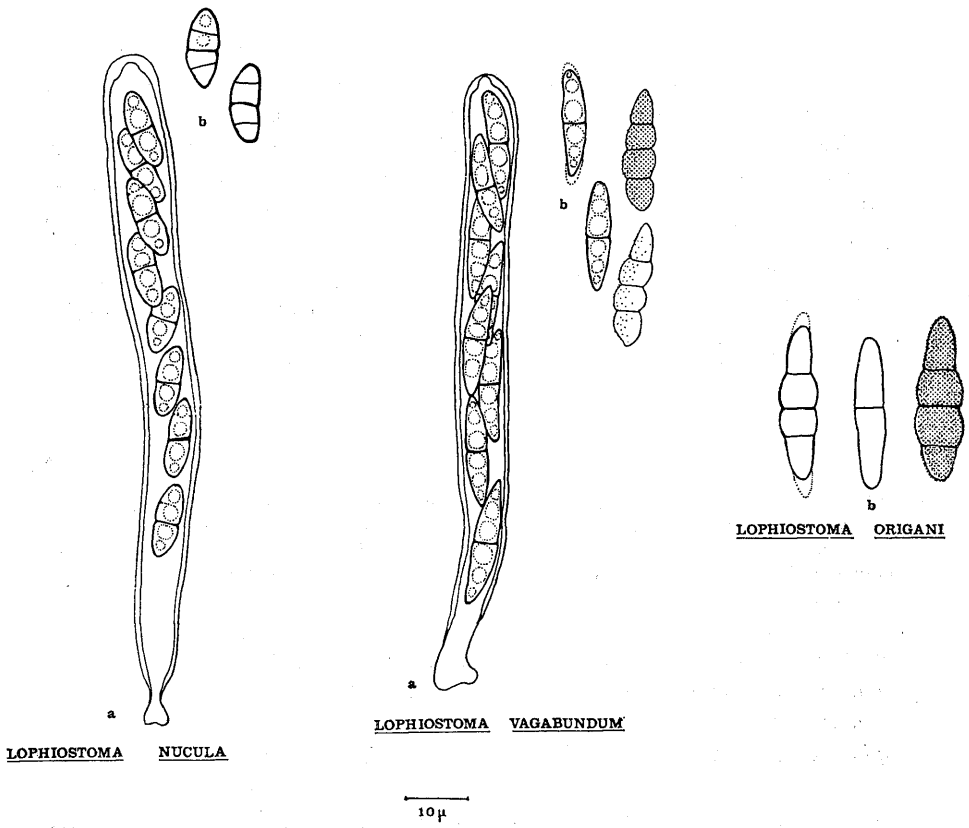

Fig. 6. a=asci, b=ascospores.

THE NUCULA GROUP

This group comprises four species and one variety. *Lophiostoma vagabundum*, *L. origani* and *L. origani* subsp. *rubidum* are probably inter-related. Their ascospores are similar in shape and all three are found on dead herbaceous material (including *Urtica*, *Cirsium* and *Chamaenerion angustifolium*). On the evidence of herbarium material only, it would seem logical to reduce *L. vagabundum* and *L. origani* to one species, but fortunately fresh material has been available and results from cultural experiments suggest that these two fungi may have more significant differences than their similar ascospore morphology might suggest. In culture *L. vagabundum* occasionally produces pseudothecia but never a conidial state. *Lophiostoma origani* has never produced pseudothecia but it does produce pycnidia. The absence of pycnidia in *L. vagabundum* does not prove conclusively that it is specifically different from *L. origani;* a small genetical or physiological barrier might be preventing pycnidial production under unfavourable cultural conditions. If too much weight is placed upon pycnidial production at specific levels, it would imply that *L. semiliberum*, *L. origani* and *L. caulium* are synonyms on the evidence of similarity in pycnidial morphology.

Lophiostoma nucula is placed here for convenience only, since it has asci of similar shape and spores of similar dimensions. There is no evidence suggesting its affinity with the others of this group; it is usually found on different substrates (e.g. *Salix*, *Acer*, *Quercus*).

KEY TO THE SPECIES

(1) Spores fusiform with acute apices and 1 central non-constricted septum (whilst still within ascus) . . . . . (2)
(1) Spores ellipsoidal with obtuse ends, a simple non-constricted septum, 17–26 × 4–6μ *Lophiostoma nucula* (p. 21)
(2) Spores 17–23 × 3–5μ . . . . . *L. vagabundum* (p. 22)
(2) Majority of spores greater than 23μ . . . . . (3)
(3) Spores 23–30 × 4–5μ, no red staining on surface of host . . *L. origani* (p. 23)
(3) Spores 23–33 × 4–5μ, conspicuous red staining on surface of host *L. origani* subsp. *rubidum* (p. 23)

Lophiostoma nucula (Fr.) de Not., 1863, *Schem. di Class.*: 46.
?*Sphaeria nucula* Fr., 1823, *Syst. mycol.*, **2**: 466.
Lophiostoma duplex Karst., 1873, *Mycol. Fenn.*, **1**: 86.
Lophiotrema nucula (Fr.) Sacc., 1878, *Michelia*, **1**: 338.

This species has been reported on *Salix*, *Populus*, *Acer*, *Quercus* and *Ulmus*. The pseudothecia are submerged, only the slot-like pseudothecial necks being visible. These necks do not project very far above the surface of the substrate, which renders this species very difficult to observe in the field. Pseudothecia are lens-shaped or globose, 0·3–0·5 mm diam. The asci are cylindrical with a knob-like base, each ascus containing 8 irregularly uniseriate ascospores (Fig. 6). Ascospores measure 20–28 × 4–6μ and are hyaline and slightly constricted at the central septum. Each spore cell is biguttulate and occasionally additional septa may be seen between the guttules. Upon liberation from the asci the spores become triseptate.

SPECIMENS EXAMINED

Ex Herb. H.
Lophiostoma duplex Karst., on *Salix*—this is a mixed collection, some of it matching *Platystomum* =(*Lophidium* Sacc.).
Ex Herb. PAD.
Lophiotrema nucula exsicc. Saccardo.
Ex Herb. CP.
Lophiotrema nucula, on *Populus tremula*, leg. Rostrup. *Lophiotrema nucula*, on *Salix caprea*, leg. A. Munk.
Ex Herb. IMI.
Lophiostoma sp., on *Acer*, Abbotsbury, leg. S. M. Francis, 18/4/1956, IMI 111075.
Ex Herb. NY.
Lophiosphaera asperum Ell. & Ev., on *Ulmus americana*, leg. Bartholomew, No. 1487, 9/6/1894.
Lophiosphaera querceti Sacc. & Speg. forma *ulmicola* Ell. & Ev. No. 936.
Lophiostoma querceti Sacc. & Speg. var. *ulmicola*, on *Ulmus americana*, 9/12/1893.

Lophiostoma vagabundum (Sacc.) Chesters & Bell, comb. nov.
Lophiotrema vagabundum Sacc., 1878, *Michelia*, **1**: 447.
?*Lophiostoma noterisii* (Nits.) in Lehm. 1886, *Syst. Bearb. Loph.*: 31.

This species is found on most dead herbaceous material. The pseudothecia are scattered, immersed or semi-immersed, with compressed truncated pseudothecial necks aligned parallel to the host substrate. The asci (Fig. 6) are cylindrical, 90–110×6μ with a short knob-like basal stalk. Each ascus contains 8 fusoid bicellular ascospores. Ascospores measure 17–23×3–5μ and are hyaline, each cell containing 2 or 3 conspicuous guttules. The spore walls appear to be constricted between the guttules but closer scrutiny shows the spore wall to be quite even and non-constricted at these points (Fig. 6). A hyaline appendage may be seen at each end of the spores. Upon liberation from the asci and prior to germination, the spore walls become punctate and some spores become dilute brown.

SPECIMENS EXAMINED

Ex Herb. PAD.
Lophiotrema vagabundum, on *Hypericum hirsutum*, leg. Petrak, 1913.
Ex Herb. B.
Lophiotrema rugiense Kirsch., sp. nov., on *Agrimonia eupatoria*, No. 87 in Herb. Kirschstein, 27/7/1914. (This specimen is a mixture of *Lophiostoma vagabundum* and an *Ophiobolus* species.) *Lophiotrema vagabundum* Sacc., on *Galeopsis tetrahit*, leg. Krieger, 1910. *Lophiostoma caulium* (Fr.) de Not., on *Galium mollugo*, leg. Kirschstein, 1922.
Ex Herb. BM.
Lophiotrema angustilabrum var. *kerriae*, leg. Grove.
Ex Herb. IMI.
Lophiotrema sp., on *Centaurea nigra*, Yorks., 21/8/1957, IMI 111222. *Lophiotrema*, on *Centaurea nigra*, Seaford, leg. S. M. Francis, 18/8/1957, IMI 111216. *Lophiotrema* sp., on *Centaurea nigra*, Seaford, leg. S. M. Francis, 18/8/1957, IMI 111218. *Lophiotrema*, on *Cirsium arvense*, Yorkshire, 21/8/1957, IMI 111226. *Lophiotrema*, on *Cirsium arvense*, Wheatfen Broad, 8/8/1957, IMI 111236. *Lophiotrema*, on *Clematis vitalba*, Bedford, 5/8/1957, IMI 111234. *Lophiotrema* sp., on *Clematis vitalba*, Box Hill, Surrey, leg. S. M. Francis, 27/10/1957, IMI 111260. *Lophiotrema vagabundum*, on *Conium*, Pickering, leg. W. G. Bramley, 26/9/1957, IMI 75898. *Lophiotrema*, on *Hedera*, Seaford, leg. S. M. Francis, 15/6/1958, IMI 111546. *Lophiotrema rubidum*, on *Rubus idaeus*, Bristol, leg. S. M. Francis, 1957, IMI 111180. *Lophiotrema vagabundum* on *Rumex*, Seaford, leg. S. M. Francis, 30/6/1956, IMI 111098b.
Ex Herb. K.
Lophiotrema vagabundum var. *hydrolapathum* Sacc., on *Rumex hydrolapathum*, exsicc. Sydow, Mycotheca Germanica No. 322.

Lophiostoma origani (Kunz.) Rabenh., 1887, *Krypt. Fl.*, **1**: 285.
Lophiotrema origani Kunz., 1876, Fung. sec. exs. n. 97.
Lophiostoma intermedium Sacc., 1878, *Michelia*, **1**:322.
Lophiotrema scrophulariae (Peck) Sacc., 1883, *Syll. Fung.*, **2**: 683.
Lophiostoma scrophulariae var. *cruentulum* in Berl. & Vogl., 1886, Add. *Syll. Fung.*, **1–4**: 256 (fide Berl.).

The recorded hosts for this species include *Oenothera*, *Arundo* and *Lythrum*, but it is probably found on many herbaceous substrates. The pseudothecia are gregarious and submerged within the host, the ostiolate neck piercing the substrate. Asci are cylindrical, the inner wall being conspicuously thick. The 8 ascospores are biseriately or irregularly uniseriately arranged; each is fusoid, 25–30×4–5μ, uniseptate or occasionally biseptate or triseptate (Fig. 6). A hyaline appendage is seen at the poles of some spores, indicating that a hyaline tunic is present around each spore. Ascospores finally become fuliginous or dilute brown, and punctate.

SPECIMENS EXAMINED

Ex Herb. B.
Lophiotrema vigheffulense, on *Arundo sylvatica*, leg. Kirschstein, 10/10/1945. *Lophiotrema origani* Kunz., on *Origanum vulgare*, leg. Kunze, No. 97, 1875. *Lophiotrema crenatum*, on *Rubus idaeus*, leg. Kirschstein, 1931.
Ex Herb. K.
Lophiotrema culmifragum Speg., on *Arundo*, leg. M. Turconi, exsicc. Pollaci Fungi Longobardia.
Ex Herb. PAD.
The specimen of *Lophiostoma intermedium* Sacc. may have been part of the type specimen of this species but was not dated. It agreed precisely with *L. origani* and not with Saccardo's description of *L. intermedium* (*Syll. Fung.*, **2**: 704–705, where the ascospores are stated to be brown and 7-septate).

L. origani var. **rubidum** (Sacc.) Chesters & Bell, comb. nov.
Lophiotrema rubidum (Sacc.) Rouss. & Bomm., 1891, *Syll. Fung.*, **9**: 1081.

This variety of *Lophiostoma origani* is found on herbaceous material. The only reason for applying varietal status to the numerous specimens listed below is that in all of them the host substrate is stained a deep pink in the vicinity of the pseudothecia, a feature which makes this variety easy to detect. While a slight pink stain is frequently observed within the substrates bearing many species of the Lophiostomataceae, this is never either so intense or in such quantity as in material infected with this variety. The relationship in ascospore size and septation between this variety and other members of the group is shown in Fig. 7.

Berlese considered *Lophiotrema rubidum* to be a synonym of *Lophiotrema vagabundum*, which he stated was also synonymous with *Lophiotrema scrophulariae* var. *cruentulum*.

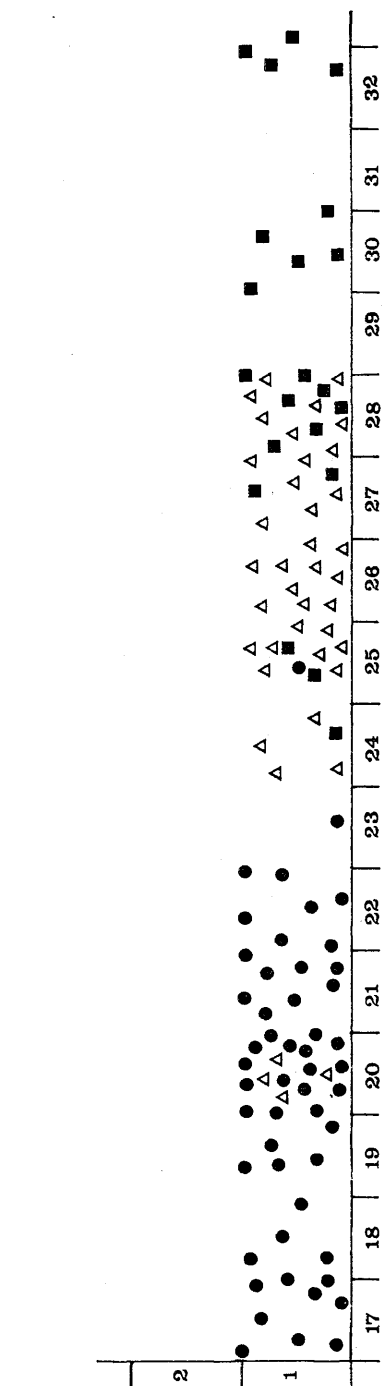

FIG. 7. Scatter diagram illustrating the variation in ascospore length and septation in *Lophiostoma vagabundum*, *L. origani* and *L. origani* var. *rubidum*.

Specimens Examined

Ex Herb. NY.
Lophiotrema rubidum, leg. C. Roumeguère, No. 7231.
Ex Herb. B.
Lophiosphaera porphyrogena Kirsch., sp. nov., No. 43, leg. Krieger, on *Dahlia* 1900.
Ex Herb. IMI
Lophiotrema rubidum, on *Clematis vitalba*, Shawford, leg. S. M. Francis, 26/8/1958, IMI 111595. *Lophiotrema rubidum*, on *Epilobium angustifolium*, Howldale, leg. S. M. Francis, 10/6/1957, IMI 111170. *Lophiotrema rubidum*, on *Filipendula*, Eire, 16/9/1957, IMI 111258. *Lophiotrema rubidum* on *Filipendula ulmaria*, Fishbourne, leg. S. M. Francis, 30/7/1958, IMI 111582. *Lophiotrema rubidum* on *Pulicaria dysenterica*, Worksop, 25/8/1957, IMI 111228.

THE PACHYTHELE GROUP

Four species and two varieties of *Lophiostoma* will be discussed in this group. All the species have predominantly 2-celled ascospores which are usually brown. Because of this the species were placed by Saccardo in the genus *Schizostoma* Ces. & de Not. (= *Xenolophium* Sydow, 1925). This group is particularly interesting in that it contains one species and two varieties of tropical origin.

Key to the Species

(1) Pseudothecia superficial, 1–1·5 mm diam., spores 14–21 × 3–5μ . . . . (2)
(1) Pseudothecia smaller than above, spores mostly more than 20μ long . . . (4)
(2) Pseudothecia ± smooth walled, ostioles simple, with no overlapping ridge . . *Lophiostoma pachythele* (p. 25)
(2) Pseudothecia not as above . . . . . (3)
(3) Pseudothecia with conspicuously roughened walls due to large wart-like outgrowths, ostiole with no overlapping ridge . . . *L. pachythele* var. *verrucosum* (p. 26)
(3) Pseudothecia smooth walled, ostiolar necks with overlapping ridge extending down the sides of the pseudothecia . . . . . *L. pachythele* var. *leve* (p. 26)
(4) Spores dilute brown (or hyaline), biconic, with spore wall constricted at the central septum . . . . . (5)
(4) Spores a definite brown, ellipsoidal, not constricted at the central septum, 30–40 × 7μ, *L. montellicum* (p. 26)
(5) Spores 18–24 × 4–6μ . . . . . *L. vicinellum* (p. 28)
(5) Spores 28–36 × 7–10μ . . . . . *L. vicinum* (p. 28)

Lophiostoma pachythele (Berk. & Br.) Chesters & Bell, comb. nov.

?*Sphaeria pachythele* Berk. & Br., 1873, *Journ. Linn. Soc.*: 128, No. 1109.

?*Lophiosphaera pachythele* (Berk. & Br.) Trev., 1877, *Bull. Soc. bot. Belg.*, **16**: 20.

Schizostoma pachythele (Berk. & Br.) Sacc., 1878, *Michelia*, **1**: 336.

As far as is known this species is tropical, the recorded substrates being *Eugenia malaccensis* and *Metrosideros polymorpha*. Berkeley and Broome's type specimen was found in Ceylon but there is no record of the host material. The pseudothecia (Fig. 8) are superficial, gregarious in small groups, and are the largest ascocarps seen for this family to date: 1–1·5 mm diam. The pseudothecial wall is massive and sclerotic with numerous asci lining the entire inner wall. Asci are clavate, thin walled with 8 biseriate or irregularly arranged ascospores (Fig. 8). Ascospores measure 14–17 × 3–5μ and are biconic, dilute brown,

smooth walled with a central constricted septum. Occasionally biseptate or triseptate specimens are seen. Numerous branched septate pseudoparaphyses are present.

SPECIMENS EXAMINED

Ex Herb. NY.
Lophiosphaera hysterioides on *Carya amara*, leg. A. B. Langlois, 27/1/1890. *Schizostoma cercocarpi* n. sp., on *Cercocarpus*, exsicc. F. S. Earle, leg. C. F. Baton, " No. 31 in part ", 28/3/1899. *Schizostoma pachythele* (Berk. & Curt.) Sacc., forest, Brazil, leg. F. J. Seaver, No. 3059, 6/3/1921.

Sydow (1925) created *Xenolophium verrucosum* and *X. leve* for two lophiostomataceous fungi. We have examined *Xenolophium verrucosum* Syd. on *Eugenia malaccensis* and *X. leve* on *E. malaccensis* and *Metrosideros polymorpha* in Herb. NY., both determined by M. L. Lohman. In our view both specimens are closely similar to *Lophiostoma pachythele* but possess certain constant morphological features of the pseudothecium which might merit varietal segregation. If this view is correct then the following names should be applied.

L. pachythele var. **verrucosum** (Syd.) Chesters & Bell, comb. nov.
Xenolophium verrucosum Sydow, 1925, *Bern. P. Bishop Mus. Bull.*, **19**: 97.

Recognised from the species by the rough highly warted texture of the pseudothecium (Fig. 8).

SPECIMEN EXAMINED

Ex Herb. NY.
Xenolophium verrucosum Syd., on *Eugenia malaccensis*, det. M. L. Lohman.

L. pachythele var. **leve** (Syd.) Chesters & Bell, comb. nov.
Xenolophium leve Syd., 1925, *Bern. P. Bishop Mus. Bull.*, **19**: 97.

Pseudothecia distinguished from the species by two highly developed ridges along each side of the pseudothecial neck (Fig. 8).

SPECIMEN EXAMINED

Ex Herb. NY.
Xenolophium leve Syd., 3 packets dated 1949, 1950, 1951, leg. M. L. Lohman, on *Eugenia malaccensis* and *Metrosideros polymorpha.*

Lophiostoma montellicum (Sacc.) Chesters & Bell, comb. nov.
Schizostoma montellicum Sacc., 1878, *Michelia*, **1**: 337.

Lophiostoma montellicum has been recorded on *Quercus*. The pseudothecia are either submerged or semi-immersed, surmounted by slot-like ostioles, aligned parallel in the substrate. The asci are cylindrical or slightly clavate with short basal stalks, each ascus containing 8 spores. Ascospores measure 32–40 × 7μ and are rich brown, ellipsoidal, with a central non-constricted septum (Fig. 8). A study of the spores under a higher magnification shows the outer wall to be very thick, but with thinner areas at the two poles; these may be pores

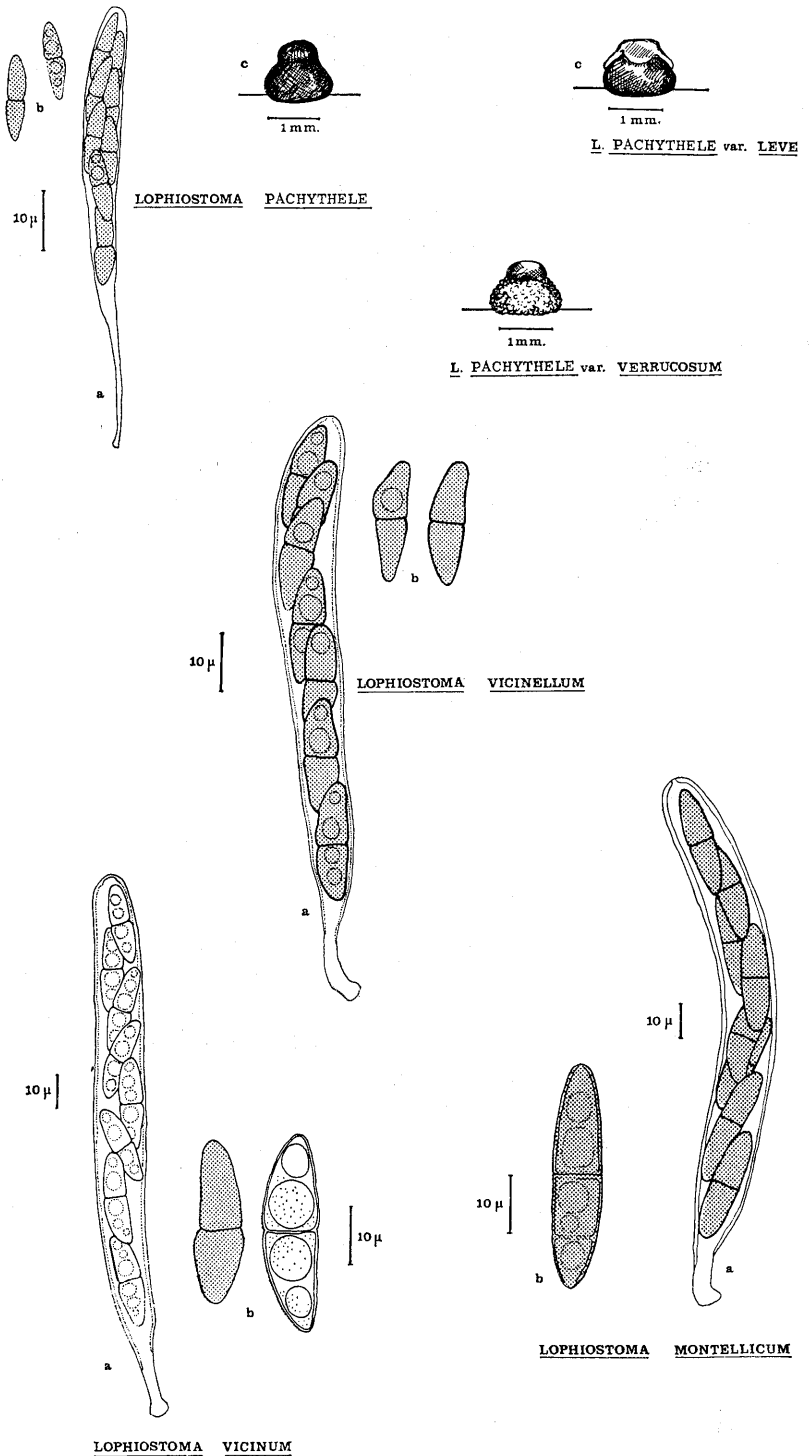

FIG. 8. a=asci, b=ascospores, c=pseudothecia.

from which germ tubes would emerge. Guttules are present and occasionally one or two additional transverse septa. As the material was scanty, a section was not taken through the pseudothecium, so presence or absence of periphyses has not been confirmed.

SPECIMEN EXAMINED

Ex Herb. PAD.
Schizostoma montellicum Sacc., on *Quercus*, Modena, No. 2307, leg. Dr. C. Fanfragnini, 1914.

Lophiostoma vicinellum Sacc., 1878, *Michelia*, **1**: 335.
Schizostoma vicinellum (Sacc.) Berl., 1890, *Icon. Fung.*, **1**: 2, Tab. 2, Fig. 2.

This species has been collected on *Abies*. The pseudothecia are large, 0·75 mm diam., grouped in clusters and quite superficially placed on the substrate. The ostioles are linear, or occasionally triradiate. Asci (Fig. 8) are cylindric-clavate, with short basal stalks, each ascus containing 8 spores. Ascospores measure 18–24 × 4–5μ and are biconic, dilute brown, smooth walled and constricted at a central septum. Pseudoparaphyses are abundant.

SPECIMENS EXAMINED

Ex Herb. PAD.
Lophiostoma (*Schiz.*) *vicinellum* Sacc., on *Abies*, ex Herb. P. Magnus, Herb. Mycol. H. B. Patavinus, P. A. Saccardo, No. 2307.
Ex Herb. NY.
Lophiostoma ovinum Ell. & Ev., sp. nov., "on decaying spot of lime trees", leg. C. L. Smith, Central American Fungi, Castillo, Nicaragua, No. 14, 1893.

Lophiostoma vicinum Sacc., 1878, *Michelia*, **1**: 337, 1885, *Krypt. Fl.*, **1**, 2: 291.
Schizostoma vicinissimum Speg., 1881, *F. Arg. Pug.*, **4**, No. 178.

The recorded hosts for this species are *Quercus*, *Salix* and *Populus*. The pseudothecia are scattered, immersed, semi-immersed or superficial, the ostioles aligned parallel to the grain of the substrate. The asci are cylindric-clavate, tapering to a short basal stalk, each ascus containing 8 bicellular ascospores in a biseriate or irregular arrangement. Ascospores are biconic, sometimes slightly flattened to one side with obtuse ends and a strongly constricted central septum. Each spore cell is biguttulate. At full maturity the spores become dilute brown, with a punctate wall (Fig. 8). The pigment in the spores is not apparent until late in development and many spores are hyaline within the asci. The ascospores are within the range 28–36 × 7–10μ, their lengths overlapping the range of *Lophiostoma montellicum*. Despite this, these species may be distinguished easily (Fig. 8).

SPECIMENS EXAMINED

Ex Herb. NY.
Lophiostoma vicinum Sacc., on *Populus nigra*, exsicc. Rehm, leg. Britzelmayr, No. 485, 1878.
Ex Herb. LPS.
Schizostoma vicinissimum Speg., on *Salix humboldtiana*, Buenos Ayres, leg. C. Spegazzini, No. 1912, 1881, type material.

Lophiostoma pileatum (Tode ex Fr.) Fuckel, 1870, *Symb. mycol.* : 158.
Sphaeria pileata Tode, 1791, *Fung. Mecklenb.*: 13.
Sph. pileata (Tode) Pers., 1801, *Synop. method. Fung.*: 56.
Sph. pileata (Tode) Fr., 1823, *Syst. mycol.*, **2**: 468.
?*Sph. excipuliforme* Fr., 1823, *Syst. mycol.*, **2**: 468.
?*Sph. balsaminea* de Not., 1847, *Microm. Ital.*, **7**, Fig. 7.
Lophiostoma balsamianum de Not., 1850, *Microm. Ital.*, **8**, Fig. 7.
?*Lophiostoma balsaminea* Ces. et de Not., 1863, *Schem. di classif.*: 45.
?*Lophiostoma excipuliformis* (Fr.) Ces. et de Not., 1863, *Schem. di classif.*:45.
?*Navicella balsamiana* Fab., 1878, *Spher. Vaucl.*: 97
?*N. pileata* Fab., 1878, *Spher. Vaucl.*: 97.
?*N. ulmi* Fab., 1878, *Spher. Vaucl.*: 98, Fig. 37.
?*N. julii* Fab., 1878, *Spher. Vaucl.*: 97, Fig. 35.

Lophiostoma pileatum is distinguished from other species of the Lophiostomataceae because it is one of the few (another being *Lophiostoma angustilabrum* var. *crenatum*), which can be identified on macroscopic evidence alone. The pseudothecia are black, approx. 0·5–1 mm diam., with slightly roughened walls, and usually semi-immersed in very old wood (*Quercus*, *Populus* or *Acer*). The necks are often high, their long axes inclined in all directions, and laterally dilated, a feature seen in all specimens, distinguishing this fungus from the others of the family (Fig. 9). The pseudothecial wall is composed of very small cells, quite unlike the arrangement in other pseudothecia. The asci are cylindrical, approx. 200–250 × 20–30μ, normally containing 8 ascospores. Ascospores are ellipsoidal with obtuse ends, (35)40–60(67) × 12–30μ, uniseriately arranged, tending to overlap the neighbouring spores. Each has 6–10 transverse septa and is rich brown (Carob brown of Ridgeway), with the 2 polar cells remaining subhyaline. Guttules are present in each of the cells (Fig. 9). Study of the developing spores shows that the first septum to be laid down is the central one, the next septa are those delimiting the polar cells, and the rest form in succession, those nearest the polar cells being formed first.

Eleven herbarium samples of this species have been seen. It was at first thought that two species were involved, which fitted the descriptions of *Lophiostoma balsamianum* (Ces. & de Not.) Sacc. and *L. excipuliforme* (Fr.) Sacc., the former with ascospores 35–45μ long, the latter 50–70μ long. In the scatter diagram (Fig. 10) the spores of each of the 11 samples is represented by a different symbol. Immediately it is apparent that there is some degree of aggregation at the 37–42μ position, and again at the 53–57μ position, agreeing with the spore lengths given for the two species mentioned above. As the scatter diagram shows, there are rather many samples whose spore lengths are intermediate between these two groups, and the 11 samples have therefore been placed under a single specific name.

The choice of the specific epithet *pileatum* was made from indirect evidence. There is no material left in Persoon's herbarium (L), of *Sphaeria pileata* (Tode). Pers., but a packet labelled " *Sph. libera?* " (with the alteration underneath: *Sph. pileata* Pers.), was examined and found to conform with the fungus

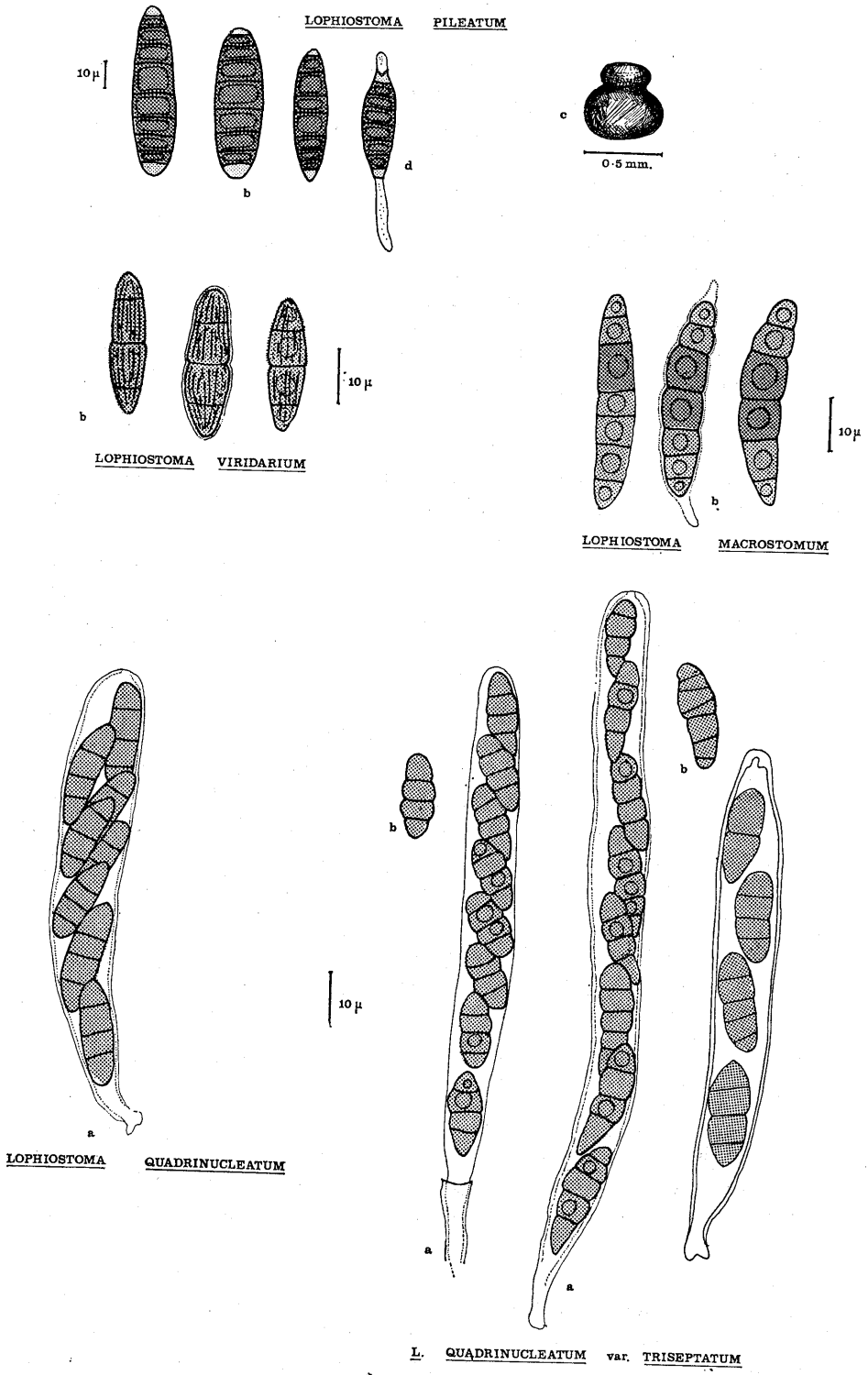

FIG. 9. a=asci, b=ascospores, c=pseudothecium, d=germinating ascospore.

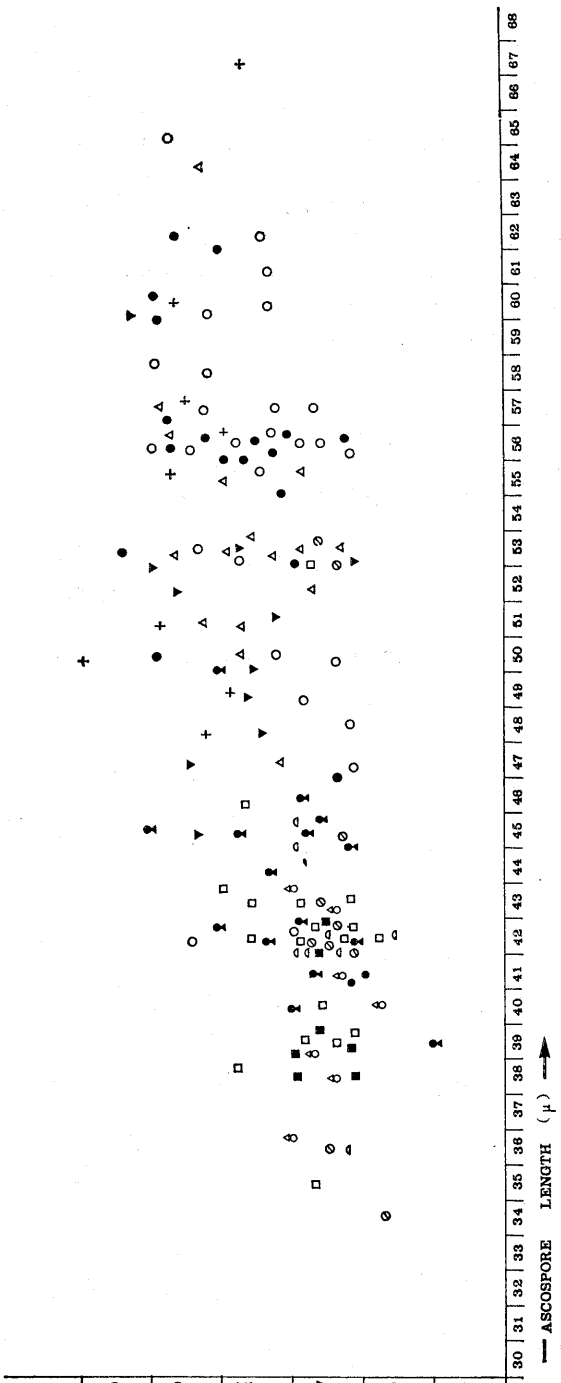

FIG. 10. Scatter diagram plotting ascospore length against septation in eleven samples of *Lophiostoma pileatum*.

described above. Evidence that Fries was referring to the same fungus under the names *Sphaeria pileata* (Tode) Fr. and *Sph. excipuliforme* Fr. is found in his descriptions of the two species. He describes the neck of the ascocarp as being stalked and dilated above, " ostioli figura caulis est superne dilatata ". Additional evidence supporting the use of *pileatum* Tode is found in Tode's own description and illustration. The specific epithet which he gave to this fungus is descriptive of the neck, the Latin word " pileus " originally referring to a close-fitting oval hat shaped like half an egg, which is the shape of the top of the pseudothecial neck of this fungus. Tode's illustration supplies the soundest evidence; it is reproduced in Fig. 11. Lehman gave this species the name

FIG. 11. *Sphaeria Pileata,* as illustrated by H. J. Tode (1790).

Lophiostoma excipuliforme Fr., but he included *L. pileatum* Fuckel and *L. balsaminea* Ces. & de Not., as " Forma Quercus " and " Forma Aceris " respectively. Berlese and Rabenhorst retained *Lophiostoma balsamianum* and *L. excipuliforme* as separate species.

SPECIMENS EXAMINED

Ex Herb. Lugd. Bot., (Herb. Persoon), L.
Sphaeria libera? Pers., hand written alteration to: *Sph. pileata* Pers., and *Sph. macrostoma* (=802a); No. 910–267–105. *Sphaeria dehiscens,* note underneath stating: " macrostoma", No. 910–270–610.
Ex Herb. Fries UPS.
Sphaeria macrostoma, on *Quercus,* leg. Mougeot. *Sphaeria diminuens,* on *Quercus,* leg. E. Fries.
Ex Herb. NY.
Lophiostoma balsamianum de Not., on *Populus fastigiata,* exsicc. C. Roumeguère, No. 7041, Feb. 1896. *Sphaeria exipuliformis,* No. 2063, leg. Desmazières. *Lophiostoma macrostomum* (Tode) de Not., exsicc. Herb. Fuckel, No. 520, leg. Fuckel, 1894. *Lophiostoma excipuliforme,* on *Hippocastanum,* No. 238, leg. Rehm. 1874.
Ex Herb. B.
Lophiostoma balsamianum de Not., exsicc. Sydow, No. 1366, 1886. *Lophiostoma macrostomum* (Tode) Ces. & de Not., on *Quercus,* leg. Hillman, 31/7/1913, note inside stating: =*pileatum* (Tode) Fuckel. *Lophiostoma balsamianum,* on *Populus nigra,* leg. Kirschstein.
Ex Herb. DAOM.
Lophiostoma excipuliforme Fr., on *Acer saccharinum,* coll. G. Morgan-Jones, det. G. D. Darker, No. 109697, 26/5/1965.

Lophiostoma viridarium Cooke, 1871, *Handb. Br. Fung.*: 849.
Lophiostoma desmazierii Sacc. & Speg., 1878, *Michelia,* **1**: 411.
Lophiostoma striatum Sacc., in Berl. & Vogl., 1886, *Add. Syll. Fung.,* **1–4**: 258.

Pseudothecia are submerged within the host material (*Cornus*, *Rubus*, *Rosa*), the ostioles alone being visible from the surface. Under the periderm close to the pseudothecia the host wood is stained a bright green (Venice green in Ridgeway's colour terminology). Asci are cylindrical with short basal stalks, each ascus containing 8 irregularly uniseriate ascospores. Each ascospore when mature is brown, fusiform with 3 transverse septa: their most striking feature is the sculptured wall. This takes the form of projections arranged in parallel rows down the length of the spores (Fig. 9) and is clearly seen even in very young ascospores. Saccardo gives the spore measurements as 35–40 × 12μ, but measurements from specimens examined are (25)28–38(40)μ long and 7–12μ wide. Occasionally a thin hyaline tunic is seen to surround spores. Branched septate pseudoparaphyses are present, and the ostiole is lined with periphyses.

Specimens Examined

Ex Herb. NY.
Lophiostoma desmazierii Sacc. & Speg., exsicc. Rehm. Ascom. No. 1093, leg. Bommer & Rousseau. *Sphaeria macrostoma* Tode, exsicc. Westendorp & Wallays, 1845–49, purchased in 1897. *Sphaeria macrostoma* (*aceris*) Desmaz., Desmaz. Pl. Crypt. de France, No. 622 & 1272. *Sphaeria macrostoma*, leg. J. Ralfs, No. 2040.
Ex Herb. IMI
Lophiostoma viridarium Cooke, on *Rubus*, Cornwall, leg. S. M. Francis, 14/4/1956. IMI 111085. *Lophiostoma viridarium* Cooke, on *Rubus fruticosa*, Cornwall, leg. M. B. Ellis, May 1952, IMI 49778.
Ex Herb. CP.
Lophiostoma desmazierii Sacc. & Speg., on *Cornus*, Sjaelland, leg. Anders Munk, 24/1/1964.

Lophiostoma macrostomum (Tode ex Fr.) Fuckel, 1870, *Symb. mycol.*: 157.
?*Sphaeria macrostoma* (Tode) ex Fries, 1823, *Syst. mycol.*, **2**: 469.
?*Lophiostoma macrostoma* Ces. et de Not., 1863, *Schem. di classif.*: 45.
?*Lophiostoma elegans* Fab., 1878, *Spher. Vaucl.*: 97.
Lophiostoma macrostomum (Tode) Sacc., 1883, *Syll. Fung.*, **2**: 700.
?*Lophiostoma biforme* Nits., 1886, in Lehm. *Syst. Bearb. Pyr. Loph.*: 69, Fig. 47.
Lophiostoma pinastri (Niessl.) Rabenh., 1887, *Krypt. Flor.*: 298.
?*Lophiostoma macrostomum* (Tode) Ell. & Ev., 1892, *N. Am. Pyrenom.*: 221.

The pseudothecia are completely submerged within the host wood (*Salix* and *Quercus*), the ostioles alone piercing the surface. Asci are clavate, tapering basally to short stalks, usually containing 8 biseriate or irregularly arranged ascospores. Ascospores are (27)30–40(46) × 7–8μ and 4–7 septate, straight or slightly flattened along one side, a rich brown with sub-hyaline polar cells. The central cells of the spores are the darkest brown, the penultimate cells a lighter colour, but so much variability in depth of colour was seen that it is suspected that even the polar cells might eventually become indistinguishable from the rest. Guttules are seen in all the cells, and occasionally a hyaline appendage is present (Fig. 9). Most of the ascospores are constricted at least at the central septum. Branched pseudoparaphyses and non-branched periphyses are present.

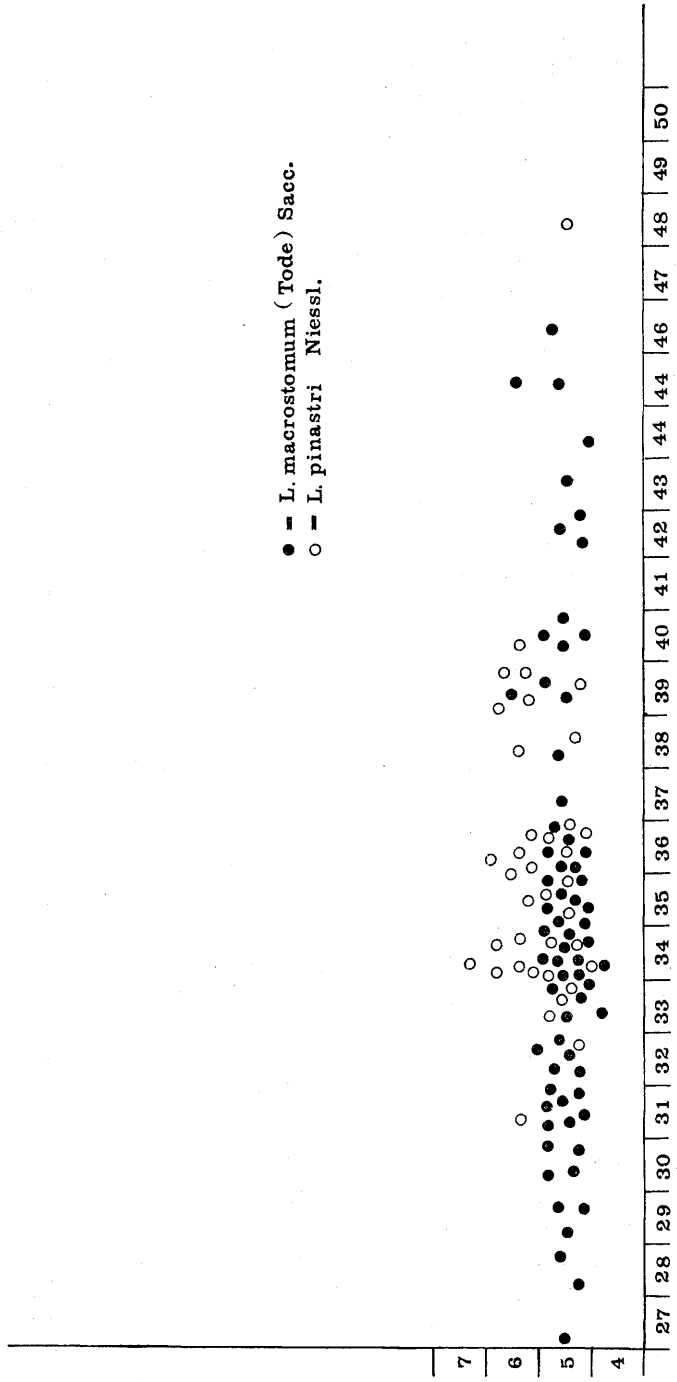

FIG. 12. Scatter diagram plotting spore length against spore septation in two samples of *Lophiostoma macrostomum* (Tode) Fuckel.

Only 7 samples of this species have been seen. A specimen *Sphaeria macrostoma* signed by Fries proved to be *Lophiostoma angustilabrum*. As he makes no comment on the presence of sub-hyaline polar cells, Fuckel's description must be treated with caution and until his herbarium material is investigated it is not certain that his *Lophiostoma macrostomum* matches the description above. Cooke, Rabenhorst and Berlese give detailed descriptions of *Lophiostoma macrostomum*, all making reference to the hyaline polar cells. Ellis and Everhart do not mention the polar cells, merely describing the spores as being brown.

Concerning the descriptions of Lehman, it is probable that *Lophiostoma biforme* Niessl is also synonymous with *L. macrostomum*.

Assessing the relationship between *Lophiostoma pinastri* Niessl and *L. macrostomum* has proved difficult. Lehman, Saccardo and Rabenhorst describe the ascospores of *L. pinastri* Niessl as elongate-pyriform, straight and 5-septate. On examination they prove to be 5–7 septate with slightly paler brown polar cells.

A scatter diagram (Fig. 12) was constructed to determine if *L. macrostomum* and *L. pinastri* could be separated by one clear discontinuity. As they are not separable using this method, it has been decided to consider them synonyms until further evidence should prove otherwise.

Specimens Examined

Ex Herb. NY.
Lophiostoma pinastri Niessl, on *Quercus*, ex Herb. Rabenh., No. 2422, leg. G. Passerini. *Lophiostoma elegans* (Fabr.) Sacc., on coniferous wood, ex Herb. Rehm., No. 1021.
Ex Herb. B.
Lophiostoma pinastri Niessl, leg. Schieferdecker, Herb. sheet No. 2131/12. *Lophiostoma salicum* (Fab.) Sacc., on *Salix*, leg. Kirschstein, 3/9/1911, Herb. sheet No. 2131/6. *Lophiostoma salicum* (Fab.) Sacc., on *Salix*, leg. Kirschstein, 7/8/1908, Herb. sheet No. 2131/6. *Lophiostoma appendiculatum*, on *Salix*, exsicc. Kirschstein, 7/8/1908. *Lophiostoma macrostomum* (Tode) Ces. & de Not., on *Salix*, leg. Kirschstein, 4/7/1909, Herb. sheet No. 2131/23.

Lophiostoma quadrinucleatum Karst., 1873, *Mycol. Fen.*, **2**: 85.
Lophiostoma acervatum Karst., 1873, *Mycol. Fen.*, **2**: 85.
?*Lophiostoma requienii* Fab., 1878, *Spher. Vaucl.*: 106, Fig. 54 (fide Sacc.).
Lophiostoma fallacissimum Karst., 1884, *Hedwigia*, **23**: 17.
?*Lophiostoma berberidis* Nits., 1886, in Lehm. *Syst. Berab. Pyr. Loph.*: 54, Fig. 34.

Lophiostoma quadrinucleatum Karst. and its variety (var. *triseptatum* Peck) are discussed below. Results suggest that a large number of named species should be placed under this one specific epithet, and because of this view the evidence supporting these reductions is presented in a slightly different form from that relevant to previously discussed species.

This species is found on *Rhamnus*, *Populus* and *Prunus*. The pseudothecia are immersed or semi-immersed in the host, the ostiolar necks aligned parallel to the grain of the wood. Asci and ascospores are illustrated in Fig. 9. The latter are biseriate, elliptical, 20–28 × 7–8 μ with three evenly spaced transverse septa. Spore walls are not constricted at the points of intersection of the septa. Branched septate pseudoparaphyses and branched periphyses are present in the pseudothecium.

SPECIMENS EXAMINED

Ex Herb. H.
Lophiostoma acervatum Karst., on *Prunus padus*, Mustiala, leg. P. Karsten, 25/7/1869 (type material). *Lophiostoma quadrinucleatum* Karst., on *Rhamnus*, Mustiala, leg. P. Karsten, 25/7/1869 (type material).
Ex Herb. NY.
Lophiostoma quadrinucleatum Karst., on *Populus tremula*, No. 13, July 18 ? (no signature).

L. quadrinucleatum var. **triseptatum** (Peck) Chesters & Bell, comb. nov.
Sphaeria surrecta Cooke, 1876, *Grev.*, **5**: 94 (fide Ell. & Ev.).
Lophiostoma pruni Ell. & Ev., 1888, *Journ. Mycol.*, **4**(7): 64.
Lophiostoma triseptatum Peck, in Ell. & Ev., 1892, *N. Am. Pyrenom.*: 224.
Lophiostoma triseptatum var. *pleuriseptatum* Ell. & Ev., 1892, *N. Am. Pyrenom.*: 225.

The species listed above do not all match, but the differences between them are so slight that they do not warrant specific rank. The ascospore measurements of the type material *Lophiostoma triseptatum* Peck fall within the range 17–20(25) × 6–8 μ.

According to Ellis and Everhart, the distinction between *Lophiostoma triseptatum* Peck and their variety *pleuriseptatum* relates to spore septation alone. The spore lengths of these two fungi are precisely similar but the var. *pleuriseptatum* has 3–5 transverse septa. In fact the differences between these two fungi are not real and break down as soon as more specimens are examined. Some of these additional specimens (e.g. DAOM 109650) match the type material of *L. triseptatum*, but others are intermediate, having the uniseriate arrangement of ascospores of *L. triseptatum* but having a small percentage of 4–5 septate ascospores (e.g. *Lophiostoma turritum*, No. 2040, Herb. NY).

Concerning *Lophiostoma pruni* Ell. & Ev., the distinguishing feature of this species is the variable number (usually 4) of ascospores in the asci. Additional specimens have been seen which have a smaller proportion of 4 spored asci than the type specimen. It becomes impossible to place these specimens under the present arrangement of species, unless a new specific epithet were proposed for each sample.

The authors of these various species themselves noted the similarities between their type specimens and those of species already in existence. For example, Ellis and Everhart stated that *Lophiostoma triseptatum* Peck was probably a small spored variety of *L. quadrinucleatum* Karst. Saccardo stated that *Lophiostoma pruni* had affinities with *L. quadrinucleatum*.

The evidence so far available suggests to us that the specimens discussed here (pp. 35–36) are examples of a variable genotype which at one extreme gives Peck's *Lophiostoma triseptatum* and at the other Karsten's *L. quadrinucleatum* These two fungi appear linked by numerous other specimens which include *L. pruni* Ell. & Ev. and *L. triseptatum* var. *pleuriseptatum* Ell. & Ev. The scatter diagram (Fig. 13), where only the type material is represented, indicates that no two " species " are separable by a clear discontinuity, which (as mentioned in the introduction), has been used as a method of deciding upon specific limits throughout this work.

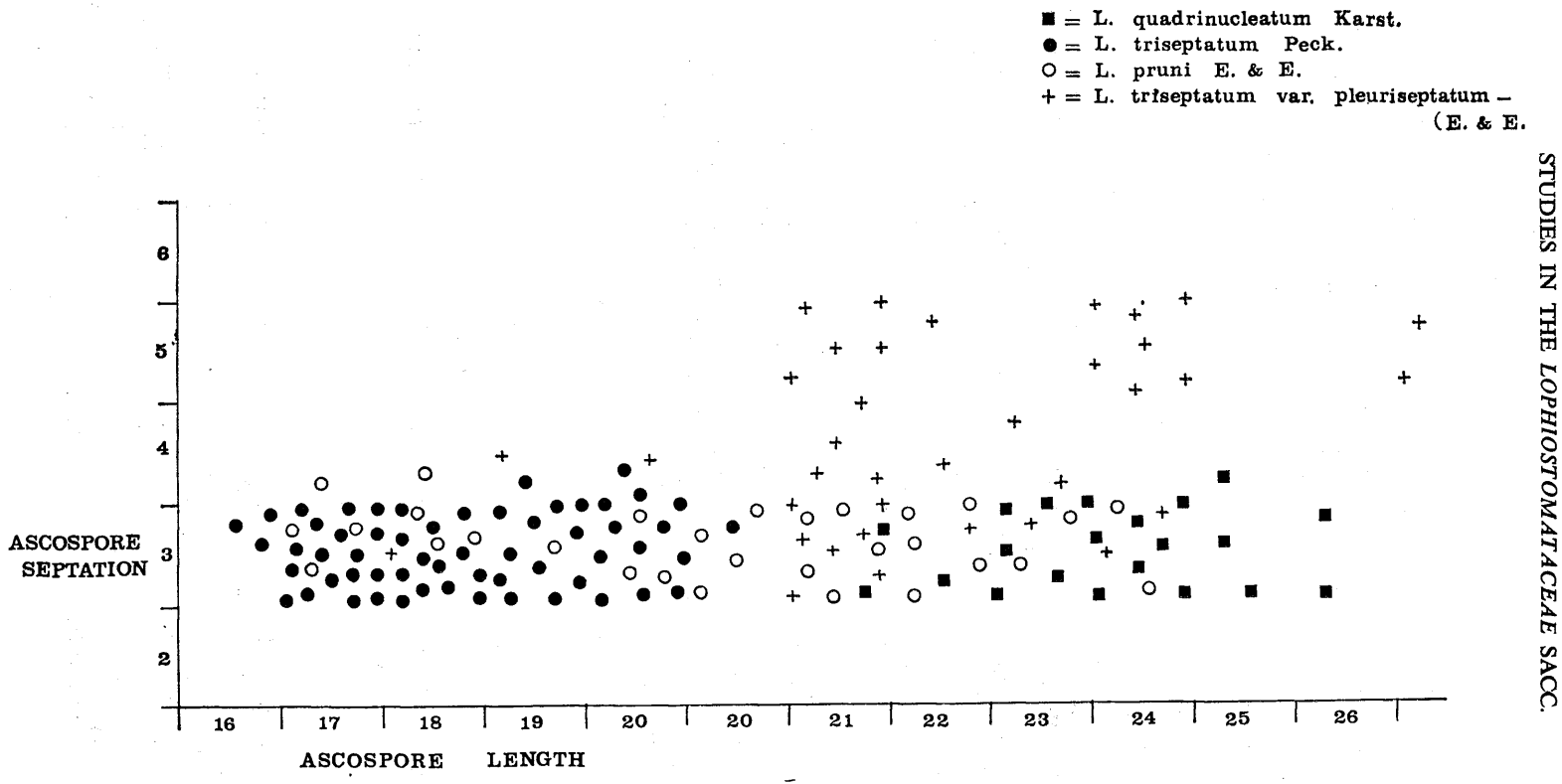

FIG. 13. Scatter diagram plotting the spore septation and length of specimens here described as: *Lophiostoma quadrinucleatum*, or *L. quadrinucleatum* var. *triseptatum*.

An emended description of var. *triseptatum* reads as follows:

Pseudothecia immersed or semi-immersed in the host (*Salix*, *Acer*, *Ulmus*). The asci are cylindrical or slightly clavate with a short basal stalk, each containing 4–8 uniseriate or irregularly biseriate ascospores which are oval with obtuse ends, (16)17–25(30)×5–7μ, with 3–5 transverse septa (Fig. 9) and very occasionally a vertical septum. The spores are usually constricted at the central septum and sometimes at all the septa. Branched septate pseudoparaphyses are present and the periphyses lining the ostiole may also be branched.

Specimens Examined

Ex Herb. NY.

Lophiostoma triseptatum Peck, on *Acer*, Lyndonville, leg. Fairman, No. 184, 1/8/1890, (this is one of the specimens mentioned by Ellis & Everhart). *Lophiostoma triseptatum* var. *pleuriseptatum* Ell. & Ev., on *Acer*, leg. Fairman, No. 134, 1890 (type material). *Lophidium nobile*, on *Acer* (no signature), No. 1804. *Lophiostoma requienii* Fab., on Cotton wood, leg. Bartholomew, No. 2115, 14/4/1896. *Lophiostoma triseptatum* Peck, on *Liriodendron tulipifera*, leg. Fairman, No. 50, 1884. *Lophiostoma lophis*, sp. nov., on *Pinus*, leg. F. E. & E. S. Clements, No. 463, 23/7/1907. *Lophiostoma pruni* Ell. & Ev., on *Prunus serotina*, leg. Fairman, No. 11 (no date). *Lophiostoma turritum*, on *Salix longifolia*, leg. J. Dearness, No. 2040, 1904. *Lophiostoma macrostomoides*, on *Salix*, leg. J. F. Brenckle, No. 147, 1911. *Lophiostoma caespitosum* Fuckel, on *Ulmus*, leg. Fairman, No. 52, 1889. *Lophiostoma pruni* Ell. & Ev., on *Viburnum*, leg. Dearness, No. 1380, 1892. *Lophiostoma triseptatum* Peck, leg. Fairman, No. 180, 25/7/1890. *Lophiostoma quadrinucleatum*, leg. Dearness, No. 546, 1890.

Ex Herb. DAOM

Lophiostoma triseptatum Peck, on *Populus* (?), Ontario, coll. G. Morgan-Jones, det. R. A. Shoemaker, 18/5/1965, DAOM 109650. *Lophiostoma triseptatum* Peck, leg. G. Morgan-Jones, 25/6/1965. *Lophiostoma*, on *Quercus*, det. G. Morgan-Jones, DAOM 110233.

Ex Herb. IMI.

Lophiostoma triseptatum, on *Populus*, IMI 31227. *Lophiostoma* sp., West Pakistan, leg. S. Ahmad, 26/6/1962, IMI 98432. *Lophiostoma triseptatum*, on *Symphoricarpos occidentalis*, leg. J. F. Brenckle, 1931, IMI 31226. *Lophiostoma triseptatum*, on *Symphoricarpos*, leg. G. R. Bisby, 1931, IMI 26879.

Ex Herb. B.

Lophiostoma triseptatum, on *Cornus stolonifera*, leg. J. F. Brenckle, 1920.

THE CAULIUM GROUP

Due to the artificial nature of the synoptic key, the "Caulium Group" includes a diverse group of species.

Key to the Species

(1) Spores 5-septate, fusiform, 30–40×5–8μ, on *Phragmites* — *Lophiostoma arundinis* (p. 39)
(1) Spores 5 or 5–7 septate, found on a variety of herbaceous or woody hosts . . (2)
(2) Spores (17)20–30(33)×4–6μ, 5–7 septate . . . . . (3)
(2) Spores (24)30–40×7–11μ, 5–8 septate . . . . . (4)
(3) Spores elliptical or fusoid . . . . . *L. caulium* (p. 39)
(3) Spores pyriform or clavate . . . . . *L. caudatum* (p. 43)
(4) Spores with obtuse ends, constricted at the central septum, usually on wood — *L. macrostomoides* (p. 45)
(4) Spores ± fusiform, widest above their centres, hardly constricted at the septa — *L. caulium* var. *congregatum* (p. 43)

Lophiostoma arundinis (Pers. ex Fr.) Ces. et de Not., 1863, *Schem. de classif.*: 46.
Sphaeria arundinis Pers., 1801, *Synop. method. Fung.*: 56.
Sphaeria arundinis Pers. ex Fries, 1823, *Syst. mycol.*, **2**: 510.

Phragmites communis is the only host material on which this species has been reported. The pseudothecia occur in linear groups semi-immersed in the host substrate. The asci are clavate, tapering to a short basal stalk, each ascus containing eight brown fusiform ascospores which are straight or slightly curved, predominantly 5-septate, (a few spores are 4–6 septate), 30–40×6–8μ. Most spores are constricted at the central septum only, generally smooth walled and occasionally delicately punctate at each end (Fig. 14).

This species name is attributed to Cesati and de Notaris because they first transferred " *arundinis* " to *Lophiostoma* but no type material has been seen.

Sphaeria arundinis Fr., No. 910. 270–559 is *Leptosphaeria arundinacea*, which occurs upon the same host. Macroscopically these two are easy to distinguish because of the larger ascocarps of *Lophiostoma arundinis* and the clear slot-like ostioles. The ascospores of *Leptosphaeria arundinacea* are only 3-septate and 25–30×3–4μ.

SPECIMENS EXAMINED

**Ex Herb. Ludg. Bot.* (*Herb. Persoon*) *L.*
Sphaeria arundinis, No. 910.270–510., (no signature, but a reference to " Syst. II, p. 510).
*Two other samples have been seen from Herb. L.: *Sphaeria arundinis* Fr., No. 910.270–522, various signatures present on this material: " Dearness ", " *Sph. linare* (??) Alb. et Schwein", and " *Hyphoderma arundinaceum* ". All the fungus material is effête, therefore it is impossible to ascertain the nature of this specimen. *Sphaeria arundinis* Fr., No. 910.270–559—this material does not belong to the *Lophiostomataceae*, but is *Leptosphaeria arundinacea*. On the sheet accompanying this particular specimen is the note: " *Sp. arundinis* Fries 510 ". In his Systema (1823), Fries had doubts in placing *Sph. arundinis* in the Platystomae. Persoon stated that his *Sph. arundinis* had a compressed ostiole, and hence seems to be the species which later has been regarded as *Lophiostoma arundinis*.
Ex Herb. IMI.
Lophiostoma arundinis, on *Phragmites*, leg. S. M. Francis, 24/5/1956, IMI 111093. *Lophiostoma arundinis*, on *Phragmites*, Chesil Bank, leg. S. M. Francis, 19/4/1958, IMI 111475. *Lophiostoma arundinis*, on *Phragmites*, leg. F. Petrak, 1938, IMI 22031. *Lophiostoma arundinis*, on *Phragmites*, Suffolk, leg. C. Booth, 1953, IMI 63138. *Lophiostoma arundinis*, on *Phragmites*, Pickering, Yorks, leg. W. G. Bramley, 24/4/1957, IMI 111163. *Lophiostoma arundinis*, on *Phragmites*, Richmond, Surrey, leg. E. W. Mason, 10/10/1925, IMI 31224. *Lophiostoma arundinis*, on *Phragmites*, leg. S. M. Francis, 25/12/1958, IMI 111647, (this sample contains *Lophiostoma arundinis* and *Lophiostoma semiliberum*).

Lophiostoma caulium (Fr.) Ces. & de Not., 1863, *Schem. di classif.*: 45.
Sphaeria caulium Fr., 1823, *Syst. mycol.*, **2**: 509.
Sphaeria insidiosa Desm., 1841, *Ann. Sc. Nat.*: 16, Fig. 14.
?*Lophiostoma insidiosum* (Desm.) Ces. & de Not., 1863, *Schem. di classif.*: 220.
Lophiostoma simillimum Karst., (=*bicuspidata*β Cooke), 1873, *Mycol. Fenn.*, **2**: 84.
Lophiostoma appendiculatum Niessl, 1875, *Hedwigia*, **1**: 21, (fide Niessl).
?*Lophiostoma niessleanum* Sacc., 1878, *Michelia*, **1**, : 447.
Lophiostoma galii Nits., 1886, in Lehm. *Syst. Bearb. Pyr. Loph.*: 41, Fig. 14 (fide Berl. & Vogl.).

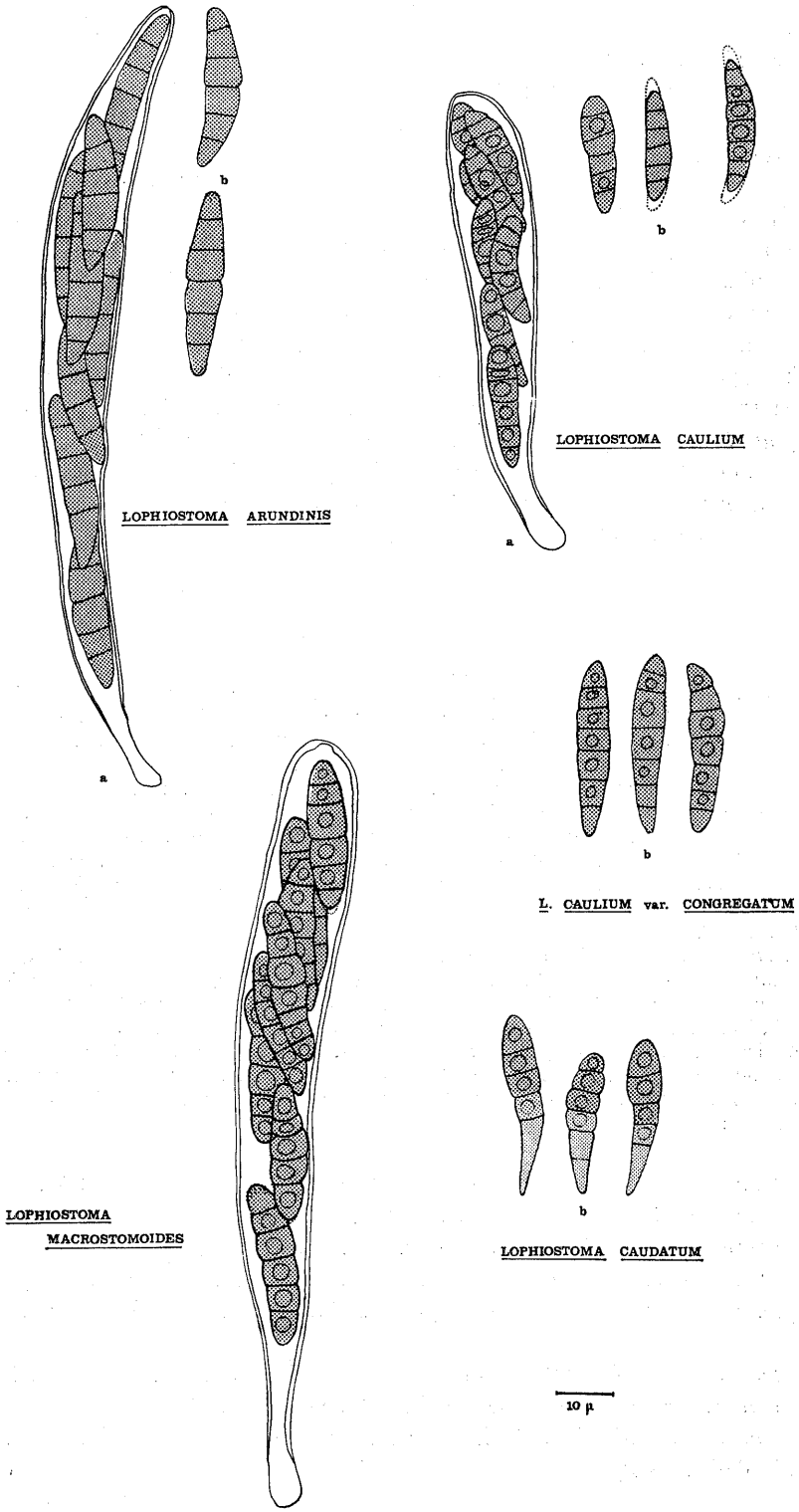

FIG. 14. a=asci, b=ascospores.

Lophiostoma dipsaci Nits., 1886, in Lehm. *Syst. Bearb. Pyr. Loph.*: 40, Fig. 12 (fide Berl. & Vogl.).

Lophiostoma parvulum Nits., 1886, in Lehm. *Syst. Bearb. Pyr. Loph.*: 42, Fig. 15 (fide Berl. & Vogl.).

Lophiostoma crysosporum Karst., 1888, *Rev. Mycol.*, **10**: 149.

Here we have included several slightly different morphological forms under the epithet " caulium ": at least some of these have previously been known under separate specific names.

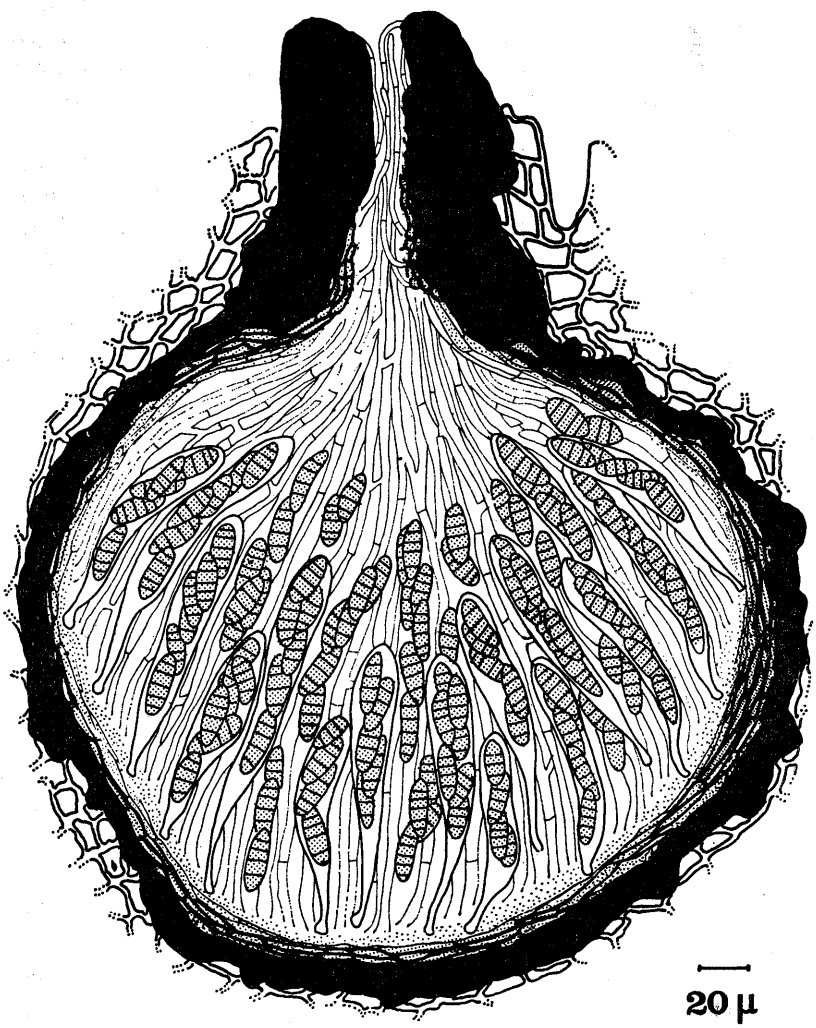

FIG. 15. Pseudothecium of *Lophiostoma caulium*.

In 1863, Cesati and de Notaris amended the *Lophiostomataceae* and applied the name *Lophiostoma caulium* Fr. to those individuals whose ascospores had 5 septa and were 20–30 × 5–8 μ, oval to elliptical, with obtuse ends. Their *Lophiostoma insidiosum* Desm. was distinguished from *L. caulium* Fr. by having fusiform appendiculate spores. Their diagnoses of these two species have been adopted by most other mycologists, including Saccardo, Rabenhorst and Berlese. Fuckel's *Lophiostoma caulium* matches *L. insidiosum* Desm; we have seen a sample of *Sphaeria caulium* from the Fries herbarium which matches *Lophiostoma insidiosum* of Desmazières. Neissl (1875) stated that *L. caulium* and *L. insidiosum* (together with his own *L. appendiculatum*) were synonyms: with this we concur.

Saccardo described *Lophiostoma niessleanum* as having 7 septate appendiculate ascospores, 28–30 × 6–7 μ, which are apparently quite easily distinguished from those of either *Lophiostoma caulium* (Fr.) Ces. & de Not. or *L. insidiosum* (Desm.) Ces. & de Not. However, 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. Within the Lophiostomataceae presence or absence of appendages can be ignored for taxonomic purposes; therefore it seems logical to place *L. niessleanum* Sacc., together with *L. insidiosum* (Desm.) Ces. & de Not., under the specific name *Lophiostoma caulium* (Fr.) Ces. & de Not. As a result, an amended description of *L. caulium* would read as follows:

Pseudothecia immersed or semi-immersed in the host material (*Urtica*, *Sambucus*, *Potentilla*, *Artemisia*, etc.), the ostioles usually in a parallel arrangement. Asci are clavate tapering to a short basal stalk, each containing 8 (or less) ascospores. Ascospores are fusoid to ellipsoidal, straight or slightly curved, with obtuse or tapered extremities, (17)20–30(33) × 4–6 μ (Fig. 14). The number of transverse septa varies between 5 and 7, but specimens with a majority of spores at the smaller end of the size range usually have 5 septa only.

Pseudothecia contain branched, septate pseudoparaphyses: the ostioles are lined with septate periphyses (Fig. 15).

Specimens Examined

Ex Herb. Fries UPS.

Sphaeria caulium Fr., (type material?)—this is the same as Fries distributed in his Scleromyceti Sueciae No. 405 at a later date, a copy of which there is at Herb. K.

Ex Herb. H.

Lophiostoma simillimum (=*bicuspidata* Cooke) Karst., on *Salix*, leg. P. Karsten, 4/1/1866, (type material). *Lophiostoma simillimum* Karst., on *Solanum dulcamara*, leg. P. Karsten, 7/7/1870, (type material). *Lophiostoma crysosporum* Karst., on *Sambucus racemosus*, leg. P. Karsten, 4/6/1888, (type material).

Ex Herb. NY.

Lophiostoma pseudomacrostomum, on *Acer*, leg. Ellis, (no date). *Lophiostoma caulium* (Desm.) Niessl, forma *minutum*, on roots of *Artemisia campestris*, leg. Rehm. No. 484, March 1878. *Lophiella cristata* (Pers.) Sacc., on *Clematis vitalba*, Caen, leg. Roberge, No. 736, 1896. *Lophiostoma insidiosum*, on *Galeopsis*, leg. Niessl., No. 88c, 1881. *Lophiostoma appendiculatum* Fuckel, on *Lactuca*(?), 1882. *Lophiostoma crysosporum* Karst., on *Sambucus racemosus*, leg. P. A. Karsten, 1888, (isotype?). *Sphaeria insidiosa*, leg. Desmazières, No. 1285, 30/8/1865, (isotype?). *Lophiostoma turritum* Cooke & Peck, leg. Macoun, No. 253, Sept. 1883. *Lophiostoma caulium* (Fr.) Ces. & de Not., exsicc. Herb. Fuckel, No. 521, 1894.

Ex Herb. B.
Lophiostoma insidiosum Desm., on *Artemisia campestris*, leg. Sydow, No. 3036, 1890. *Lophiostoma niessleanum* Sacc., on *Artemisia campestris*, leg. Kirschstein, 20/5/1918. *Lophiostoma simillimum*, on *Artemisia maritima*, leg. Kirulus, exsicc. Winter, No. 304, 13/7/1933. *Lophiostoma caulium* (Fr.) de Not., on *Oenothera biennis*, leg. Kirschstein, 20/10/1920. *Lophiostoma insidiosum*, on *Potentilla argentea*, leg. Sydow, No. 1354, Herb. sheet No. 2131/25.
Ex Herb. IMI.
Lophiostoma sp., on *Alnus*, leg. W. G. Bramley, IMI 111284. *Lophiostoma insidiosum* (Desm.) Ces. & de Not., on *Aster multiflorus*, leg. Brenckle, No. 314, IMI 18536. *Lophiostoma insidiosum*, on *Centaurea nigra*, leg. S. M. Francis, 1957, IMI 111194. *Lophiostoma caulium*+*L. insidiosum* (?), on *Cirsium*, leg. S. M. Francis, 1957, IMI 111192. *Lophiostoma simillimum*, on *Clematis*, leg. Petrak, 1939, IMI 22029. *Lophiostoma simillimum*, on *Clematis vitalba*, leg. S. M. Francis, 19/1/1958, IMI 111341. *Lophiostoma simillimum*, on *Clematis vitalba*, leg. S. M. Francis, 20/4/1958, IMI 111479. *Lophiostoma simillimum*, on *Clematis vitalba*, leg. S. M. Francis, 22/6/1958, IMI 111562. *Lophiostoma caulium*, on *Filipendula ulmaria*, Wheatfen Broad, 28/3/1948, IMI 27765. *Lophiostoma insidiosum*, on *Hedera*, leg. S. M. Francis, IMI 111200. *Lophiostoma* sp., on *Origanum vulgare*, 13/2/1958, IMI 111414. *Lophiostoma caulium*, on *Rumex*, leg. S. M. Francis, 7/8/1957, IMI 111188. *Lophiostoma caulium*, on *Rumex*, leg. S. M. Francis, 11/5/1958, IMI 111514. *Lophiostoma* sp., on *Sambucus nigra*, leg. S. M. Francis, 26/12/1957, IMI 111320. *L. (insidiosum)-simillimum*, on Umbellifera (?), leg. S. M. Francis, 4/4/1957, IMI 111161. *Lophiostoma caulium*, on *Urtica dioica*, leg. Webster, 2/3/1957, IMI 111134.

L. caulium var. **congregatum** (Harkn.) Chesters & Bell, comb. nov.
Lophiostoma congregatum Harkn., 1884, *Bull. Cal. Acad.* : 47.
L. brenckleanum Sacc., 1917, *R. Acc. Pad.*: 166.

This variety has been found on *Sambucus* and *Chrysothamnus*. The pseudothecia are scattered, semi-emergent, or superficial, with elongated prominent pseudothecial necks aligned parallel to the long axis of the host material. Asci are clavate, with a short basal stalk, each ascus containing 8 (or sometimes less) brown ascospores. Ascospores are cylindrical to fusiform, straight or slightly curved, often with their widest point above the middle of the spore, 6–8 septate, 30–40×6–8μ (Fig. 14). Evidence derived from a scatter diagram shows that var. *congregatum* cannot be separated from *Lophiostoma caulium* by a clear discontinuity. A more extensive collection of material may prove var. *congregatum* to be widespread, in which case the rank of subspecies would apply. Pseudoparaphyses and branched periphyses are present in the pseudothecium.

SPECIMENS EXAMINED

Ex Herb. NY.
Lophiostoma congregatum Harkn., on *Sambucus racemosa*, Sierra Nevada, leg. Harkness, no date, type material?
Ex Herb. IMI.
Lophiostoma brenckleanum Sacc., n. sp., on *Chrysothamnus*, leg. O. A. Stevens, 18/7/1915, IMI 18534, (paratype).

Lophiostoma caudatum Fab. emend. Chesters & Bell.
?*Lophiostoma caudatum* Fab., 1878, *Sph. Vaucl.*: 103, Fig. 47.
?*Lophiostoma dacrysporum* Fab., 1878, *Sph. Vaucl.*: 103.
Lophiostoma prominens Nits., in Lehm. 1886, *Syst. Bearb. Pyren. Loph.*: 38 (fide Sacc.).
?*Lophiostoma phragmitis* Nits., in Lehm., 1886, *Syst. Bearb. Pyren. Loph.*: 44.

The type material of this species has not been seen but, based on the excellent descriptions and illustrations left by Fabre, there can be little doubt that the herbarium specimens presently examined fit his concepts of *Lophiostoma caudatum* and *L. dachrysporum*.

Lophiostoma caudatum was described by Fabre as having pyriform, biseriately arranged ascospores, 3–5 septate, 30–35 × 5–6μ. *L. dachrysporum* Fabre had smaller spores of similar shape and 5 septate, 24–30 × 6–8μ. Using the evidence supplied by the specimens which have been examined, there appears to be a considerable overlap in the spore sizes of specimens which would otherwise be considered as either *Lophiostoma caudatum* Fabre or *L. dachrysporum* Fabre. For this reason the specimens seen have been placed under the single specific epithet " *caudatum*," until further evidence should prove otherwise. An amended description would read as follows:

Pseudothecia submerged in herbaceous material, particularly upon graminaceous hosts. Asci are clavate, short stalked and contain 8 brown ascospores. Ascospores are pyriform, tapering basally, often remaining paler at the basal end for some time (Fig. 14). Spores are 3–5 septate (probably the 3 septate spores are immature), more or less constricted at the septa, (20)24–33 × 6–8μ. Abundant branched, septate pseudoparaphyses are present in the mature pseudothecium; the ostiole is lined with unbranched periphyses.

It is interesting to note that the ascospores of a sample of *Lophiostoma caulium* (IMI 111514), are slightly clavate. More material may show that a " series " of spore shapes may link *L. caulium* with *L. caudatum* in a similar way to those which have been seen to link *L. caulium*, through *L. simillimum* Karst. and *L. niessleanum* Sacc., to *L. caulium* var. *congregatum*.

This is reminiscent of Vavlov's Law of Homologous Series. He stated that in closely related taxa (i.e. species and genera), a similar series of heritable variations occur, and knowing the variations which occur in one taxon, one can predict the possible variations which occur in a closely related taxon, the material of which may be in short supply. This theory he supported mainly on the evidence supplied by cultivated plants, but it could be useful as a taxonomic guide when considering the fungus species *Lophiostoma caulium*, *L. caulium* var. *congregatum*, and *L. caudatum*. Although the use of herbarium material alone is questionable evidence in support of inter-relationships, it is sufficient to link *L. caulium* with *L. niessleanum* Sacc. and *L. congregatum* Harkn. through a number of intermediates, and extensive collections may further link *L. caulium* with *L. caudatum* in a similar series.

Specimens Examined

Ex Herb. NY.

Lophiostoma clavisporum Ell. & Ev., on *Elymus canadensis*, leg. Bartholomew, 18/3/1895. *Lophiostoma melainon* Rehm., on *Festuca*, leg. Britzelmayr, No. 528, (no date). *Lophiostoma rhopalosporum* Ell. & Ev., on *Vitis*, leg. Bartholomew, 20/4/1899. *Lophiostoma prominens* Peck, on *Vitis*, leg. Bartholomew, (no date).

Ex Herb. IMI.

Lophiostoma caudatum Fab., on *Phragmites*, leg. S. M. Francis, 31/1/1959, IMI 111688. *Lophiostoma caudatum*, on *Urtica dioica*, leg. S. M. Francis, 28/2/1959, IMI 111721.

Lophiostoma macrostomoides (de Not.) Ces. & de Not., 1863, *Schem. di classif.*: 219, emend. Chesters & Bell.

?*Sphaeria macrostomoides* de Not., 1842, *Micro. Ital.*: 111, Fig. 6.

?*Navicella salicum* Fab., 1878, *Sph. Vaucl.*: 98, Fig. 38.

?*Navicella gaudefroyi* Fab., 1878, *Sph. Vaucl.*: 98, Fig. 39.

This species is found on wood, especially *Salix* and *Populus*. The pseudothecia are immersed or semi-immersed, the ostiolar necks aligned parallel to the grain of the host wood. The clavate asci form a layer across the base of the mature pseudothecium. Ascospores are oblong elliptical with obtuse ends, (24)27–37(40) $\times$6–11μ and 5–7(8) septate. Many are constricted at the central septum only, but others are more or less constricted at all the septa (Fig. 14). The spore walls may show slight punctuation at the polar ends of the spores, suggesting that a tunic surrounds them during development, similar to other *Lophiostomataceae*.

Lophiostoma macrostomoides de Not. was compiled by Saccardo, who cited the ascospores as 25–28 $\times$ 7–8μ and those of *Navicella salicum* Fab. as 30–40 $\times$ 10μ. Sufficient material has been seen to prove that the differences in ascospore size are not significant. Rabenhorst described *Lophiostoma macrostomoides* as posessing 4–5 septate ascospores measuring 24–38 $\times$ 9·5μ: presumably he too had combined Fabre's species with that of de Notaris, although he did not mention Fabre's *Navicella salicum* either in the list of synonyms or elsewhere in his treatise on the *Lophiostomataceae*. It is difficult to be precise about Rabenhorst's views because he cites No. 482 in Rehm Ascomyceten in relation to his description but, on examination, this specimen has muriform ascospores—we have presently included it in *Platystomum* Trev.

Specimens Examined

Ex Herb. NY.

Lophiostoma macrostomoides, on *Populus*, bei Burgdorf, No. 17, (no signature). *Lophiostoma macrostomoides*, on *Salix alba*, exsicc. Cavara, No. 183, (no date). *Lophiostoma macrostomoides*, on *Sambucus*, Tyrol, leg. Rehm, (no date). *Sphaeria macrostoma* Tode, par. J. B. H. Desmazières, No. 622, (no date). *Lophiostoma salicum*, exsicc. Rehm., No. 1020, (no date). *Lophiostoma macrostomoides*, on driftwood, leg. L. A. Fritch, June 1892.

Ex Herb. B.

Lophiostoma simillimum Karst., on *Clematis vitalba*, leg. Kirschstein, 25/5/1919. *Lophiostoma macrostomoides*, on *Populus nigra*, leg. Hillman, No. 43, 29/7/1916. *Lophiostoma macrostomoides*, on *Salix*, leg. Kirschstein, 1911.

Ex Herb. IMI.

Lophiostoma excipuliforme, on *Salix atrocinerea*, leg. Ellis, 22/7/1940, IMI 5500. *Lophiostoma salicum*, on *Salix*, 1946, IMI 5492.

Ex Herb. PAD.

Lophiostoma salicum, exsicc. Rehm., No. 1020, 10/11/1899.

Ex Herb. CP.

Lophiostoma macrostomoides, on *Salix*, leg. A. Munk, 20/1/1965. *Lophiostoma macrostomoides*, on *Salix cinerea*, leg. J. Lind, 8/10/1908. *Lophiostoma macrostomoides*, on *Salix aurita*, leg. A. Munk, 25/11/1963.

THE GENUS PLATYSTOMUM TREV.

The genus *Platystomum Trev.* is synonymous with *Lophidium* Sacc., but *Platistomum* Trevisan antidates *Lophidium* Saccardo. All the species which will be described under this generic name have some of their ascospores with vertical septa.

It should be noted that certain specimens of *Lophiostoma pseudomacrostomoides* are difficult to place under an exact name. If, in any specimen, there are few ascospores having vertical septa, that specimen has here been referred to *Lophiostoma macrostomoides* de Not. But a proportion of specimens have many ascospores with 4–5 vertical septa, and these have been referred to *L. pseudomacrostomum* (here placed under *Platystomum compressum* as variety *pseudomacrostomum*).

From this evidence it is apparent that the genus *Platystomum* is not completely distinct from the genus *Lophiostoma* and a certain degree of overlap exists between them.

KEY TO THE SPECIES

(1) Ascospores with a single transverse septum and numerous pseudosepta, spores 90–110×20–30μ . . . . . *Platystomum macrosporum* (p. 46)
(1) Ascospores with true vertical septa, spores smaller than above . . . . . (2)
(2) Ascospores more than 30μ in length . . . . . (5)
(2) Ascospores (majority) less than 30μ in length . . . . . (3)
(3) Ascospores hyaline . . . . . *P. compressum* var. *nuculoides* (p. 48)
(3) Ascospores brown . . . . . (4)
(4) Nearly all spores with 1–3 vertical septa, (17)20–30×7–8μ . *P. compressum* (p. 48)
(4) Many spores with no vertical septa, some samples remaining maize yellow, others brown, 20–34×6–10μ . . . *P. compressum* var. *pseudomacrostomum* (p. 49)
(5) All spores with numerous vertical and oblique septa, constricted at the central transverse septum only, 30–40×11μ . . . . . *P. incisum* (p. 50)
(5) Spores botryoidal, constricted at all septa, 30–50(54)×15–20μ *P. pachysporum* (p. 50)

Platystomum macrosporum (Speg.) Chesters & Bell, comb. nov.
Lophiostoma macrosporum Speg., 1878, in *Michelia*, **1**: 466.

The pseudothecia develop in small groups superficially or semi-immersed upon *Quercus*. Each pseudothecium contains only a few asci arranged in a layer at the base of the ascocarp. Asci are clavate with a very short basal stalk, 300–350μ long, each containing 8 biseriate ascospores. Spores are cylindrical with obtuse ends, 90–110×20–30μ, maize yellow and punctate when young, finally ripening to brown. Each spore has a single non-constricted central transverse septum and numerous other non-constricted vertical and transverse pseudosepta (Fig. 16). The presence of pseudosepta as opposed to true septa caused Saccardo to place this within the genus *Lophiostoma*. The walls of the pseudosepta are very thick.

SPECIMEN EXAMINED

Ex Herb. NY.
Lophiostoma macrosporum Speg., on *Quercus alba*, Nov. 1878, Newfield, New Jersey, (no signature).

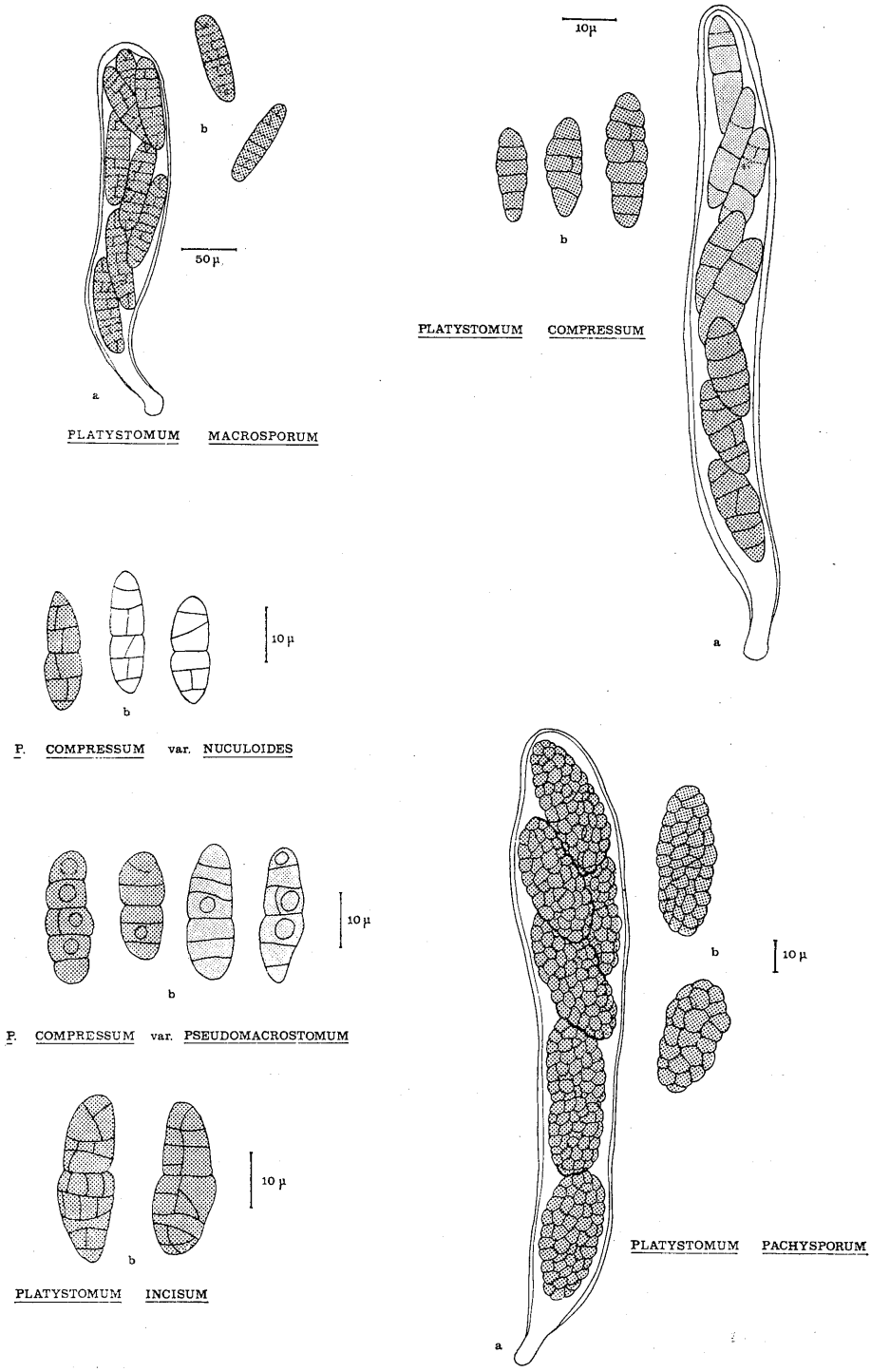

FIG. 16. a=asci, b=ascospores.

Platystomum compressum (Pers. ex Fr.) Trev. emend. Chesters & Bell.

Sphaeria angustata Pers., 1801, *Synop. Fung.*: 55 (fide Sacc.).

Sphaeria angustata Pers. ex Fr., 1823, *Syst. mycol.*, **2**: 470.

?*Sphaeria compressa* Pers. ex Fries, 1823, *Syst. mycol.*, **2**: 470.

?*Lophiostoma angustatum* Fuckel, 1870, *Symb. mycol.*: 158.

?*Platystomum compressum* Trev., 1877, *Bull. Soc. r. Bot. Belg.*, **16**: 16.

?*Lophidium compressum* (Pers.) Sacc., Ces et de Not., 1878, in Sacc. *F. ital.*, No. 233.

Lophidium pseudocompressum Sacc. & Berl., 1886, *Rev. Mycol.*: 34 (fide Berl. & Vogl.).

This species is found on a large number of woody hosts including *Salix*, *Cornus*, *Quercus*, *Prunus* and *Pyrus*. The pseudothecia are crowded, immersed with the ostiolar necks aligned parallel to the long axis of the host. Asci are cylindrical, with a short basal stalk. Ascospores irregularly uniseriate, (17)20–30×7–8μ mostly bluntly fusoid with 3–5 transverse septa and 1–3 vertical septa (Fig. 16). A few spores may be transversely septate only. The spores at the base of the ascus mature first. Branched septate pseudoparaphyses and periphyses are abundant in the mature pseudothecium.

Specimens Examined

Ex Herb. Ludg. Bot. (*Herb. Persoon, L*).

Sphaeria compressa, No. 910.270–358, is here named as the lectotype of *Platystomum compressum*. *Sphaeria media* Pers., leg. Kunze, No. 910.269–328. *Sphaeria media*, leg. Chaillet, No. 910.269–329. *Sphaeria diminuens* Pers., No. 910.270–627, (no signature). *Sphaeria diminuens* Pers., No. 910.270–615, (no signature). *Sphaeria macrostoma* Tode, on *Quercus*, No. 910.269–382, (no signature).

Ex Herb. UPS.

Sphaeria diminuens (Fr.) (no signature, but packet bearing handwritten alteration: " *Lophidium diminuens* "). *Sphaeria macrostoma* Desmaz., Caen, on old wood, (no signature).

Ex Herb. B.

Lophiostoma caespitosum Fuckel, on *Crataegus*, leg. Sydow, No. 2344, 1888. *Lophiostoma compressa*, on *Populus tremula*, leg. Rehm, No. 1457, 1876. *Lophiostoma subcorticale*, on *Pyrus*, leg. Rehm, (only a small portion of this material is *Platystomum compressum*). *Lophiostoma compressum*, exsicc. Rehm No. 182.

Ex Herb. NY.

Lophiotrema praemorsum var. *spiriae*, leg. Sydow, No. 1574. *Lophidium compressum* (Pers.) Trev., f. *ruborum* (Crouen.), Rehm, on *Rubus fruticosa*, No. 182c. *Platystomum compressum*, on *Salix purpurea*, leg. Petrak, 1923. *Sphaeria macrostoma*, No. 1272, (no signature).

P. compressum var. **nuculoides** (Sacc.) Chesters & Bell, comb. nov.

?*Lophiotrema nucula* var. *nuculoides* Sacc., 1883, *Syll. Fung.*, **2**: 680.

?*Lophidium nuculoides* Sacc., 1886, *Add. Syll.*: 260.

Lophiostoma anisomerum Nits., 1886, in Lehm., *Syst. Bearb. Pyr. Loph.*: 86, Fig. 54 (fide Sacc.).

Lophiostoma brachystomum Nits., 1886, in Lehm., *Syst. Bearb. Pyr. Loph.*: 88, Fig. 59 (fide Sacc.).

Lophidiopsis nuculoides (Sacc.) Berl., 1891, in Sacc. *Syll. Fung.*, **9**: 1093.

The pseudothecia may be found immersed or more or less superficially placed upon the host substrate (*Salix*, *Populus*). Asci are cylindrical, with a short basal stalk, each containing 8 hyaline, irregularly uniseriate ascospores (Fig. 16). Ascospores are elliptical or bluntly fusiform, 20–30 × 7–8 μ with 3–4 transverse septa and 1–3 vertical septa. Most spores remain hyaline, or become dilute brown, but occasionally fully brown spores are seen which are indistinguishable from those of *Platystomum compressum*. Branched pseudoparaphyses are abundant and the ostiolar neck is lined with periphyses. If this variety is maintained, it is based entirely on ascospore colour which may not prove a valid criterion once more specimens are available for examination.

Specimens Examined

Ex Herb. UPS.
Lophiostoma macrostomum (Tode) de Not., leg. Sprengel.
Ex Herb. NY.
Lophidiopsis nuculoides Sacc., on *Populus nigra*, leg. Fautrey, 26/12/1896. *Lophiostoma nucula*, on *Populus nigra*, leg. Britzelmayr, No. 481, exsicc. Rehm.
Ex Herb. B.
Platystomum nuculoides, on *Populus nigra*, leg. Kirschstein, 8/6/1908. *Platystomum nuculoides* (Sacc.) Lindau, on *Salix fragilis*, leg. Kirschstein, 1908. *Platystomum nuculoides*, on *Populus nigra*, leg. Kirschstein, 22/10/1918.

P. compressum var. **pseudomacrostomum** (Sacc.) Chesters & Bell, comb. nov.
Lophiostoma pseudomacrostomum Sacc., 1878, *Michelia*, **1**: 339.
Lophiostoma erosum Ell. & Ev., 1892, *N. Am. Pyrenom.*: 223.
Lophiostoma scelestum Cooke & Ell., 1892, *N. Am. Pyrenom.*: 223.
Lophidium rude Ell. & Ev., 1897, *Bull. Torrey bot. Club*, **24**: 129.

The fungi which are included here have proved difficult to classify and it will be necessary to cover a little of the historical background before describing the characteristics of this variety. All samples examined occur on woody hosts, particularly *Salix*, but also on *Populus*, *Corylus*, *Acer* and *Quercus*. The samples seen fall into two groups, those with maize yellow spores and those whose spores are a rich brown. All are characterised by the indefinite number of ascospores with vertical septa.

The sample of *Lophiostoma pseudomacrostomum* from Saccardo's herbarium (PAD) has ascospores of irregular shape, some bluntly fusiform, others clavate, 20–30 × 7–10 μ, with 4–7 transverse septa and some spores with 1–2 vertical septa.

The type material of *Lophiostoma erosum* Ell. & Ev. has spores similar to those of *L. pseudomacrostomum* (20–34 × 8–11 μ). *L. scelestum* Ell. & Ev. is also comparable with *L. pseudomacrostomum* Sacc. Ellis and Everhart made no reference to vertical septa in either of their two new species, although they compared them with *L. pseudomacrostomum*.

Nine herbarium samples were seen which matched *L. pseudomacrostomum* Sacc. (i.e. 9 samples had maize yellow spores). Some were highly dictyosporous (for example the specimen *L. macrostomoides* leg. Bartholomew, No. 3015,

herb. NY), whilst in others only one or two dictyospores were found. It has been decided to place all these specimens mentioned above under the one specific name *Platystomum compressum* var. *pseudomacrostomum*, regardless of the depth of colour of the ascospores. Such a variety may be described:

Pseudothecia growing on wood, especially *Salix* spp. Asci clavate, short stalked, containing 8 ascospores in an irregularly biseriate arrangement. Spores variable in shape, bluntly fusoid, elliptical or slightly clavate, 20–25 × 7–11 μ (Fig. 16). They have 5–8 transverse septa and a few to many muriform spores, which either remain maize yellow, or become rich brown at maturity. Branched septate pseudoparaphyses are abundant and the ostiole is lined with branched periphyses.

SPECIMENS EXAMINED

Ex Herb. PAD.
Lophiostoma pseudomacrostomum, on *Quercus*, No. 2304, in Herb. Sacc.
Ex Herb. NY.
Specimens with " maize yellow " ascospores
Platystomum desertorum Tracy & Earle, on *Artemisia*, 1824. *Lophiostoma macrostomoides*, on *Corylus*, 25/3/1892 (no signature). *Lophidium rude* Ell. & Ev., on cottonwood, 2/4/1896 (type material). *Lophiostoma macrostomoides*, on cottonwood, No. 1386 (no signature). *Lophiostoma macrostomoides*, on *Fraxinus viridis*, leg. Bartholomew, No. 3015, 1893. *Lophiostoma macrostomoides*, on *Populus monilifera*, leg. Bartholomew, 26/2/1894. *Lophiostoma pseudomacrostomum*, on *Salix amygdaloides*, leg. Bartholomew, No. 1543. *Lophiostoma versisporum* Ell. & Ev., on *Vitis vinifera*, 1884. *Sphaeria macrostoma*, leg. Desmazières, No. 622.
Specimens with brown ascospores
Lophiostoma scelestum Cooke & Ell., on maple, No. 96 (type material). *Lophiostoma scelestum* Cooke & Ell., on maple, 1880 (no signature). *Lophiostoma erosum* Ell. & Ev., on *Salix*, 1878 (type material). *Lophiostoma erosum* Ell. & Ev., on *Salix*, leg. Dearness, No. 2757, 1891. *Lophiostoma erosum*, on *Salix cordata*, leg. Bartholomew, No. 1666, 20/2/1895—this specimen has a mixture of maize yellow ascospores, but a few had become a dark brown at full maturity. *Lophiostoma scelestum* No. 92, 1878 (no signature). *Lophiostoma bicuspidatum* Cooke, purchased from Herb. Massee (no date).

Platystomum incisum (Ell. & Ev.) Chesters & Bell, comb. nov.
Lophidium incisum Ell. & Ev., No. 5754, Herb. Ellis (NY), 1894.

The pseudothecia are clustered in small groups, semi-immersed or more or less superficial on the host. The asci are cylindrical with a short stalk, each ascus containing 8 irregularly uniseriate ascospores. Spores are 30–40 × 11 μ, each having a central constricted septum and numerous non-constricting, oblique, vertical and transverse septa (Fig. 16). Pseudoparaphyses abundant.

SPECIMEN EXAMINED

Ex Herb. NY.
Lophidium incisum Ell. & Ev., on *Symphoricarpos*, leg. M. E. Jones, No. 5754, 1894.

Platystomum pachysporum (Sacc.) Chesters & Bell, comb. nov.
Lophiostoma pachysporum Sacc., 1878, *Michelia*, **1**: 249.
Lophidium pachysporum Sacc., 1883, *Syll. Fung.*, **2**: 714.

This species has been recorded on *Populus* and *Abies*. The pseudothecia are immersed within the substrate, the small ostiolar necks piercing the surface. Asci are cylindric/clavate, with short basal stalks, each ascus containing 8 (or sometimes less) dark brown ascospores. Ascospores have such a number of constricted septa in all directions as to give the spores a grape-like (botryoidal) appearance. The younger spores may be tapered at their extremities, but fully mature spores (Fig. 16) are elliptical in outline, they measure 30–54 × 15–20μ. Branched septate pseudoparaphyses and branched periphyses are abundant.

Specimens Examined

Ex Herb. PAD.
Lophiostoma pachysporum, on *Abies*, No. 2301 (part of type?).
Ex Herb. NY.
Lophiostoma gregarium Fuckel, on *Abies*, exsicc. Saccardo Mycotheca Veneta, No. 1157, 1877.
Lophidium pachystomum Ell. & Ev., on *Populus*, leg. Bartholomew, No. 1583, 21/7/1894.

APPENDIX I

DOUBTFUL SPECIES

Although the following species fits the morphological requirements of the Lophiostomataceae, i.e. the ostioles are slot-like, the ascospores are quite unlike any other species, but closely resemble *Ophiobolus*, a fact which Saccardo commented upon in his Sylloge Fungorum, Vol. 2.

Lophiostoma vermisporum Ell., 1882, *Bull. Torrey bot. Club*, **9**: 19.
Lophionema vermisporum (Ell.) Sacc., 1883, *Syll. Fung.*, **2**: 717.

The type specimen was collected on dead stems of *Oenothera biennis*. Pseudothecia are gregarious, immersed, with high narrow protruding ostiolar necks. Asci are clavate, with a button-like stalk, each ascus containing 8 hyaline, filiform ascospores, whose lengths extend from the tip to the base of the ascus. Each spore tapers gently towards the base, and is 2–10 septate, very slightly constricted at the septa and within the range 75–90 × 3·5–5μ. Branched pseudoparaphyses and periphyses are present.

The ostiolar necks of this specimen described above are strongly compressed, but as this species stands alone and is morphologically unlike any other Lophiostomataceae seen to date, its validity remains questionable.

If further research should prove it to be separate from *Ophiobolus* and a true member of the Lophiostomataceae, there seems little logic in separating it from *Lophiostoma* into the genus *Lophionema* (as did Saccardo), any more than there would be in giving any other member of the Lophiostomataceae a different generic epithet purely on differences in spore shape.

In the Ellis herbarium (NY), there is a specimen of *Lophionema apoclastospora* Solh., and references to four other new species of this genus. *Lophionema apoclastospora* is now known as *Glyphium schizosporum* (Maire) Zogg. As the other four species have not been seen, it is not possible to ascertain their true relationships.

Specimen Examined

Ex Herb. NY.
Lophionema vermisporum (Ell.) Sacc., on *Oenothera biennis*, No. 643, 7/8/1881 (type material).

APPENDIX II

EXCLUDED SPECIES

In the following list the specific names are listed alphabetically.

Lophiotrema aequivocum Ell. & Ev., on decorticated wood, British Columbia, in Herb. NY., type material. The ostiolar necks on this material are not elongated but are quite circular, therefore it has not been considered as a member of the Lophiostomataceae.

Lophionema apoclastospora Solh., on decorticated wood of *Salix*, Bow Mountains, 27/6/1942, No. 430, leg. W. G. Solheim, in Herb. NY., (type). This species is now known as *Glyphium schizosporum* (Maire) Zogg.

Lophidium confertum Ell. & Ev., on *Fraxinus viridis*, Kansas, leg. E. Bartholomew 16/4/1894, in Herb. NY., type specimen. The ostioles of this specimen are quite rounded.

Platystomum dulcamarae Kirschst., on *Solanum dulcamara*, in Herb. B., type specimen. The ostiolar necks of the specimen are rounded, therefore it has been rejected from the Lophiostomataceae.

Lophidium incisum Ell. & Ev., exsicc. No. 5754, 6/8/1894, leg. Jones, in Herb. NY.

Lophiostoma inscuptum Rehm, No. 289, in Herb. NY. This species is *Leptosphaeria clivensis* (see Holm, 1952).

Lophidium minus Ell., on decorticated limbs of *Nyssa*, No. 1660, 1883, in Herb. NY., type specimen. The ostioles of this specimen are rounded.

Schizostoma nevadense Ell. & Ev., No. 518, in Herb. NY., type specimen, no signature or date given.

Lophidium nitidum Ell. & Ev., on *Vitis*, No. 1336, 2/2/1895, in Herb. NY., type specimen. The ostiolar necks are cylindrical, therefore this specimen has been excluded from the Lophiostomataceae.

Lophiostoma roseo-tinctum Ell. & Ev., on *Staphylea trifolia*, in Herb. NY., type specimen. This is a *Leptosphaeria* sp.

Platystomum salicinum Earle, on *Salix*, in Herb. NY., type specimen. The ostiolar necks are cylindrical.

Lophiostoma stuarti Fab., on *Thymus vulgaris*, in Herb. P., type specimen. This is a species of *Leptosphaeria*.

Schizostoma stupeum Ell. & Ev., Blackwater river, leg. Smith, in Herb. NY., type specimen. The ostioles of this specimen are quite rounded.

Lophiostoma subcollapsa Ell. & Ev., on bark of *Nyssa*, Newfield, 10/7/1886, in Herb. NY., part of type specimen. The ostioles of this species are circular; a note on the herbarium packet reads: " *Trematosphaeria?* ".

Lophiosphaera taperina Kirschst., on *Ulmus campestris*, 1905, in Herb. B., leg. Kirschstein, type specimen. The necks of this specimen are circular.

Lophidium tingens Ell., on decorticated *Acer*, No. 693, in Herb. NY., type specimen. The ostiolar necks are cylindrical.

Lophidium trifidum Ell. & Ev., on dead branches of *Salix*, No. 483, 18/7/1899, in Herb. NY., type specimen. Due to the cylindrical necks of the ascocarps, this specimen has been excluded from the Lophiostomataceae.

REFERENCES

Berkeley, M. J. & Broome, C. E. (1859). Notices of British fungi. *Annls. & Mag. nat. Hist.*, **3**: 356–377.

Berkeley, M. J. & Broome, C. E. (1861). Notices of British fungi. *Annls. & Mag. nat. Hist.*, **7**: 449–456.

Berlese, A. N. (1890). La famiglia delle Lophiostomaceae Sacc. *Malpighia*, **4**: 40–55.

Berlese, A. N. (1890). *Icones fungorum ad usum Sylloges Saccardianae accomodatae.*

Berlese, A. N. & Voglino, P. (1886). *Sylloge Fungorum, additamenta ad vol. 1–4.*

Bonorden, H. F. (1851). *Handbuch der allgemeinen Mykologie.* Stuttgart.

Cesati, V. & De Notaris, G. (1863). *Schema di classificazione degli Sferiacei Italici.* Genoa.

Dumortier, B. C. (1822). *Comment. Bot., Observ. Bot.*; 87, Tournay.

Ellis, J. B. & Everhart, B. M. (1892). *The North American Pyrenomycetes.* Newfield, New Jersey.

Fabre, J. H. (1878). Essai sur les Spheriacées du département de Vaucluse. *Annls. Sci. nat.*, **9**: Ser. vi, 66–118.

Fries, E. M. (1823). *Systema mycologicum*, **2**.

Fries, E. M. (1846). *Summa vegetabilium scandinaviae.* Stockholm & Leipzig.

Fuckel, L. (1870). *Symbolae mycologicae*, Weisbaden.

Hedberg, O. (1958). The taxonomic treatment of vicarious taxa. *Uppsala Univ. Årsskr.*, **6**: 186–195.

Lehmann, F. (1886). Systematische Bearbeitung der Pyrenomyceten-Gattung *Lophiostoma* (Fr.) Ces. & de Not., mit Berückstichtigung der verwandten Gattungen *Glyphium* (N.i.c.), *Lophium* Fr. und *Mytilidion* Duby. *Nova Acta.*, **50**(2): 47–152.

Nees von Esenbeck, C. G. (1816). *Das System der Pilze und Schwämme.* Wurzburg.

Persoon, C. H. (1801). *Synopsis methodica Fungorum*: 54–57. Göttingen.

Rabenhorst, G. L. (1887). *Kryptogamen-Flora*, Bd. 1, 2: 290–308. Leipzig.

Saccardo, P. A. (1883). *Sylloge Fungorum*, **2**: 673–717.

Saccardo, P. A. (1891). *Sylloge Fungorum*, **9**: 1074–1094.

Tode, H. J. (1790–91). *Fungi mecklenburgensis selecti.* Lüneburg.

Trevisan, V. (1877–78). Note sur la tribu des Platystomées de la famille des Hypoxylacées. *Bull. Soc. r. Bot. Belg.*, **16**: 14–20.

Vavilov, N. I. (1921–22). The law of homologous series in variation. *J. Genet.*, **11–12:** 47–89.