Canadian and some extralimital *Nodulosphaeria* and *Entodesmium* species

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Twenty-eight species are illustrated and described from Canada or extralimital regions and keys to species are provided. One new species, ***N. revelstokensis***, is described on *Castilleja miniata* Dougl. Twelve species are excluded.

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L'auteur décrit et illustre 28 espèces du Canada ou de régions hors limite et propose des clés pour ces espèces. Une nouvelle espèce est décrite, le ***N. revelstokensis*** sur *Castilleja miniata* Dougl. Douze espèces sont exclues.

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Introduction

The work reported follows closely the plan used in a revision of *Leptosphaeria* (Shoemaker 1984). A key to allied genera (including *Nodulosphaeria* and *Entodesmium*) was presented in that paper. The text treats *Nodulosphaeria* and then *Entodesmium* and is organized in this order: generic description, key to species, species descriptions arranged alphabetically by epithet, followed by notes on excluded species, if applicable.

Nodulosphaeria Rabenhorst 1858, No. 725. nom. cons. prop.
TYPE: Rabenhorst 1858, No. 725 (S), typ. cons. prop. (=*N. derasa* (Berkeley & Broome) L. Holm, *Sphaeria derasa* Berkeley & Broome) (Barr and Holm 1984).

Ascocarps scattered or sometimes clustered, immersed or becoming exposed, globose, conic, rarely depressed, usually with some basal mycelium or hyphal strands in the epidermis. Beak short, terete, with or without hyaline periphyses, usually terminating in, or lined apically with, acute to blunt brown sparsely septate hairs resembling the hyaline periphyses but usually more robust. Wall at least 2 or 3 cells thick and composed of brown thin-walled oblong to polygonal cells; sclerenchyma rare, external crust present or absent. Physes abundant, broad, septate, with guttules in some, with external gelatinous coating in most species. Asci bitunicate, numerous in a broad basal layer, cylindric or clavate, with a short stalk and broad base from crozier attachment, usually 8 spored, often multiseriate above reduced to uniseriate in the slender stalk. Ascospores fusiform to cylindric, rarely 3, usually 4 or more septate, first septum often slightly constricted, usually distinctly above the middle (±0.4, i.e., at 4/10ths of the distance from the apex to the base), widest cell above the first septum and shorter than wide in at least a substantial proportion of spores, often guttulate, of some shade of yellow or brown, not echinulate, with a subapical ridge in some, an appendage present at each end, or absent, appendages cushion shaped, globose, conic, cylindric or curved, lacking an entire sheath, with a distinctive pattern of septum formation leading to notable numbers of 4-, 6-, and 8-septate spores. Occurring mostly on herbaceous dicots, mainly Asteraceae, and usually highly specialized at least to host genus. One species known on Pinaceae and one on Liliaceae.

Key to accepted species of *Nodulosphaeria*

1*a*. Spores not appendaged (cf. 1*b*, 1*c*) 2

2*a*. Spores 5 septate 3

3*a*. Spores 38–45 × 5–7 μm; on *Succisa* ..... *succisae*
3*b*. Spores 22–30 × 6–7 μm; on *Castilleja* ..... *revelstokensis*

2*b*. Spores 6 septate; on *Inula* ..... *franconica*
2*c*. Spores 8 septate; on Asteraceae ..... *dolioloides*

1*b*. Spore appendages globose (cf. 1*c*) 4

4*a*. Spores 3 septate (cf. 4*b*–4*g*) 5

5*a*. Spores 22–29 × 4.5–5 μm; on Liliaceae ..... *submodesta*
5*b*. Spores 15–19 × 5–6 μm; on Pinaceae ..... *araucariae*

4*b*. Spores 4 septate 6

6*a*. Spores with subterminal ridge; on *Laserpitium* ..... *spectabilis*
6*b*. Spores not ridged; on many dicots ..... *modesta*

4*c*. Spores 5 septate 7

7*a*. Spores 36–51 × 5–6 μm; on *Hieraceum* ..... *aquilana*
7*b*. Spores 38–45 × 8–11 μm; on *Campanula* ..... *kuemmerlei*
7*c*. Spores 38–46 × 6–7 μm; on *Succisa* ..... *succisae* affin.

4*d*. Spores 6 septate 8

8*a*. Spores 35–44 × 4–5 μm; on *Clematis* ..... *aucta*
8*b*. Spores 57–70 × 4–5 μm; on various dicots ..... *olivacea*

4*e*. Spores 6–8 septate; on *Laserpitium* ..... *ladina*
4*f*. Spores 8 septate; on *Epilobium* ..... *cadubriae*
4*g*. Spores 12–14 septate; on *Sambucus* ..... *megalospora*

1*c*. Spore appendages longer than wide 9

9*a*. Appendages straight 10

10*a*. Spores 6 septate; on *Centaurea scabiosa* ..... *centaureae*
10*b*. Spores 8 septate 11

11*a*. Spores 40–55 μm long; on *Senecio* ..... *pellita*
11*b*. Spores 60–70 μm long; on various dicots ..... *octoseptata*

10*c*. Spores 10 or 11 septate; on *Epilobium* ..... *epilobii*

9*b*. Appendages curved 12
12*a*. Spores 6 septate; on *Buphthalmum* ..... *septemcellulata*
12*b*. Spores 8 septate, 38–45 × 4.5–5 μm; on *Centaurea jaceae* ..... *jaceae*
12*c*. Spores 8 septate, 40–50 × 4–4.5 μm; on *Senecio* ..... *derasa*

Nodulosphaeria araucariae Hino & Katumoto 1966, p. 285 Fig. 1

Ascocarps scattered, subepidermal, subglobose to pyriform, 120–150 μm diam. Beak barely erumpent, central, terete, truncate–conical, ±30 μm long, ±30 μm wide, composed of wall pseudoparenchyma around a 10–15 μm diam. ostiole, lined with hyaline periphyses. Wall in longitudinal section laterally of 4–6 layers of subglobose to polygonal dark brown 4–6 × 4–6 μm pseudoparenchyma cells externally and of subhyaline lenticular 6–10 × 2–3 μm cells internally, not thinner at base, not thickened at basal margin. Physes ± 1 μm wide. Asci numerous in a broad hymenium, clavate, 65–71 × 9–10.5 μm, short stalked, with 8 overlapping linearly biseriate ascospores. Ascospores fusiform, 15.5–19 × 5–6 μm, 3 septate in sequence 2:1:2, second cell from apex shorter than wide, first septum constricted and median (0.50), yellowish brown, with one large guttule per cell, smooth, without sheath, with globose rarely conoid appendages.

This redescription is redrawn from the original diagnosis and abundant illustrations. The authors considered this a primitive species of *Nodulosphaeria* occurring on Pinaceae, comparable with the primitive *N. submodesta* on *Tofieldia* of Liliaceae. *Nodulosphaeria araucariae* lacks the brown bristles in the beak. The first septum appears to be just below the middle, unlike other species of *Nodulosphaeria* which have the first septum above the middle. It is an interesting species to be sought on Pinaceae but not a convincing *Nodulosphaeria* in all respects.

COLLECTION EXAMINED: (by Hino and Katumoto 1966) JAPAN: *Araucaria brasiliana* A. Rich., Kuroki-tyô, Prov. Tikugo, Kyûsyu, 12 Oct. 1959.

Nodulosphaeria aquilana (D. Sacc. in Sacc. & D. Sacc.) L. Holm 1957, p. 83 Figs. 4,33,38,68,82,109,110

≡*Leptosphaeria aquilana* D. Sacc. in Sacc. & D. Sacc., Sylloge Fungorum, 17: 724. 1905

Ascocarps scattered, deeply immersed, globose with a flattened base, 275–350 μm wide, 200–250 μm high. Beak erumpent, central, terete, truncate–conical, 80–90 μm long, 100–120 μm wide, with erect acute brown 2- or 3-septate 60–80 × 6–9 μm hairs around a 20–30 μm diam. ostiole, not lined with periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 20–25 μm thick of 3–5 layers of oblong brown 9–17 × 4–7 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 10- to 15-μm intervals, without guttules, without slime coating. Asci numerous in a broad hymenium, cylindrical, 70–100 × 13–15 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores. Ascospores narrowly fusiform, 36–45 × 4.5–6 μm, 5 septate in sequence 4:2:1:2:3, third cell from apex enlarged towards base and short, first septum constricted and supramedian (0.42), yellowish brown, with guttules, smooth, with globose appendages.

This species on *Hieracium* is quite distinctive. The beak hairs are abundant, pointed and 2 or 3 septate. The wall is usually of 4 layers of oblong cells. The ascospores have small globose appendages and the first septum above the middle (ca. 0.42). The 5 septa develop in the sequence 4:2:1:2:3. The septa in the basal part are formed almost simultaneously. The last septum in the apical part forms after all the others and is absent in a small percentage of spores. See *N. aucta* Niessl in Rab. and *N. ladina* (E. Müller) L. Holm for differences from these species.

COLLECTIONS EXAMINED: CANADA: QUÉBEC: 74283(*a*), *Hieracium pratense*, Mt. Albert, H.E. & M.E. Bigelow 1908, July 6, 1957, as *Leptosphaeria aquilana*; MANITOBA: 180649, *Campanula rotundifolia* L., near Bob Hill Lake, Riding Mountain National Park, R.A. Shoemaker & J.A. Parmelee, 16 July 1979, as *Nodulosphaeria succisae* Munk in Møller; BRITISH COLUMBIA: 106209, *Castilleja miniata* Dougl., Mt. Revelstoke, elev. 5500 ft., R.A. Shoemaker, 3 August 1963, as *Nodulosphaeria succisae* Munk in Møller. ITALY: 184898, *Scrophularia* spec., Tagliacozzo (Aquila), D. Saccardo, Apr. 1904, ex D. Saccardo Mycotheca italica 1485, ex S, as *Leptosphaeria aquilana* D. Sacc. sp.n. NORWAY: 123696, dead stems, above Geiranger, L. E. W[ehmeyer] 9363, July 30, 1950, as *Leptosphaeria ogilviensis* (B. & Br.) Ces & De Not. SWEDEN: 15840, *Hieracium umbellatum* L., Jamtlandia, A.G. Eliasson, 2/7, 1931, as *Leptosphaeria ogilviensis* (B. & Br.) Ces. & De Not.; 36844, *Hieracium umbellatum*, Bah. Ljungs An Korsviken, A.G. Eliasson, 5/7, 1888, as *Lepto-*

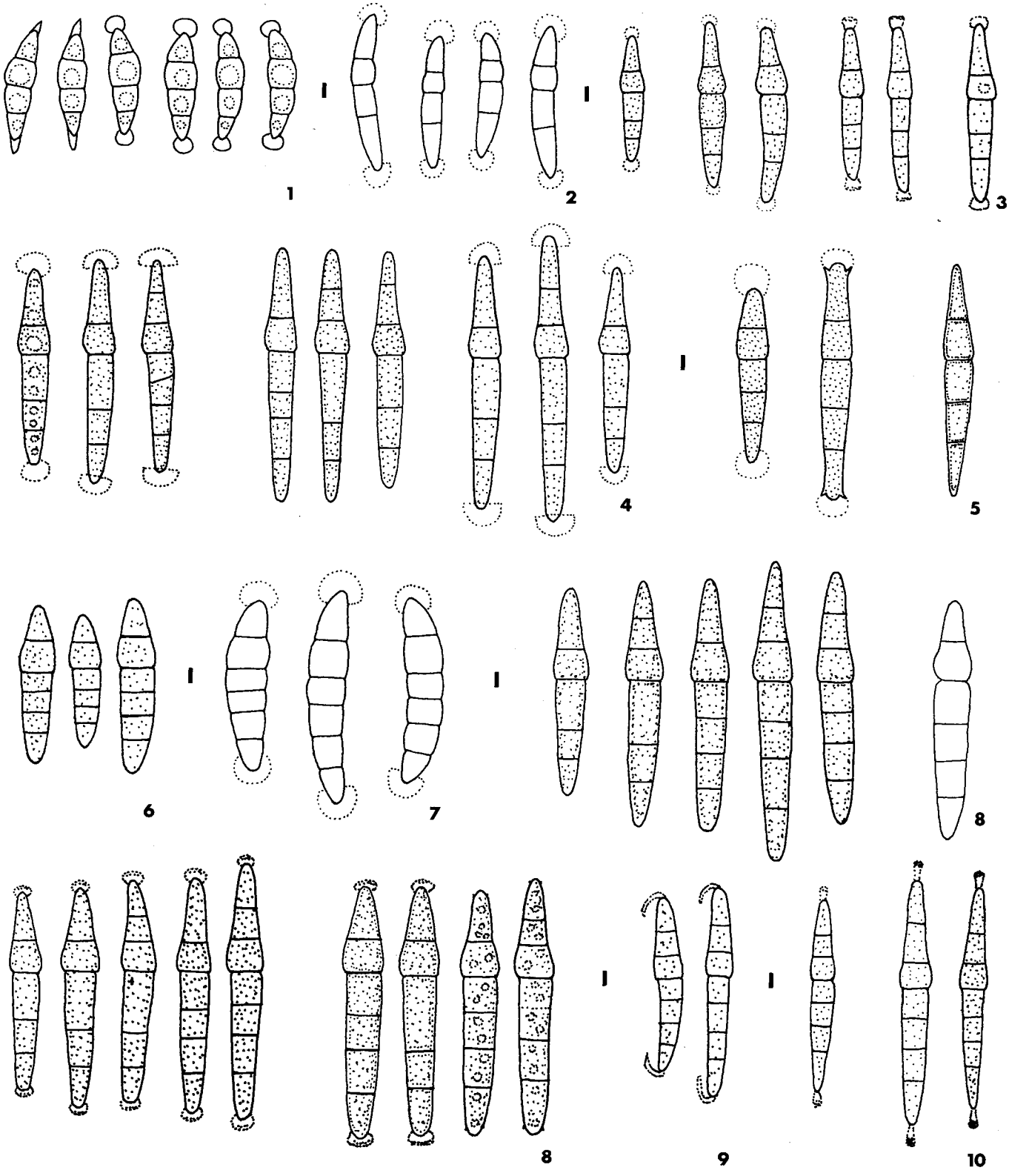


FIG. 1. *N. araucariae*, from Hino and Katumoto (1966). FIG. 2. *N. submodesta*, from Holm (1961). FIG. 3. *N. modesta*, 105308, 180124, 123668, 123578. FIG. 4. *N. aquilana*, 180649, 184898 (in lactic), 106209. FIG. 5. *N. spectabilis*, 185000, from Niessl (1872) redrawn ×1000. FIG. 6. *N. revelstokensis*, 106210. FIG. 7. *N. kuemmerlei*, from Holm (1961) redrawn ×1000. FIG. 8. *N. succisae*, 123706, from Munk in Møller (1958) redrawn × 1000, 188301, 188302, right spores with appendage dissolved and showing minute ridge. FIG. 9. *N. septemcellulata*, 123652. FIG. 10. *N. centaureae*, 123639, 179313. All ×1000.

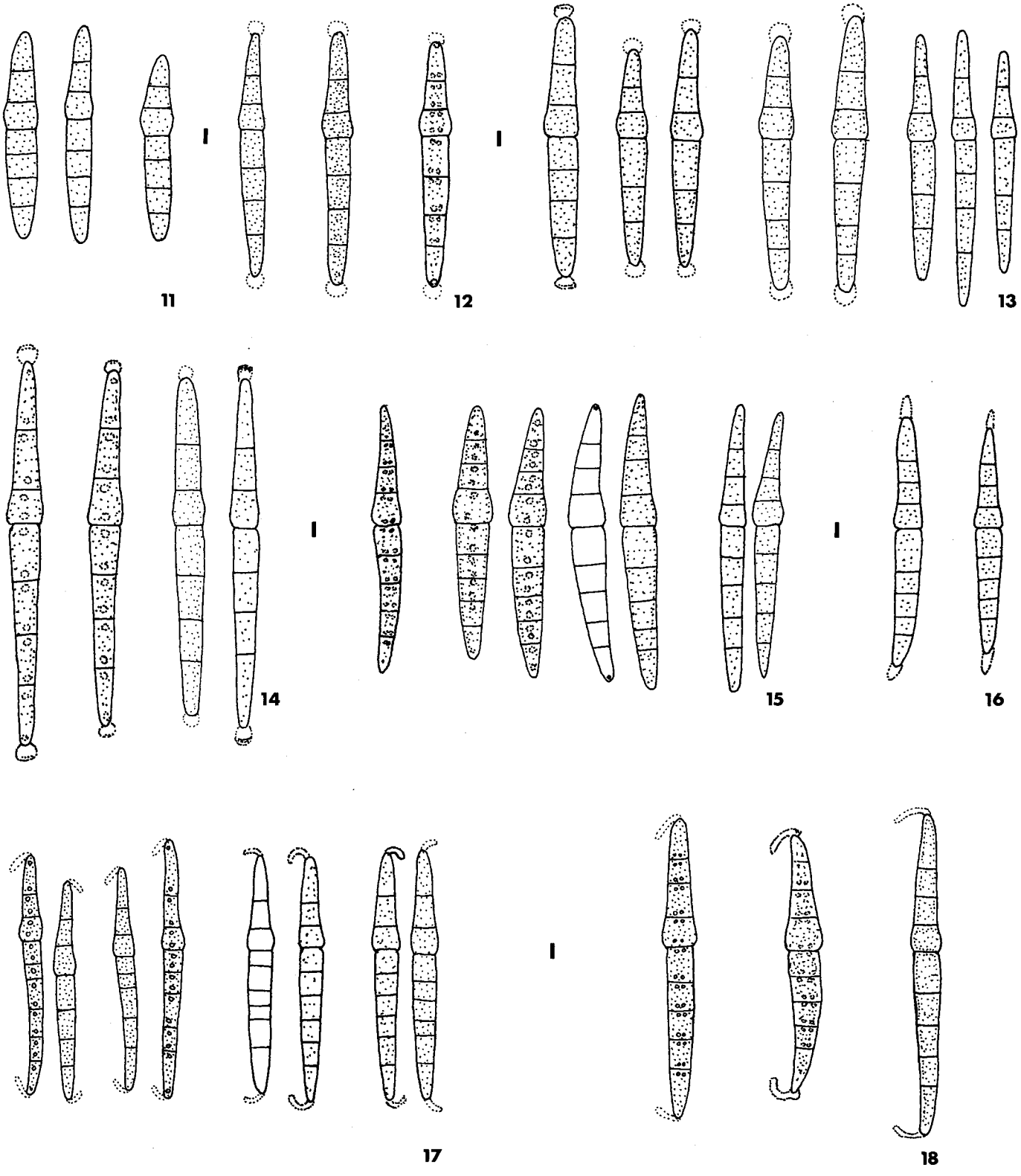


FIG. 11. *N. franconica*, 184935, Rehm's drawing on packet in S. FIG. 12. *N. aucta*, 184901, 187592. FIG. 13. *N. ladina*, 123633, 188309, 184952 (in lactic). FIG. 14. *N. olivacea*, 188304, 121616. FIG. 15. *N. dolioloides*, 183101, 105315, 164782. FIG. 16. *N. cadubriae*, 188199. FIG. 17. *N. jaceae*, 184948, 15837, 36834. FIG. 18. *N. derasa*, 184921, 123577, 123567. All ×1000.

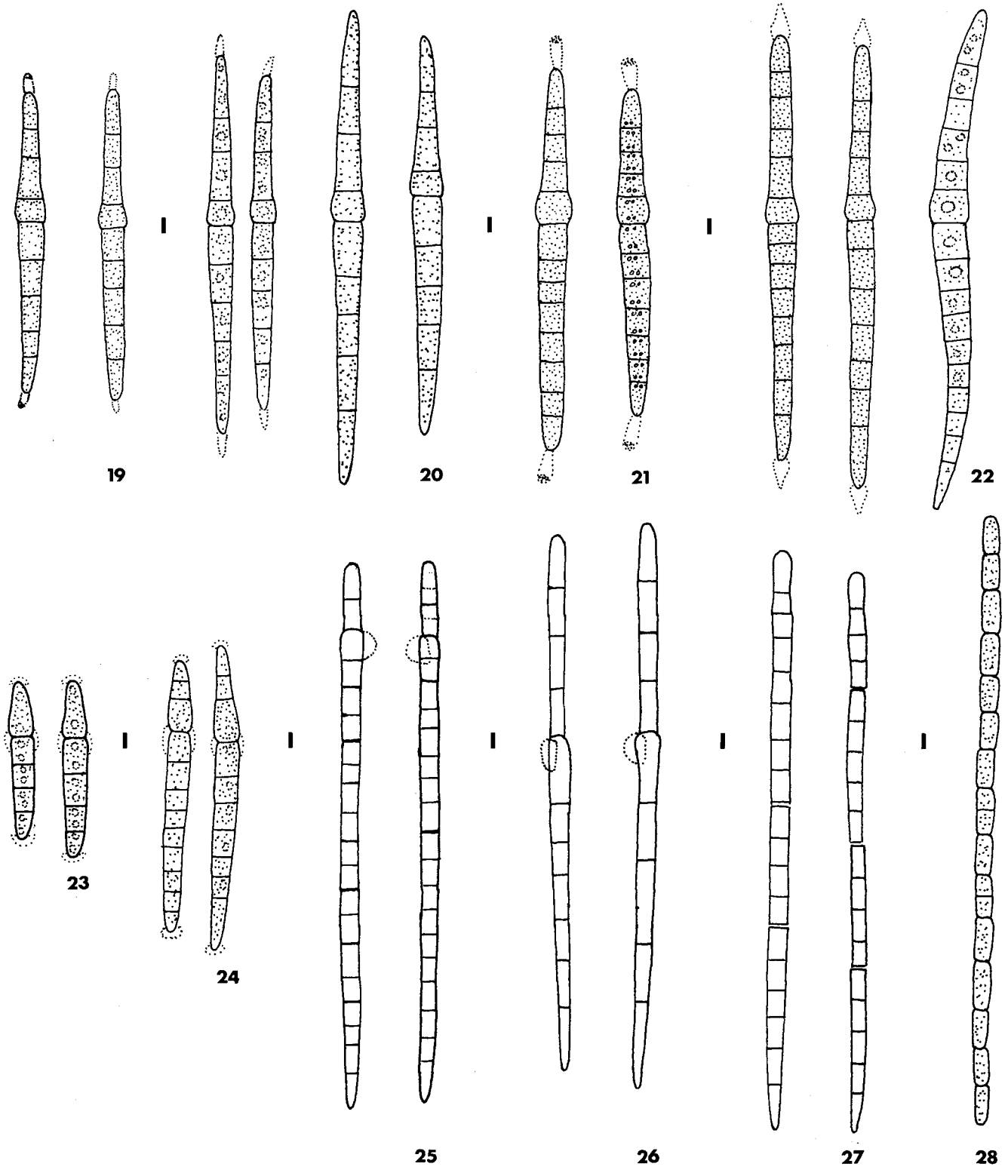


FIG. 19. *N. pellita*, 121670, 123598. FIG. 20. *N. octoseptata*, 120199, 105092 (in lactic). FIG. 21. *N. epilobii*, 123553. FIG. 22. *N. megalospora*, 151574, Niessl's figure (1872) redrawn ×1000. FIG. 23. *Entodesmium niessleanum*, 90400. FIG. 24. *E. multiseptatum*, 121677. FIG. 25. *E. eliassonii*, 188696. FIG. 26. *E. mayorii*, 188711, 188710. FIG. 27. *E. lapponicum*, 188697. FIG. 28. *E. rude*, 151624. All ×1000.

sphaeria ogilviensis (B. & Br.) Ces. et De Not.

Nodulosphaeria aucta (Niessl in Rabenh.) L. Holm 1961, p. 73
Figs. 12,39,69,83,115
≡*Leptosphaeria aucta* Niessl in Rabenh., F. eur. No. 2240. 1877

Ascocarps scattered, deeply immersed, globose with a flattened base, 220–300 μm wide, 180–230 μm high. Beak barely erumpent, central, terete, truncate–conical, 60–70 μm long, 70–80 μm wide, with bluntly pointed brown 50–60 × 6–7 μm hairs with 0–1(2) septa around a 20–30 μm diam. ostiole, not lined with periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 17–24 μm thick of 3 or 4 layers of oblong dark brown 8–12 × 3–4 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, without an external crust. Physes 3–5 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 70–90 × 10–14 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores. Ascospores narrowly fusiform, 35–44 × 4–5 μm, 6 septate in sequence 3:2:1:2:3:4, third cell from apex short and enlarged towards base, first septum constricted and supramedian (0.40), yellowish brown, with small guttules, smooth, without sheath, with small globose appendages, with a refractive sphere near each end, with the appearance of a germ pore at each end.

This species on *Clematis* has consistently 6-septate ascospores and is thereby distinct from *N. aquilana* (D. Sacc. in Sacc. & D. Sacc.) L. Holm, which has 5-septate ascospores. *Nodulosphaeria ladina* (Müller) L. Holm with larger 6–7(8)-septate ascospores lacks the conspicuous beak hairs characteristic of *N. aucta*. Holm (1961, p. 73) recorded terminal germ pores in the ascospores of this species. I found a refractive sphere near the terminal appendage base which gives the effect of a slight corona and the total impression is of a germ pore. However, I could not detect a thin area in the end wall. The precise interpretation of these fine features is not attempted herein.

COLLECTIONS EXAMINED: CZECHOSLOVAKIA: 184901, *Clematis recta*, prope Brünn, [G. v. Niessl], vere et aestate, TYPE, Rabenhorst, Fungi europaei 2240, ex S, ex Herb. Rehm, as *Leptosphaeria aucta* n.s.; 185013, *Clematis recta*, prope Brünn (Moraviae), Prof. Dr. Niessl, aestate 1877, Rehm, Ascomyceten 488, ex S, ex Herb. Rehm, as *Leptosphaeria aucta* Niessl; 187592, *Clematis recta*, pr. Brünn, G. v. Niessl, vere et aestate, part of TYPE, ex Rabenhorst, Fungi europaei 2240 as *Leptosphaeria aucta* n.s.

Nodulosphaeria cadubriae (Speg.) L. Holm 1961, p. 73
Figs. 16,56,84,122
≡*Leptosphaeria cadubriae* Speg., Atti Soc. Crittogam. Ital. Ser. 2, 3: 55. 1881

Ascocarps scattered, deeply immersed, globose with a flattened base, 350–450 μm wide, 200–250 μm high. Beak barely erumpent, central, terete, truncate–conical, 80–120 μm long, 100–140 μm wide, crowned with bluntly pointed brown aseptate 20–25 × 6–8 μm hairs around a 30–40 μm diam. ostiole, not lined with periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 35–40 μm thick of 5 or 6 layers of polygonal brown 6–10 × 5–9 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, without an external crust. Physes not seen. Asci numerous in a broad hymenium, cylindrical, 70–90 × 14–17 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores. Ascospores narrowly fusiform, 37–45 × 5–6 μm, 8 septate in sequence 4:3:2:1:(6):2:3:4:5, fourth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.44), end cells and the cell below the inflated cell longer than others, yellowish brown, without guttules, smooth, without sheath, with conical appendages.

This species on *Epilobium* was redescribed by Holm, who saw the type and a more recent collection in good condition. A slide in the Wehmeyer Herbarium prepared from the type has been examined. When some spores from it were revived in water, they exhibited conical appendages about 2 μm wide. Holm did not find any appendages on the spores from the type. On a later collection he described the appendages as "almost globose, about 7 μm diam., and can only be seen in India ink." My observation shows that there are appendages on spores from the type. That they appeared as conical and not globose may be an artifact from the long storage of the slide in polyvinyl alcohol. Even without the distinctions in appendages Holm noted (1961, p. 74), *N. cadubriae* with 8-septate ascospores is easily distinguished from *N. epilobii* (Müller) L. Holm, which likewise occurs on *Epilobium*, by the longer 10 or 11-septate ascospores in the latter.

COLLECTION EXAMINED: ITALY: 188199, *Epilobium dodonaei*, Fortogna, Cadore, Spegazzini, 17 September 1879, La Plata Mus. Pt. 2626, TYPE, ex L. E. Wehmeyer Collection.

Nodulosphaeria centaureae (E. Müller) L. Holm 1957, p. 85
Figs. 10,31,40,70,85,112
≡*Leptosphaeria centaureae* E. Müller 1950, p. 299

Ascocarps clustered, subepidermal, globose with a flattened base, basally setose, 200–300 μm wide, 200–300 μm high. Beak erumpent, central, terete, truncate–conical, 30–100 μm long, 80–100 μm wide, with bluntly pointed brown aseptate 35–50 × 5–7 μm hairs around a 20–30 μm diam. ostiole, lined with erect brown periphyses like the setae at upper end and hyaline 15–20 × 1.5–2 μm periphyses below. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 20–28 μm thick of 3 or 4 layers of oblong dark brown 8–10 × 4–7 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, with a reddish brown external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, with fine guttules, with slime coating. Asci numerous in a broad hymenium, clavate–cylindrical, 80–120 × 9–12 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores above reduced to one spore at ascus base. Ascospores narrowly fusiform, 28–42 × 5–6 μm, 6 septate in sequence 3:2:1:3:2:3, third cell from apex short and enlarged towards base, first septum constricted and supramedian (0.40), yellowish brown, with small guttules, smooth, without sheath, with small clavate appendages, with a refractive guttule near each end, without the appearance of a germ pore at each end.

This species occurs on *Centaurea scabiosa* L. and rarely (doubtfully) on other Asteraceae. The record on *Knautia silvatica* (L.) Duby (Dipsacaceae) from Switzerland is doubtful. The fungus is *N. centaureae*, but the part of the host plant in DAOM looks suspiciously like *Centaurea scabiosa*.

The fungus has a well-developed beak terminating and lined apically with blunt brown hairs. Some hyaline periphyses occur lower in the ostiole but are less evident. The ascospores are regularly 6 septate. The appendages are straight, narrow,

clavate and appear to be of a denser material at the extreme end. This species has the tendency to mature many spores simultaneously and to release them readily in water mounts.

COLLECTIONS EXAMINED: GERMANY: 20226, *Centaurea scabiosa*, Mittelfranken, Kr. Hersbruck: Ellenbach, K. Starcs, 14.7.1946, Nr. G. 1459, as *Leptosphaeria derasa* (B. et Br.) Awd. HUNGARY: 179313, *Centaurea sadleriana* Janka, mte. Tarkö haud procul pagi Felsötárkány montium Bükk-hegység, Dr.S. Tóth, 31.VII. 1962. SWITZERLAND: 90278, *Centaurea scabiosa* L., Bergün-Filisur, Graubünden, 1200 m, E. Müller & R.A. Shoemaker, 7 June 1962; 123639, *Centaurea scabiosa*, Graubünden, Fetan, E. Müller, 14.7.1949, as *Leptosphaeria centaureae* E. Mül.; 123643, *Knautia silvatica*, Kt. Graubünden, Fetan, E. Müller, 15.7.1949, as *Leptosphaeria ogilviensis*; 123653, *Senecio nemorosa*, Kt. Graubünden, Ardez? (Vna fide E. Müller, pers. comm.), E. Müller, 16.7.1949, as *Leptosphaeria centaureae* E. Müller.

Nodulosphaeria derasa (Berkeley & Broome) L. Holm 1957, p. 89 Figs. 18,32,41,57,86,124

≡*Sphaeria derasa* Berkeley & Broome, Ann. Mag. Nat. Hist. Ser. 2, 9: 328. 1852

Ascocarps clustered, deeply immersed becoming exposed, globose with a flattened base, 250–350 μm wide, 250–300 μm high, densely setose. Beak erumpent, central, terete, truncate–conical, 60–80 μm long, 70–80 μm wide, with bluntly pointed brown aseptate 40–60 × 5–6 μm hairs around a 20–25 μm diam. ostiole, lined with brown hairs apically, and with hyaline 15–20 × 2–3 μm periphyses below. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 35–40 μm thick of 6 or 7 layers of oblong dark brown 8–10 × 5–7 μm pseudoparenchyma cells with central two layers darker than adjacent cells, not thinner at base, not thickened at basal margin, with reddish brown external crust. Physes 2–3 μm wide, with thin septa at 15- to 25-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate–cylindrical, 90–110 × 11–14 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores above reduced to one spore at base. Ascospores narrowly fusiform, 28–55 × 5–6 μm, 8 septate in sequence 4:3:2:1:5:2:3:4, fourth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.44), yellowish brown, with guttules, smooth, without sheath, with small curved cylindric appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species occurs on *Senecio*. The ascocarps are usually heavily coated with hairs but some are glabrous. The wall is well developed and has a characteristic central band of darker colored cells that are most prominent in the basal area where the adjacent cells are nearly hyaline. Holm (1957, p. 89) drew attention to this feature. The spores are regularly 8 septate with thin cylindric curved appendages. Occasionally 10-septate spores are found, as recorded by Rehm for f. *alpestris* which Holm (1957, p. 89) treated as a synonym. The pattern of septation in the lower part of the spores seems to vary. Commonly the upper cell of the basal part is long, equalling the long basal cell. The last septum can develop in either of these long cells. Holm described the pattern as 4:3:2:1:3:2:3:4. I am not sure which pattern is more representative of usual development.

COLLECTIONS EXAMINED: ITALY: 184921, Stengel eines Compositen, Mauern der Stilfserjoch-Strasse bei Franzenhöhe (Tyrol), ca. 2300 m, Dr. Rehm, 7/1884, Rehm Ascomyceten 828, ex S, as *Leptosphaeria derasa* [(Berk. & Br.) Thüm.] f. *alpestris* Rehm. GREAT BRITAIN: 97970, *Senecio jacobaea*, Youlgreave, Derbyshire, J. Webster, 23.*iv*.58, IMI. no. 72928, as *Leptosphaeria derasa* (Berk. & Br.) Auersw.; 140148, *Senecio jacobaea*, Derbyshire, J. Waterston, 23.*iv*.1958, IMI. no. 72928, as *Leptosphaeria derasa* (Berk. & Br.) Auersw. PAKISTAN: 90406, *Senecio chrysanthemoides* [Phil.], Dunga gali, 16.8.1954, ex ZT, Fungi of Pakistan 11,057. SWITZERLAND: 123566, *Senecio alpina*, Kt. Glarus, Filzbach, Alp Platten, E. Müller, 5.6.1949, ex ZT, as *Leptosphaeria derasa* (B. et Br.) Asw.; 123567, *Senecio alpina*, Kt. St. Gallen, Molser Alp, Flums, E. Müller, 21.5.1949, ex ZT, as *Leptosphaeria derasa* (B. et Br.) Auersw.; 123631, *Senecio carniolucus*, Grbd. Bergün, Fregslas, E. Müller, 2.8.1949, ex ZT, as *Leptosphaeria derasa* (B. et B.) Asw.; 123577, *Senecio doronicum*, Kt. Grbd. Lü, Alp Champatsch, E. Müller, 6.7.1949, ex ZT, as *Leptosphaeria derasa* (B. et Br.) Auersw.

Nodulosphaeria dolioloides (Auersw. in Rabenhorst) Rabenhorst 1863, No. 547 Figs. 15,42,58,87,119

≡*Leptosphaeria dolioloides* Auersw., Leipzig Tausch.-Ver. 1866: 4. 1866

Ascocarps scattered to clustered, immersed to exposed, depressed to globose with a flattened base, 200–300 μm wide, 175–250 μm high with some basal hairs. Beak barely erumpent, central, terete, truncate–conical, 20–30 μm long, 30–50 μm wide, with projecting bluntly pointed brown aseptate 20–30 × 4–5 μm hairs around a 10–15 μm diam. ostiole, lined with similar brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 35–50 μm thick of 6–8 layers of oblong dark brown 8–10 × 6–8 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust, internal 2 or 3 cell layers hyaline, with scleroplectenchyma near beak base. Physes 3–4 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate–cylindrical, 70–85 × 12–16 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores. Ascospores narrowly fusiform, acute at ends, 36–42 × 5.5–6.5 μm, 8 septate in sequence 4:3:2:1:3:2:3:4, fourth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.43), yellowish brown, with or without small guttules, smooth, without sheath, without appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species occurs on various Asteraceae. The ascocarps can be immersed and depressed with the small beak barely erumpent forming a dark centre to a larger circle of the fruit body. In some collections the ascocarps are exposed and hemispheric resembling a small *Leptosphaeria doliolum* but without the concentric ridges. The beak consists largely of the brown hairs and is sometimes very reduced. The asci are short with 2 fascicles of 4 spores. The ascospores are sharply pointed, 8 septate, constricted at the first septum, with the fourth cell inflated and short. The fifth cell may be long, though most other cells are subequal. It is quite distinct from *N. derasa* which has blunt spores with evident cylindric curved appendages and a darkened central layer in the ascocarp wall.

COLLECTIONS EXAMINED: CANADA: NEW BRUNSWICK: 170033, *Tanacetum vulgare* L., grassy field between campground and Kouchibouguac R., 524 877, Kouchibouguac

National Park (K.N.P.), M. Corlett, 1978, as *Leptosphaeria dolioloides* Auersw.; 164782, *Tanacetum*, Baie St., Louis Road, K.N.P., S. J. Hughes (KNP 300*a*), 3 July 1977, as *Leptosphaeria dolioloides* Auersw.; 170047, *Tanacetum* sp., Baie St. Louis Road, K.N.P., S.J. Hughes, 3 July 1977, as *Leptosphaeria dolioloides* Auersw.; ONTARIO: 85700, *Achillea millefolium*, Bear Island, Lake Timagami, R.F. Cain 1863, June 21, 1932, TRTC 4424, as *Leptosphaeria millefolia* (Fuckel) Niessl; 85699, *Achillea millefolium*, Matagama Point, L. Timagami, R.F. Cain 1518, June 20, 1932, TRTC 3435, as *Leptosphaeria millefolii* (Fuckel) Niessl; 92138, *Achillea millefolium* L., Bear I., Lake Timagami, Nipissing District, G.D. Darker, 9 July 1928, as *Leptosphaeria millefolii* (Fuckel) Niessl.; MANITOBA: 182693, *Achillea* sp., Fire Lookout Road, S. of Hwy 19, Riding Mountain National Park (R.M.N.P.), R.A. Shoemaker, D.R.H. Hammersley & J.A. Parmelee RMNP 328, 19 July 1979, 182694, *Achillea* sp., Hwy. 19, 2 km west of Swanson Creek, R.M.N.P., R.A. Shoemaker, J.A. Parmelee & D.R.H. Hammersley RMNP 316, 19 July 1979; BRITISH COLUMBIA: 105315, *Achillea millefolium* L., Eagle Pass, elev. 1800 ft., R.A. Shoemaker, 23 June 1963. U.S.A.: ALASKA: 121623, *Achillea* (*borealis* or *multiflora*), Fairbanks, R.M. Chute (2), Jan. 19, 1946, ex Herb. L.E. Wehmeyer 9269, as *Leptosphaeria dolioloides* (Auersw.) Karst. var. nov.? GERMANY: 184922, *Tanacetum officinale*, Gross-Drebnitz pr. Bischofswerda (Saxoniae), Auerswald, Mai 1862, Rabenhorst, Fungi europaei 547, ex S, ex Herb. Rehm; 183101, *Tanacetum* sp., bei Regenstauf (Oberpfalz), H. Rehm, Rehm, Ascomycetes 641b, ex Herb. Dearness s.n. *Leptosphaeria dolioloides* Awd. HUNGARY: 150886, *Chrysanthemum vulgaris* (L.) Bernh., Orvényko montium "Bükk hegység", Dr. S. Tóth, 25.IV.1961, ex BP, as *Leptosphaeria dolioloides* Auersw. NORWAY: 123679, *Tanacetum*, Geiranger, L.E. W[ehmeyer] 9287, July 30, 1950 as *Leptosphaeria dolioloides* (Awd.) Karst. SOVIET UNION: 121626, *Tanacetum vulgare* L., Lettland, Prov. Vidzeme, Kr. Cetis, K. Starzs, 1931, ex Herb. K. Starzs 665, as *Leptosphaeria dolioloides* (Auersw.). SWEDEN: 121621, *Artemisia vulgaris*, Upland, Stockholm, Ekbacken, L. Romell 3.V.1896, ex Fungi exs. suecici no. 773, as *Leptosphaeria dolioloides* (Auersw.) Auersw.; 36833, *Tanacetum vulgare*, Dalsland, Gastad, Gauenasudde, A.G. Eliasson, 106, 1888, as *Leptosphaeria dolioloides* Auersw.

Nodulosphaeria epilobii (E. Müller) L. Holm 1957, p. 91
Figs. 21,43,59,88,125

≡*Leptosphaeria epilobii* E. Müller 1950, p. 303

Ascocarps scattered to clustered, immersed to superficial, globose with a flattened base, 250–380 μm wide, 250–300 μm high. Beak erumpent, central, terete, truncate–conical, 30–100 μm long, 90–140 μm wide, composed of 6–8 layers of wall pseudoparenchyma lined with bluntly pointed brown 20–30 × 3–5 μm hairs with 0 or 1 septa around a 20–30 μm diam. ostiole, lined basally with hyaline 20–25 × 2–3 μm periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 35–45 μm thick of 5–7 layers of oblong dark brown 6–8 × 4–6 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, without an external crust sometimes with scleroplectenchyma at beak base. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 95–110 × 16–19 μm, short stalked, with 8 overlapping linearly tetraseriate to 6-seriate ascospores reduced to one spore at base. Ascospores narrowly fusiform, 55–67 × 5.5–6.5 μm, 10(11) septate in sequence 5:4:3:2:1:(7)2:3:4:5:6, fifth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.40), cell 6 and end cells longest, yellowish brown, with small guttules, smooth, without sheath, with blunt conical appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species has robust ascocarps with a relatively broad beak. The ascospores are distinctive with the conspicuous straight bluntly conical appendages and 10 or 11 septa. I am not sure of the pattern in the basal part. The last septum can occur either in the first or last long cell of the basal part. *Nodulosphaeria cadubriae* (Speg.) L. Holm occurs on *Epilobium dodonaei* Vill. and has 8- or 9-septate ascospores with large globose appendages. *Nodulosphaeria pellita* (Fries) Shoemaker has ascospores with bluntly conical appendages, but the spores have only 8 septa.

COLLECTIONS EXAMINED: SWITZERLAND: 123553, *Epilobium alsinifolium*, Kt. Graubünden, Bergün, Val Tuors, Chants, E. Müller, 30.7.1949, ex ZT, as *Leptosphaeria epilobii* E. Müller; 123554, *Epilobium fleischeri*, Kt. Graubünden, Bergün, Plaz-bi, E. Müller, 30.7.1949, ex ZT, as *Leptospheria epilobii*.

Nodulosphaeria franconica (Petrak) L. Holm 1957, p. 84
Figs. 11,44,71,113

≡*Leptosphaeria derasa* var. *franconica* Petrak, Krypt. Forsch. Bayer. Bot. Ges. 2: 162. 1931

Ascocarps scattered, subepidermal, globose with a flattened base, 180–225 μm wide, 125–160 μm high. Beak barely erumpent, central, terete, truncate–conical, 25–40 μm long, 80–100 μm wide, with centrally directed bluntly pointed brown aseptate 25–30 × 4–5 μm hairs around a 25–35 μm diam. ostiole, not lined with periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 17–25 μm thick of 2 or 3 layers of acerose dark brown 9–12 × 5–7 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, with a reddish brown external crust, inner layer thin walled and hyaline. Physes 3–4 μm wide, with thin septa at 10- to 15-μm intervals, without guttules, without slime coating. Asci numerous in a broad hymenium, cylindrical, 70–90 × 12–16 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores. Ascospores narrowly fusiform, 35–40 × 5.5–7 μm, 6 septate in sequence 3:2:1:3:2:3, third cell from apex short and enlarged towards base, first septum constricted and supramedian (0.43), yellowish brown, without guttules, smooth, without sheath, without appendages, without a refractive sphere at ends, without the appearance of a germ pore at each end.

This species, on *Inula* (Asteraceae), has delicate small ascocarps with a very short beak composed of a slightly thicker wall area subtending some pointed brown periphyses that point inward. The ascocarp wall is thin and composed of 2 or 3 layers of relatively large cells. A few scleroplectenchyma cells of small diameter occur in the beak region. The asci are short, filling the small centrum. The ascospores lack appendages, are 6 septate and strongly constricted at the first septum and are relatively broad and short.

COLLECTION EXAMINED: GERMANY: 184935, *Inula salicina* [L.], Osilia, Arensburg, T. Vestergren, 24/6, 1899, Rehm, Ascomyceten 383, ex S, ex. Herb. Rehm, as *Leptosphaeria*

francicola [sic] (Petr.) E. Müller and *Leptosphaeria agnita* var. *ambigua* Berl.

Nodulosphaeria jaceae (L. Holm) L. Holm 1957, p. 86 Figs. 17,60,89,120

≡*Leptosphaeria jaceae* L. Holm, Sven. Bot. Tidskr. 46: 35. 1952

Ascocarps scattered, subepidermal becoming exposed, depressed–globose with a flattened base, 300–400 μm wide, 250–300 μm high. Beak barely erumpent, central, terete, truncate–conical, 20–30 μm long, 80–90 μm wide, with 4–6 layers of smaller wall cells subtending bluntly pointed brown aseptate 25–30 × 4–5 μm hairs around a 10–15 μm diam. ostiole, not lined with hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 30–35 μm thick of 5 or 6 layers of oblong dark brown 9–11 × 6–8 μm pseudoparenchyma cells, slightly thinner at base, thickened at basal margin, with a yellow external crust. Physes 2–3 μm wide, with thin septa at 10- to 15-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate, 90–110 × 12–15 μm, short stalked, with 8 overlapping linearly tetraseriate ascospores above reduced to one spore at base. Ascospores narrowly fusiform, 38–46 × 4–5.5 μm, 8 septate in sequence 3:2:1:4:3:2:4:3, third cell from apex short and enlarged towards base, first septum constricted and supramedian (0.39), yellowish brown, with 2 large guttules per cell, smooth, without sheath, with curved cylindric appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species occurs on *Centaurea jacea* L. (Asteraceae). The ascocarps have a short beak consisting of a thickening of the wall made up of numerous layers of small wall cells. The ascocarp wall is moderately thick of a robust brown pseudoparenchyma with a few layers of soon-crushed hyaline cells at the interior. The asci are clavate and have 4 spores near the top and gradually reduce to one spore at the long narrow base. The spores are 8 septate and bear a cylindric curved appendage at each end which readily distinguishes this species from *N. dolioloides*, with which it has sometimes been confused.

COLLECTIONS EXAMINED: GERMANY: 184948, *Centaurea*, Oythal im Allgau (bayer. Alpen), Dr. Rehm, 7/1906, ex S, ex Herb. Rehm, Rehm, Ascomyceten 1694, as *Leptosphaeria modesta* (Desm.) Awd. SWEDEN: 36834, *Centaurea jaceae*, Uppland, Norrtalje, Herman Hamberg, Aug. 1891, as *Leptosphaeria dolioloides* (Auersw.); 15837, *Centaurea jacea*, Hallandia, Onsala, Gottskar, A.G. Eliasson, 26/5, 1914, ex ZT, as *Leptosphaeria dolioloides* (Auersw.) Karst.

Nodulosphaeria kuemmerlei Moesz 1926, p. 140 Fig. 7

Ascocarps scattered, immersed, pyriform, 100–150 μm wide, 150–200 μm high. Beak erumpent, central, terete, truncate–conical, 50–100 μm long, 50 μm wide, with apical brown hairs 30 × 5 μm but no bristles in the pore. Wall in longitudinal section laterally ca. 10 μm thick of 1 or 2 layers of rounded cells with somewhat thickened and pigmented membranes. Physes not recorded. Asci few, broadly cylindric, 90–105 × 25–27 μm, short stalked, with 8 overlapping linearly 2- or 3-seriate ascospores. Ascospores fusiform, 35–45 × 7.5–10.5 μm, 5 septate, second cell from apex shorter than wide and enlarged, first septum constricted and supramedian (0.42), pale olive, smooth, without sheath, with globose appendages 7–9 μm diam.

This species was redescribed and illustrated from the type by Holm (1961), who noted affinities with *Wettsteinina* because of the "square-built" spores and few asci. He noted it was unlike *Nodulosphaeria* in being foliicolous. The spores are broader than usual for a *Nodulosphaeria*.

COLLECTION EXAMINED: (by Holm 1961) Albania, Montes Korab... ca. 2800 m, *Campanula alpina*, Kümmerle.

Nodulosphaeria ladina (E. Müller) L. Holm 1957, p. 83 Figs. 13,45,61,90,114

≡*Leptosphaeria ladina* E. Müller 1950, p. 293

Ascocarps scattered, deeply immersed, globose to depressed globose with a flattened base, 250–350 μm wide, 180–300 μm high. Beak erumpent, central, terete, truncate–conical, 30–60 μm long, 70–100 μm wide, crowned with erect bluntly pointed brown 20–30 × 4–5 μm hairs with 0 or 1 septum with a 10–15 μm diam. ostiole, without hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 25–30 μm thick of 4 or 5 layers of oblong dark brown 8–11 × 5–7 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 10- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate, 90–110 × 16–19 μm, short stalked, with 8 overlapping linearly tetraseriate to hexaseriate ascospores above reducing to one below. Ascospores narrowly fusiform, 45–53 × 5.5–7 μm , 6 septate in sequence 3:2:1:3:2:3, third cell from apex short and enlarged towards base, first septum constricted and supramedian (0.42), cells 1,4, and 7 longest, yellowish brown, without guttules, smooth, without sheath, with small cushion-shaped, almost globose appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

In Europe this species appears to be restricted to *Laserpitium* (Holm 1957). I have not studied the type but did have available authenticated material. It conformed well with Müller's (1950, p. 293) detailed description. A crown of short brown hairs extends upward from the beak but is soon worn off. The wall is pseudoparenchymatous. The asci are clavate, relatively long, and fill the centrum. The spores are regularly 6 septate and have an obvious cushion-shaped to nearly globose appendage at each end. The collection Rehm Ascomyceten 35*b* excluded by Holm (1957, p. 84) does seem to have consistently smaller spores that are 5 or 6 septate.

COLLECTIONS EXAMINED: GERMANY: 184952, Umbelliferen, im Labertal Regensburg, Rehm, ex S, ex Herb. Rehm 35*b*, as *Leptosphaeria ogilviensis* (B. et Br.) Ces. et DN.; 188309, Umbelliferen, im Labertal bei Regensburg, Rehm, ex Herb. Dearness, Rehm, Ascomycetes 35*b*, as *Leptosphaeria ogilviensis* (B. et Br.) Ces. et DN. SWITZERLAND: 123633, *Laserpitium halleri*, Grbd., Fetan, E. Müller, 14.7.1949, as *Leptosphaeria ladina* E. Müller; 123635, *Laserpitium halleri*, Grbd. Bergün, Val Tuors, Chaclavuot, E. Müller, 4.8.1949, as *Leptosphaeria ladina*, E. Mül.; 90399, *Laserpitium siler* L., Tuors Davant, near Bergün, Graubünden, E. Müller & R.A. Shoemaker, 13 July 1961.

Nodulosphaeria megalospora (Auerswald & Niessl in Niessl) L. Holm 1961, p. 74 Figs. 22,46,72,91,126

≡*Leptosphaeria megalospora* Auersw. & Niessl in Niessl, Verh. Naturforsch. Ver. Brünn, 10: 180. 1872

Ascocarps scattered, deeply immersed, globose with a flattened base, 200–300 μm wide, 180–270 μm high with a few

fine basal hairs. Beak erumpent, central, terete, truncate–conical, 90–130 μm long, 80–100 μm wide, with terminal erect bluntly pointed brown aseptate 25–30 × 4–5 μm hairs, wall composed of cells like those in the ascocarp wall around a 10–20 μm diam. ostiole, not lined with hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 12–18 μm thick of 4 or 5 layers of oblong dark brown 8–10 × 3–5 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, with guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 70–85 × 16–19 μm, short stalked, with 8 linearly fasciculate ascospores. Ascospores narrowly fusiform, 75–92 × 5.5–7 μm, (10)12 septate in sequence 4:3:4:2:1:4:3:4:2:4:3:4, sixth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.42), yellowish brown, with guttules, smooth, without sheath, with straight conical almost turbinate appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This is an extremely elegant species on *Sambucus*. The ascocarps occur in the bark with only the setose tip of the beak protruding. After drying the ascocarps are depressed globose, finely hairy, but not rugulose as Niessl stated unless this referred to the surface pattern of polygonal cells that is clear under moderately high magnification. The asci are short and broad and form a layer in the lower part of the centrum. The spores are fasciculate and as described by Niessl except that I think he may have included the hyaline appendages as cells in the spores which he described as 15 or 16 septate and hyaline at the ends. He gave a very clear account of the species and very good illustrations. I arbitrarily included this fungus in *Ophiobolus* as *O. megalosporus* (Auersw. & Niessl in Niessl) Shoemaker (1976, p. 2384), but now consider it well placed in *Nodulosphaeria*.

COLLECTIONS EXAMINED: CZECHOSLOVAKIA: 151574, *Sambucus ebulus*, pr. Brünn, G. de Niessl, aestate, part of TYPE, Rabenhorst, Fungi europaei 2049, as *Leptosphaeria megalospora* Auersw. & Niessl in Niessl; 184966, Rabenhorst, Fungi europaei 2049, ex S, ex Herb. Rehm.

Nodulosphaeria modesta (Desmazières) Munk ex Holm 1957, p. 80 Figs. 3,34,47,73,92,106

≡*Sphaeria modesta* Desm. Ann. Sci. Nat. Bot. Ser. 3, 8: 173. 1847

Ascocarps scattered, subepidermal becoming exposed, globose with a flattened base, 150–250 μm wide, 130–200 μm high. Beak papillate, central, terete, truncate–conical, 15–20 μm long, 50–70 μm wide, with blunt brown aseptate 25–40 × 6–7 μm hairs around a 15–20 μm diam. ostiole, not lined with hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 7–10 μm thick of 1 or 2 layers of oblong dark brown 8–12 × 3–5 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 10- to 15-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 60–70 × 13–17 μm, short stalked, with 8 overlapping linearly hexaseriate ascospores above reduced to two spores below. Ascospores narrowly fusiform, 29–40 × 5–6 μm, 4 septate in sequence 2:1:2:3, second cell from apex short and enlarged towards base, first septum constricted and supramedian (0.43), yellowish brown, with small guttules, smooth, without sheath, with small globose appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species is common and occurs on many genera of dicots. The ascocarps are relatively small with a very short beak consisting of a slight thickening of the wall from which blunt brown hairs grow inward toward the centre of the ostiole. The wall is exceptionally thin; one or two layers of cells that are oblong with only slightly thickened walls. The asci are short, filling the short centrum and bearing 8 spores, 6 above and 2 below. The ascospores are distinctive, regularly 4 septate and bearing globose appendages. It is unlikely to be confused with any other species. Holm (1961, pp. 66–69) discussed the variation within *N. modesta* and pointed out some characteristics that may prove valuable in further refining the concept(s) of what may prove to be subordinate taxa. Holm found the type to have constantly 4-septate spores. This removes some of the confusion caused by Berlese's illustration (1892, plate 71, Fig. 4) of 6-septate spores with conical appendages, and of ascocarps with erect hairs said to be drawn from part of the type collection.

COLLECTIONS EXAMINED: CANADA: QUÉBEC: 74327(*a*), *Ranunculus acris*, Mt. Albert, H.E. Bigelow & M.E. Bigelow 2001, July 10, 1957, as *Leptosphaeria modesta*; 74194(*a*), composite stalk, Mt. Albert, H.E. & M.E. B[igelow] 1950, July 8, 1957; ONTARIO: 136894, *Asclepias incarnata* L., six miles N. of Port Severn on Hwy 103, D. Malloch, Aug. 18, 1968, as *Leptosphaeria ogilviensis* (B. & B.) Ces. & De Not.; 136681(*b*). *Daucus carota*, Willowdale, York Co., D. Malloch, July 20, 1969; ALBERTA: 180111, *Actaea arguta* Nutt., Coppermine Creek, Waterton National Park (W.N.P.), 49°07′ N, 114°00′ W, K.N. Egger 47(*a*), 1 Aug. 1980; 180077(*b*) *Aquilegia brevistyla* Hook., Coppermine Creek, Waterton National Park, 49°07′ N, 113°59′ W, K.N. Egger 479, 1 Aug. 1980; 180113, *Aquilegia flavescens* S. Wats., Lower Rowe Lake, W.N.P., 49°03′ N, 114°03′ W, K.N. Egger 425(*a*) 30 July 1980; 180114, *Aquilegia* sp., Crandell Lake Trail, W.N.P., 49°05′ N, 113°58′ W, K.N. Egger 686(*b*), 10 Aug. 1980; 180115, *Aquilegia* sp., Crandell Campsite, W.N.P., 49°06′ N, 113°57′ W, K.N. Egger 674, 9 Aug. 1980; 180117, *Aster foliaceus* Lindl., Coppermine Creek, W.N.P., 49°07′ N, 114°00′ W, K.N. Egger 475, 1 Aug. 1980; 180118, *Aster* sp., Crandell Lake Trail, W.N.P., 49°06′ N, 113°58′ W, K.N. Egger 382(*a*), 29 July 1980; 180119, *Campanula rotundifolia* L., Buffalo paddock, W.N.P., 49°07′ N, 113°51′ W, K.N. Egger 558, 6 Aug. 1980; 180120, *Castilleja miniata* Dougl., Cameron Lake Rd. to Crandell Lake Trail, W.N.P., 49°05′ N, 115°58′ W, K.N. Egger 690, 10 Aug. 1980; 180124, *Hedysarum sulphurescens* Rydb., Belly River Campground, W.N.P., 49°01′ N, 113°41′ W, K.N. Egger 631(*a*), 7 Aug. 1980; 180125, *Lomatium triternatum* (Pursh) Coult. & Rose, Belly River, W.N.P., 49°01′ N, 113°41′ W, K.N. Egger 641, 8 Aug. 1980; 180116, *Mimulus lewisii* Pursh, Summit Lake Trail, W.N.P., 49°01′ N, 114°02′ W, K.N. Egger 710, 11 Aug. 1980; 180130, *Ranunculus* sp., Lower Rowe Lake, W.N.P., 49°03′ N, 114°03′ W, K.N. Egger 430, 30 July 1980; 180131, *Rosa* sp., Crandell campsite, W.N.P., K.N. Egger 655(*b*), 9 Aug. 1980; 180135, *Solidago* sp., Red Rock Canyon Rd., W.N.P., 49°06′ N, 113°54′ W, K.N. Egger 510(*a*), 5 Aug. 1980; BRITISH COLUMBIA: 105314, *Campanula rotundifolia* L., Eagle Pass, elev. 1800 ft., R.A. Shoemaker, 23 July 1963, as *Nodulosphaeria* sp.; 105308, *Chrysanthemum leucanthemum* L., Eagle Pass, elev. 1800 ft., R.A. Shoemaker, as *Nodulosphaeria* sp.; 183195, *Pedicularis bracteosa* [Pennell], Rossland, elev. 3000 ft., G.G.

H[edgcock], 25 July 1934, ex Herb. Dearness 1729, as *Leptosphaeria dumetorum* Niessl, FP67305. U.S.A.: IDAHO: 121705, *Pedicularis racemosa*, E. Moscow Mt., Latch Co., C.G. Shaw & A. Goheen, July 22, 1948, as *Leptosphaeria niessleana* Rab.; OREGON: 121647, *Pedicularis racemosa*, Roseburg Quadrangle, Douglas Co??, Wm. C. Cusick, July 1914, as *Leptosphaeria niessleana* Rab.; UTAH: 105885, *Castilleja* sp., Silver Lake, Brighton, Salt Lake County, elev. 8700 ft., G.D. Darker 5790, 29 July 1936; WASHINGTON: 182886, *Castilleja miniata* [Dougl.], Ione, 3100 ft., G.G. Hedgcock F.P. 54605, 15 July 1931, ex Herb. Dearness 7670, as *Leptosphaeria concinna* E. & E.; WYOMING: 121605, *Actaea rubra* [(Ait) Willd.], Little Laramie River, Albany Co., 7000 ft., L.E. W[ehmeyer] 3331, July 25, 1922, as *Leptosphaeria*; 120230(*b*), Umbellifer, Teton Pass Rd., Jackson, L.E. Wehmeyer 1022(*a*), 9230, June 20, 1940, as *Leptosphaeria oreophila* Sacc. FRANCE: 123699, *Crepis*?, Chamonix, 3000 ft., L.E. W[ehmeyer] 9347, July 5, 1955, as *Leptosphaeria niessleana* Rab. GERMANY: 184016, *Crepis* [sp.], bei Schaftlarn Isar, Oberbayern, Rehm, 10.1910, ex Herb. Dearness, Rehm, Ascomycetes R91e, as *Leptosphaeria modesta* (Desm.) Rabh.; 184956, *Daucus carota*, Wiadeheim, Rehm, 6/1872, ex S, ex Herb. Rehm, as *Leptosphaeria cibostii* De N. HUNGARY: 151070, *Astrantia major* L., pratis "Nagymezo" montium "Bükk hegység," Dr. S. Tóth, 2.VIII.1958, ex BP, as *Leptosphaeria modesta* (Desm.) Auersw. INDIA: 123857, *Draba lanceolata* Royle, Mitsahoi, 20 mi. S.W. of Iras, Kashmir, 11,000 ft., F.G. Dickason 37, July–Aug. 1928, as *Leptosphaeria modesta* (Desm.) Auersw.; 123934, *Chrysanthemum richteria* Benth., Shipting Nulla, Lahul, Punjab, 11,000 ft., W. Koelz 906, Aug. 2, 1930, as *Leptosphaeria modesta* (Desm.) Auersw.; 123787, *Eritrichium* sp., Sonamarg, Sind River, 50 mi. E.N.E. of Srinigar, Kashmir, F.G. Dickason 26, July–Aug. 1928, as *Leptosphaeria modesta* (Desm.) Auersw.; 123956, *Scrophularia scabiosaefolia*, Sisu, Lahul, Punjab, 10000 ft., W. Koelz 815, July 31, 1930, as *Leptosphaeria modesta* (Desm.) Auersw. SOVIET UNION: 121634, *Rubus saxatilis* L., Lettland, Prov. Vidzeme, Vestiena, K. Starcs 705, 5.VI.1933, as *Leptosphaeria virgultorum* Sacc. SWEDEN: 15839, *Anthriscus silvestris* (L.) Hoffm., Ad Kolstad prope Borgholm, Oelandia = [Öland], A.G. Eliasson, 13/6, 1928, as *Leptosphaeria modesta* (Desm.) Karst.; 36839, *Linaria vulgaris* [Mill.], Boh[uslan], Oransi Stillingholman, A.G. Eliasson, 9/7, 1888, as *Leptosphaeria modesta* (Desm.) Auersw.; 36838, [?*Linaria*], V[astergotland], Wensisborg Hufundasan, A.G. Eliasson, 31/8 1888, as *Leptosphaeria modesta* (Desm.), 123672, *Solidago virgaurea*, Skuldarshjolden, Storlien, L.E. W[ehmeyer] 9361, July 25, 1950, as *Leptosphaeria niessleana* Rab. SWITZERLAND: 123578, *Crepis blattarioides*, Kt. Graubünden, Lü, E. Müller, 5.7.1949, ex ZT, as *Leptosphaeria modesta* (Desm.) Auersw.; 184845, *Phyteuma betonicifolium* [Vill.], Kt. Graubünden, Bergün, Val Plaz-bi, E. Müller, 7.8.1949, ex ZT, as *Leptosphaeria modesta* (Desm.) Asw.; 123692, composite stems, Zermatt, 5,000 ft., L.E. W[ehmeyer] 9302, July 7, 1953, as *Leptosphaeria niessliana* Rab.; 123668, umbellifer, Staffelalp, Zermatt, L.E. W[ehmeyer], July 11, 1955, as *Leptosphaeria niessleana* Rab.; 123697, umbellifer, below Zermatt, 5,000 ft., L.E. W[ehmeyer] 9336, July 7, 1953, as *Leptosphaeria niessleana* Rab.

Nodulosphaeria octoseptata (Wehmeyer) L. Holm 1957, p. 91
Figs. 20,35,48, 62,93,121
≡*Leptosphaeria octoseptata* Wehmeyer, Lloydia, 9: 239. 1946

Ascocarps scattered, subepidermal, globose with a flattened base, 400–500 μm wide, 320–380 μm high, hairy below. Beak erumpent, central, terete, truncate–conical, 30–60 μm long, 80–110 μm wide, composed of pseudoparenchyma with bluntly pointed brown aseptate 25–35 × 4–5 μm hairs around a 15–20 μm diam. ostiole, basally lined with hyaline 25–30 × 2–3 μm periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 35–50 μm thick of 4 or 5 layers of oblong dark brown 6–8 × 5–6 μm pseudoparenchyma cells and 4 or 5 layers of acerose hyaline 8–12 × 2–4 μm interior cells, thinner at base, not thickened at basal margin, with a reddish external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 100–120 × 17–20 μm, short stalked, with 8 overlapping linearly fasciculate ascospores or with one spore extended into basal part. Ascospores narrowly fusiform, 65–80 × 5–6 μm, 8 septate in sequence 4:3:2:1:3:2:3:4, fourth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.42), yellowish brown, with small guttules, smooth, without sheath, with long conical straight appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species from western U.S.A. resembles *N. pellita* (Fries) Shoemaker but differs in having longer ascospores and a generally thinner ascocarp wall composed of brown pseudoparenchyma without a central band of hyaline scleroplectenchyma characteristic of *N. pellita*.

COLLECTIONS EXAMINED: U.S.A.: UTAH: 105092, stem of dicot, Lake Mary Trail, elev. 9000′, Brighton, Salt Lake County, G.D. Darker 8250, 29 July 1936, as *Nodulosphaeria niesslii* (Bäumler) L. Holm; WYOMING: 120199, *Senecio crassulus*, Skyline Trail, Teton Nat. Park, L.E. Wehmeyer (1168) 9251, July 24, 1940, as *Leptosphaeria octoseptata* n.sp.

Nodulosphaeria olivacea (Ellis) L. Holm 1961, p. 75
Figs. 14,36,49,63,94,118
≡*Leptosphaeria olivacea* Ellis, Bull. Torrey Bot. Club, 10: 53. 1883

Ascocarps scattered, deeply immersed, globose with a flattened base, 300–375 μm wide, 220–270 μm high. Beak barely erumpent, central, terete, truncate–conical, 25–75 μm long, 60–110 μm wide, composed of pseudoparenchyma around a 25–30 μm diam. ostiole, not lined with hyaline periphyses or brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 30–70 μm thick of 3–8 layers of polygonal dark brown 7–9 × 6–8 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 10- to 15-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 70–85 × 13–17 μm, short stalked, with 8 overlapping linearly fascicled ascospores. Ascospores narrowly fusiform, 57–70 × 4–5 μm, 6 septate in sequence 3:2:1:3:2:3, third cell from apex short but mostly longer than wide, and sometimes shorter than wide and enlarged towards base, first septum constricted and supramedian (0.43), yellowish brown, with

2 large guttules per cell, smooth, without sheath, with globose appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species occurs on a number of hosts in western U.S.A. All the numbers cited by Wehmeyer (1946, pp. 238–239) were reexamined and are quite uniform and a good match to the original description except that no 7-septate spores were encountered. The drawing in Ellis & Everhart (1892, plate 28, Figs. 11–13) shows mainly 6-septate spores and I consider this to be the common condition. The enlarged cell is usually longer than wide. There are no brown beak hairs and hyaline periphyses are rare. I reluctantly leave it in *Nodulosphaeria* because in at least some ascospores the enlarged cell is shorter than wide and, consequently, nodose.

COLLECTIONS EXAMINED: CANADA: ALBERTA: 180029, *Angelica dawsonii* Wats., Summit Lake Trail, Waterton National Park, 49°01′ N, 114°02′ W, K.N. Egger 715, 11 Aug. 1980; BRITISH COLUMBIA: 107857, *Valeriana sitchensis* Bong., Trail to Miller Lake, Mt. Revelstoke, elev 6300 ft., R.A. Shoemaker, 7 Aug. 1963 as *Nodulosphaeria succisae* Munk in Møller; 105790, *Valeriana sitchensis* Bong., Mt. Revelstoke, elev. 6350 ft., R.A. Shoemaker, 18 July 1963; 107859, Asteraceae, Trail to Miller Lake, Mt. Revelstoke, elev 6300 ft., R.A. Shoemaker, 7 Aug. 1963, as *Nodulosphaeria succisae* Munk in Møller; 105245, unknown host, Mt. Revelstoke, elev. 6300′, R.A. Shoemaker, 24 July 1963, as *Nodulosphaeria modesta* (Desm.) Munk. U.S.A.: WYOMING: 121604, *Aquilegia coerulea*, Brooklyn Lake, Med. Bow. Mts., 11,000′, L.E. W[ehmeyer] 3334, Aug. 6, 1922; 188304, *Carum carui* L., South of Teton Pass, above 9,000 ft., L.E. Wehmeyer 1132, July 11, 1940, ex Wehmeyer Slide Collection: Wyoming, as *Leptosphaeria olivacea* Ellis; 120236, *Erigeron salsuginsus*, S. of Teton Pass, Jackson, L.E. Wehmeyer 1113*c*, 9224, July 11, 1940, as *Leptosphaeria erigerontis* Berl. 121616, *Ligusticum porteri*, Nelson's Ranch, Med. Bow Mts., L.E. W[ehmeyer] 3328, July 22, 1922, as *Leptosphaeria* sp.; 121615, *Mertensia ciliata*, Centennial, L.E. W[ehmeyer] 3329, July 25, 1922.

Nodulosphaeria pellita (Fries) Shoemaker 1968, p. 1144
Figs. 19,64,98,99,123

≡*Sphaeria pellita* Fr. Syst. Mycol. 2(2): 503. 1823

Ascocarps scattered, deeply immersed, globose with a flattened base, 200–500 μm wide, 200–400 μm high, hairy below. Beak erumpent, central, terete, truncate–conical, 70–150 μm long, 80–130 μm wide, composed of wall cells, lined apically with bluntly pointed brown aseptate 20–25 × 4–5 μm hairs around a 20–30 μm diam. ostiole, basally lined with hyaline 15–20 × 2–3 μm periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 40–55 μm thick of 7–9 layers of globose to oblong dark brown 5–7 × 4–6 μm pseudoparenchyma cells with 1 or 2 central layers of hyaline scleroplectenchyma, not thinner at base, not thickened at basal margin, with a dark brown external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate, 100–120 × 17–20 μm, short stalked, with 8 overlapping linearly fasciculate ascospores or 6 spores above and 2 spores below. Ascospores narrowly fusiform, 50–60 × 4.5–5.5 μm, 8 septate in sequence 4:3:2:1:3:2:3:4, fourth cell from apex short and enlarged towards base, first septum constricted and supramedian (0.45), yellowish brown, with small guttules, smooth, without sheath, with conic to clavate straight appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species has a distinctive wall. It is broad and has two layers of brown pseudoparenchyma and one or two layers of hyaline scleroplectenchyma in the centre. Holm distinguished *N. octoseptata* (Wehmeyer) L. Holm (1957, p. 91) as having a thin wall and longer ascospores and occurring in North America. *Nodulosphaeria octoseptata* has longer spores and its wall is generally thinner but can be as broad as in *N. pellita* but does not have the conspicuous hyaline band of scleroplectenchyma observed in the European *N. pellita*.

COLLECTIONS EXAMINED: GERMANY: 121670, *Senecio fuchsii*, Kr. Siegen, Schonung bei Brugholdinghausen, Dr. A. Ludwig, 15.5.1926, as *Leptosphaeria dolioloides* Au.; 184990, *Senecio fuchsii*, im Algum, Aree, VII.1909. ex S, ex Herb. Rehm, as *Leptosphaeria derasa* (B. et Br.). SWEDEN: 114078, Lund TYPE, ex Herb. E. Fries, UPS, as *Sphaeria pellita* Fr.; 184785, [dicot stem], Falkenberg, J. Rick, Majo 1901, ex L, as *Leptosphaeria descisens* Oud. SWITZERLAND: 123604, *Senecio doronicum*, Grbd. Fetan, E. Müller, 15.7.1949, ex ZT, as *Leptosphaeria robusta* (Strasser) E. Müller; 123598, *Senecio nemorensis*, Grbd. Bergün, Fregslas, E. Müller, 2.8.1949, ex ZT, as *Leptosphaeria robusta* (Strasser) E. Mül.

Nodulosphaeria revelstokensis n. sp.
Figs. 6,50,74,80,81,108

Ascomata dispersa, superficialia, globosa, 400–500 μm lat., 300–400 μm alt., paucisetosa. Rostrum teres, truncato–conicum, 20–40 μm long., 70–90 μm lat., ex cellulis brunneis, 5–8 × 4–7 μm compositum; ostiolum 30–50 μm diam., periphysatum. Paries ascomatis 20–25 μm lat., ex cellulis brunneis, polygoniis, pseudoparenchymatis compositus. Physes 2–5(8) μm lat., multiseptatae, guttulatae, mucosae. Asci copiosi, cylindrici, 80–100 × 10–14 μm, 8 spori. Ascosporae tetraseriatae fusiformes, 22–30 × 6–7 μm, 5 septatae in ordinem 2:1:3:2:4, septo primo supramedio; cellulis 1 et 6 longis, cellulis ceteris curtis; luteo-brunneae, guttulatae, laeves.

Hab. in caulibus *Castillijae miniatae*. "Mt. Revelstoke, B.C., elev. 5500 ft., R.A. Shoemaker, 3 Aug. 1963, DAOM 106210, Type."

Ascocarps scattered, superficial, globose with a flattened base, 400–500 μm wide, 300–400 μm high, sparingly setose in lower half. Beak central, terete, truncate–conical, 20–40 μm long, 70–90 μm wide, composed of 6–8 layers of brown polygonal 5–8 × 4–7 μm cells around a 30–50 μm diam. ostiole, lined internally with brown 20–25 × 3–4 μm acute periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 20–25 μm thick of 3 or 4 layers of polygonal brown 6–8 × 4–5 μm pseudoparenchyma cells, slightly thinner at base, not thickened at basal margin, with a reddish brown external crust. Physes 2–4 μm wide (8 μm at centrum base) with thin septa at 15- to 20-μm intervals, with guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 80–100 × 10–14 μm, short stalked, with overlapping obliquely tetraseriate ascospores above and biseriate below. Ascospores narrowly fusiform,

22–30 × 6–7 μm, 5 septate in sequence 2:1:3:2:4, first septum supramedian (0.39), second cell from apex enlarged towards base, cells 1 and 6 slightly longer than central cells, yellowish brown, without guttules, smooth, without sheath or appendages.

This species has ascospores resembling those of *N. kuemmerlei* Moesz but smaller and without appendages. In addition, the ascocarps of *L. revelstokensis* are much larger with bristles in the ostiole, but not at the end of the beak as in *N. kuemmerlei*.

COLLECTION EXAMINED: CANADA: BRITISH COLUMBIA: 106210, *Castilleja miniata* Dougl., Mt. Revelstoke, elev. 5500 ft., R.A. Shoemaker, 3 August 1963, as *Leptosphaeria* sp.

Nodulosphaeria septemcellulata (E. Müller) L. Holm 1957, p. 86 Figs. 9,75,95,116,117

≡*Leptosphaeria septemcellulata* E. Müller 1950, p. 300

Ascocarps scattered, subepidermal then exposed, globose with a flattened base, 140–200 μm wide, 130–180 μm high hairy below. Beak erumpent, central, terete, truncate–conical, 40–80 μm long, 70–90 μm wide, composed of wall cells with pointed brown 50–80 × 4–6 μm hairs with 0 or 1 septa around a 15–20 μm diam. ostiole, not lined with hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 24–30 μm thick of 4 or 5 layers of polygonal dark brown 5–7 × 5–7 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate, 80–100 × 12–15 μm, short stalked, with 8 overlapping linearly hexaseriate ascospores above with 2 below. Ascospores narrowly fusiform, 32–42 × 4.5–6.5 μm, 6 septate in sequence 3:2:1:3:2:3, third cell from apex short and enlarged towards base, first septum constricted and supramedian (0.43), yellowish brown, with small guttules, smooth, without sheath, with long cylindric curved appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

The ascocarps of this species are small and often bear erect brown hairs on the tip of the beak and shorter similar hairs lining the beak. The spores are regularly 6 septate and furnished with conspicuous, curved, cylindric appendages about 3–4 × 0.5–1 μm. It occurs on *Buphthalmum* in Europe.

COLLECTIONS EXAMINED: YUGOSLAVIA: 184997, *Buphthalmum salicifolium* [L.], Ubrichsburg b. Zirchlach in Krain, Voss, 13.VI.1887, ex S, ex Herb. Rehm, as *Leptosphaeria septemcellulata* E. Müll. SWITZERLAND: 123637, *Buphthalmum salicifolium* [L.], Grbd. Fetan, E. Müller, 13.7.1949, as *Leptosphaeria septemcellulata* E. Mül.; 123652, *Buphthalmum salicifolium* [L.]., Kt. Graubünden, Albula, Schwittener, Tabel, E. Müller, 2.6.1951, as *Leptosphaeria septemcellulata* E. Müller.

Nodulosphaeria spectabilis (Niessl) L. Holm 1961, p. 70 Figs. 5,51,76,96,107

≡*Leptosphaeria spectabilis* Niessl, Verh. Naturforsch. Ver. Brünn, 10: 179. 1872

Ascocarps scattered, deeply immersed, globose with a flattened base, 210–240 μm wide, 200–250 μm high. Beak barely erumpent, central, terete, truncate–conical, 70–90 μm long, 90–110 μm wide, composed of wall cells lined with bluntly pointed brown aseptate 30–40 × 4–5 μm hairs around a 15–20 μm diam. ostiole, not lined with hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 25–30 μm thick of 5 or 6 layers of oblong dark brown 10–12 × 5–7 μm pseudoparenchyma cells, thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 110–135 × 13–15 μm, short stalked, with 8 overlapping linearly biseriate ascospores or triseriate above and uniseriate below. Ascospores narrowly fusiform, 34–44 × 5.5–6.5 μm, 4 septate in sequence 2:1:2:3, second cell from apex short and enlarged towards base, first septum constricted and supramedian (0.42), yellowish brown, with small guttules, smooth with subterminal ridges, without sheath, with large globose terminal appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end.

This species has very distinctive spores. The spores are 4 septate, with the enlarged cell short but not really shorter than wide and the ridges just below each end are very conspicuous even in old material. The globose appendages visible in water mounts with ink staining are quite broad, about 10–12 μm, or double the diameter of the spores. *Nodulosphaeria spectabilis* usually occurs on *Laserpitium*. Recently it was reported on *Peucedanum cervaria* (L.) Lap. also in Umbelliferae. The authors noted a somewhat greater spore length, 46.7–53 μm (Hilber and Hilber 1983, p. 404). Holm (1961, p. 70) reported terminal germ pores in the ascospores, but I could see only a thin complete wall between the annular ridges.

COLLECTION EXAMINED: AUSTRIA: 185000, *Laserpitium latifolium* [L.]., ? ?am Poldner bei Sonder ???, P. Strasser, 13/6 1903, ex S, ex Herb. Rehm, as *Leptosphaeria modesta* Awd.

Nodulosphaeria submodesta (E. Müller) L. Holm 1961, p. 64 Fig. 2

≡*Leptosphaeria submodesta* E. Müller, Sydowia, 5: 53. 1951

Ascocarps scattered, subepidermal becoming erumpent, semiglobose to depressed with a flattened base, 200–250 μm wide. Beak none, pore central, crowned with brown hairs ca. 30 × 6 μm. Wall in longitudinal section laterally 15–20 μm thick of about 4 layers of rounded dark brown 7–10 μm diam. pseudoparenchyma cells, not thinner at base, not thickened at basal margin. Physes numerous, threadlike, gelatinized. Asci numerous, clavate, 70–85 × 12–14 μm, very short stalked, with 8 overlapping linearly biseriate ascospores. Ascospores fusiform, 22–29 × 4.5–5 μm, 3 septate in sequence 2:1:2, second cell from apex shorter than wide and enlarged towards base, first septum constricted and supramedian (0.44), pale olive, smooth, without sheath, with semiglobose appendages about 5 μm diam.

This species is unusual among *Nodulosphaeria* species in that it occurs on *Tofieldia* of the Liliaceae. *Nodulosphaeria submodesta* seems to accord well with the generic characters, much better than the other species with 3-septate ascospores, *N. araucariae* Hino & Katumoto. The first septum appears to be formed well above the middle, at 0.44 as in most other species of *Nodulosphaeria*. *Nodulosphaeria submodesta* exhibits the simplest spore form from which others can be derived in a progressively more complex series.

The above description is based on Holm (1961), who studied a collection from Switzerland: *Tofieldia calyculata* [(L.) Wahlenb.], Graubünden, Ftan, E. Müller, 14.VII.1949.

TYPE: *Leptosphaeria submodesta*. The Canadian collection is extremely scanty.

COLLECTION EXAMINED: CANADA: ONTARIO: 91809(*b*), *Desmodium canadense* (L.) D.C., High Park, Toronto, G.D. Darker 7247, 28 Aug. 1941.

Nodulosphaeria succisae Munk in Møller 1958, p. 67
Figs. 8,52,97,111

Ascocarps scattered, subepidermal, ellipsoidal to globose with a flattened base, 250–300 μm wide, 250–300 μm high, slightly hairy below. Beak barely erumpent, central, terete, truncate–conical, 60–70 μm long, 56–60 μm wide, with bluntly pointed brown 25–30 × 3–4 μm hairs with 0 or 1 septa around a 15–20 μm diam. ostiole, not lined with hyaline periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 20–25 μm thick of 4 or 5 layers of oblong dark brown 12–15 × 4–5 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 100–115 × 17–20 μm, short stalked, with 8 overlapping obliquely tetraseriate ascospores above to uniseriate below. Ascospores narrowly fusiform, 36–46 × 5.5–7.5 μm, (4)5(6) septate in sequence (5):2:1:(4):2:3, second (third) cell from apex short and enlarged towards base, first septum constricted and supramedian (0.36), yellowish brown, with guttules, smooth, without sheath, with small globose caplike appendages, without a refractive sphere near ends, without the appearance of a germ pore at each end, with extremely small annular ridges near each end.

The specimens used for the description are parts of exsiccatae studied by Holm (1961, pp. 69–70), who was reluctant to apply the name *N. succisae* to the collections. He reported that Munk shared the hesitation. The original description indicates that the one specimen from which *N. succisae* was described had constantly 5-septate spores. As Holm has clearly demonstrated, the exsiccatae specimens have spores with 4, 5, or 6 septa and the sequence of formation of the last septum in the apical and basal part can be interchanged. The sequences (5):2:1:(4):2:3 and (4):2:1:(5):2:3 both occur regularly, though the former seems more frequent. A very fine annular ridge is just visible below the ends of the spores but much less conspicuous than that observed in *N. spectabilis* (Niessl) L. Holm. The appendages of *N. succisae* are smaller and caplike and will disappear if the spores are mounted in water for a long period (overnight). I could not see a germ pore.

COLLECTIONS EXAMINED: BELGIUM: 188303, *Scabiosa succinea* [L.], Env. de Liege, V. Mouton, Décembre 1888, ex C. Roumeguère, Fungi selecti exsiccati 4849, as *Leptosphaeria modesta* f. *minor*. GERMANY: 188302, *Succisa pratensis* [Moench], Machern ad Lipsian, Auerswald et Delitsch, ex Rabenhorst, Fungi europaei 948, as *Leptosphaeria modesta* Desmaz.; 188301, *Succisa pratensis* Moench, Prov. Brandenburg: Triglitz in der Prignitz, Otto Jaap, 6.VIII.1906, ex Otto Jaap, Fungi selecti exsiccati 218, as *Leptosphaeria agnita* (Desm.) de Not et Ces. var. *ambigua* Berl. NORWAY: 123706, *Succisa pratensis* Moench, Oye, L.E. W[ehmeyer], July 29, 1950, as *Leptosphaeria*.

Excluded species

Excluded species have long filiform ascospores that lack the short nodose cell characteristic of *Nodulosphaeria* spores. With the exception of *N. gallica* L. Holm, the species excluded lack the prominent brown bristles on or in the beak that are diagnostic of *Nodulosphaeria*. The species are listed alphabetically by epithet. A description and illustration can be found in Shoemaker (1976) or in the other works cited below.

Ophiobolus cirsii (Karsten) Sacc., *O. erythrosporus* (Riess in Rab.) Winter in Rab., *O. fruticum* (Rab. ex Desm.) Sacc., *N. gallica* L. Holm (1961, p. 77), *O. mathieui* (West.) Sacc., *N. muelleri* L. Holm (1961, p. 76), *O. niesslii* Baumler, *O. ponticus* Petrak, *O. pseudaffinis* Petrak (Holm 1961, p. 78), *O. ulnisporus* (Cooke) Sacc. (Holm 1957, p. 101), *N. valesiaca* Holm & Müller (1962 (1963), p. 57), possibly a synonym of *O. dictamni* (Fuckel) Sacc. (Shoemaker 1976, p. 2376), *O. volkartii* E. Müller (Holm 1961, p. 77).

The recently published large work by Crivelli (1983) on *Pleospora* and allies refers three additional species to *Nodulosphaeria* and broadens the generic concept to include two species with dictyospores. My observations in 1961–1962 on some of the specimens he refers to *N. pileata* (Volkart) Crivelli and to *N. winteri* (Niessl) Crivelli suggest they are generically allied but perhaps not in *Nodulosphaeria* because of the more robust characteristics of the ascospores and the peculiar caplike appendages that retain the shape of the ends of the spores.

Entodesmium Riess 1854, p. 28

TYPE: *E. rude* Riess

Ascocarps scattered or in rows, immersed, globose with a long cylindrical erumpent beak lined with hyaline periphyses, lacking brown terminal hairs but slightly hairy on the body. Wall thin, composed of a few layers of thin-walled polygonal to oblong cells. Asci numerous, clavate to cylindrical, short- or long-stalked, bearing 8 spores, usually in linear fascicles, less often tetraseriate or biseriate. Ascospores elliptical to filiform, 4 septate to multiseptate, constricted near the first-formed septum which is usually near the apex (0.14–0.36) less often supramedian or median, furnished in some with globose appendages at each end, furnished in some with a bandlike or cushion-shaped appendage near first-formed septum, without a refractive sphere near each end, lacking detectable polar germ pores, separating at septa in some species. Host specialized on legumes.

Key to species of *Entodesmium*

1*a*. Ascospores filiform, length:width over 20:1 2

2*a*. Spores break apart at septa 3

3*a*. All cells separating; on various legumes ..... *rude*
3*b*. Apical 2 or 3 cells remaining intact; on *Astragalus* ..... *lapponicum*

2*b*. Spores remaining intact 4

4*a*. Spores 8–10 septate; on *Astragalus* ..... *mayorii*
4*b*. Spores 18–27 septate; on *Vicia* ..... *eliassonii*

1*b* Ascospores shorter, length:width under 10:1 5

5*a*. Spores 4 septate; on *Lathyrus* ..... *niessleanum*
5*b*. Spores 7–11 septate; on *Lathyrus* ..... *multiseptatum*

Entodesmium eliassonii L. Holm 1957, p. 135
Figs. 25,29A,53,77,100,130

Ascocarps scattered or in twos, subepidermal, lageniform to pyriform with a flattened base, 200–350 μm wide, 200–400 μm high, slightly hairy below. Beak erumpent, central, terete, truncate–conical, 100–190 μm long, 120–140 μm wide, composed of 4 or 5 layers of wall pseudoparenchyma around a 30–40 μm diam. ostiole, lined with hyaline 15–20 × 2–3 μm periphyses without brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 12–20 μm thick of 3–5 layers of prismatic dark brown 10–15 × 3–4 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 20- to 25-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical–clavate, 110–125 × 9–10 μm, medium long stalked, with 8 overlapping linearly fascicled ascospores. Ascospores filiform, 75–90(100) × 3.5–4 μm, 18–27 septate in sequence (5):4:(5):1:5:4:5:3:5:4:5:2:5:4:5:3:5:4:5, with additional septation giving up to 27 septa, not separating into part spores, 3rd (4th or 5th) cell from apex enlarged, first-formed septum supramedian (0.14), yellowish brown, with a few small guttules, smooth, without sheath, with a lateral appendage on one side of enlarged cell.

Holm considered this species to be derived from *E. multiseptatum* (Winter) L. Holm because of the similar apical part of the ascospores. The basal part becomes much longer in *E. eliassonii*. One new feature was noted. There is a peculiar appendage extending almost halfway around the enlarged cell. It might be an adaptation to insect transmission. This type of appendage was noted on ascospores of *E. mayorii* also. The pattern of septation in the ascospores is noteworthy. The first septum cuts of a short cylindrical apical part that eventually becomes 2- to 4-celled. Immediately below the first septum is the widest part of the spore and the peculiar lateral appendage. The long basal part of the spore is divided by the second septum at a point slightly above the midpoint. Then a series of subdivisions results in 3, 7, 15 septa or more in the basal part.

COLLECTION EXAMINED: SWEDEN: 188696, *Vicia cracca* L., Jämtland, Åre, A.G. Eliasson, 27.VI.1931, ex S. HOLOTYPUS, as *Ophiobolus rudis* (Riess) Rehm.

Entodesmium lapponicum (L. Holm) L. Holm 1957, p. 136
Figs. 27,78,101,131

≡*Ophiobolus lapponicus* L. Holm, Sven. Bot. Tidskr. 42: 343. 1948

Ascocarps scattered, subepidermal to exposed, lageniform with a flattened base, 170–300 μm wide, 140–350 μm high, slightly hairy below. Beak barely erumpent, central, terete, truncate–conical, 80–120 μm long, 80–100 μm wide, composed of 6–12 layers of wall pseudoparenchyma around a 15–30 μm diam. ostiole, lined with hyaline 20–30 × 2–3 μm periphyses without brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 12–16 μm thick of 3–5 layers of prismatic hyaline to pale yellow 8–10 × 2–3 μm pseudoparenchyma cells and 2 or 3 flattened hyaline inner layers, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 100–120(140) × 9–10 μm, short stalked, with 8 linearly fascicled ascospores. Ascospores filiform, 80–90(100) × 2.5–3 μm, 15(20) septate, rounded apically, narrowed basally, second cell from apex narrowed near apex and enlarged towards base, first septum from apex constricted, second septum from apex slightly broader, yellowish brown, without guttules, smooth, without sheath, without appendages, separating beginning at the middle, then at 1/4 from each end, into 4-celled units and ultimately into cells 5–7 μm long. Septation sequence presumably 4:3:4:2:4:3:4:1:4:3:4:2:4:3:4, first septum median (0.48).

The ascocarps are mainly immersed and only the broad short thick-walled beak is evident. The ascocarp wall is thin and composed of only a few layers of thin-walled cells. The ascospores are distinctive in this species. The spores are broadly rounded at the apex, narrowed to the first septum from the apex and slightly broader at the second septum from the apex, and narrowed to the base. The ascospores are divided into 16 cells (rarely more) beginning at the middle and subdivided into 4 four-celled units which readily separate as the spores mature. The peculiar apical unit seems to remain intact longest, well after the lower units have separated into 1-celled fragments.

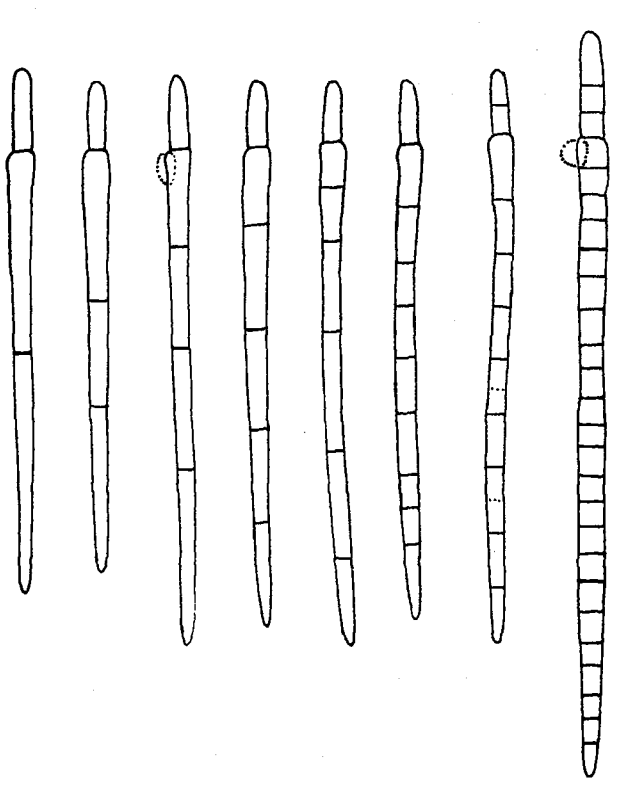
The peculiar apical part of the spore of *E. lapponicum* is said to be homologous to that in *E. multiseptatum* (Holm 1957, p. 136). The separation into individual cells is found in *E. rude* Riess, but it lacks the characteristic apical part of the spore that is fundamental to the series.

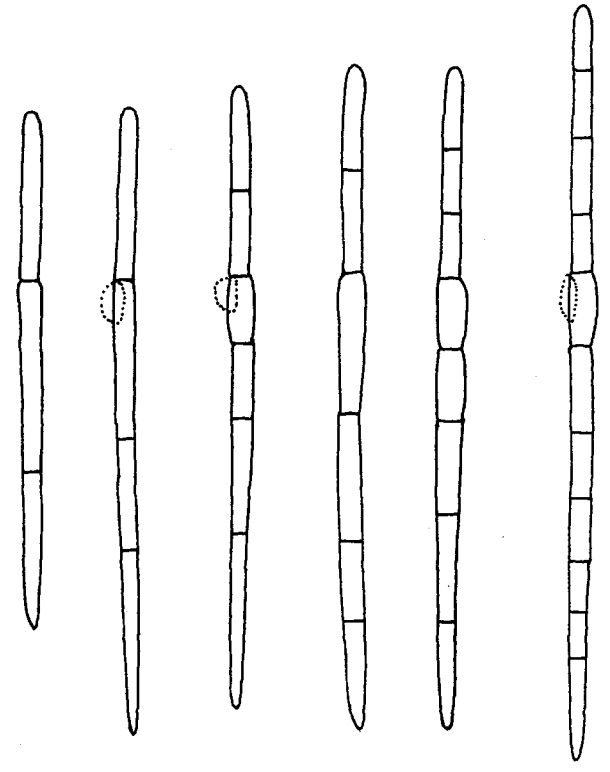
COLLECTION EXAMINED: SWEDEN: 188697, *Astragalus frigidus*, Torne Lappmark: Jukkasjärvi s:n, Abisko, J.A. Nannfeldt, 5.VII.1927, ex S. TYPUS, as *Ophiobolus lapponicus* L. Holm.

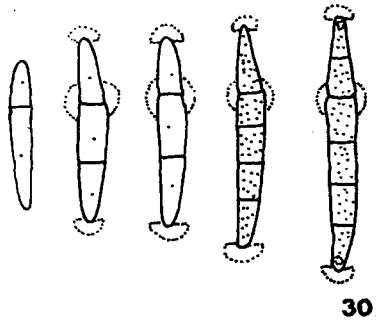
Entodesmium mayorii (E. Müller) L. Holm 1957, p. 135
Figs. 26,29B,65,102,129

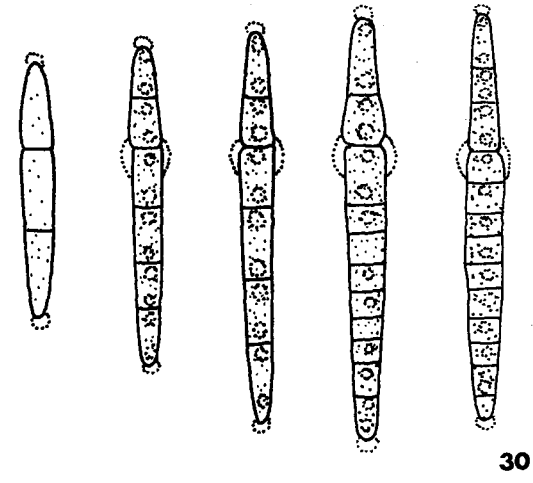
≡*Ophiobolus mayorii* E. Müller, Ber. Schweiz. Bot. Ges. 62: 327. 1952

Ascocarps scattered, deeply immersed, globose with a flattened base, 200–350 μm wide, 250–350 μm high. Beak barely erumpent, central, terete, truncate–conical, 140–180 μm long, 100–120 μm wide, composed of 4–6 layers of wall pseudoparenchyma around a 25–30 μm diam. ostiole, lined with hyaline 15–20 × 2–3 μm periphyses, without brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 10–20 μm thick of 3–5 layers of oblong brown 8–10 × 2–3 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, thicker near beak, without an external crust. Physes 2–3 μm wide, with thin septa at 20- to 30-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, cylin-







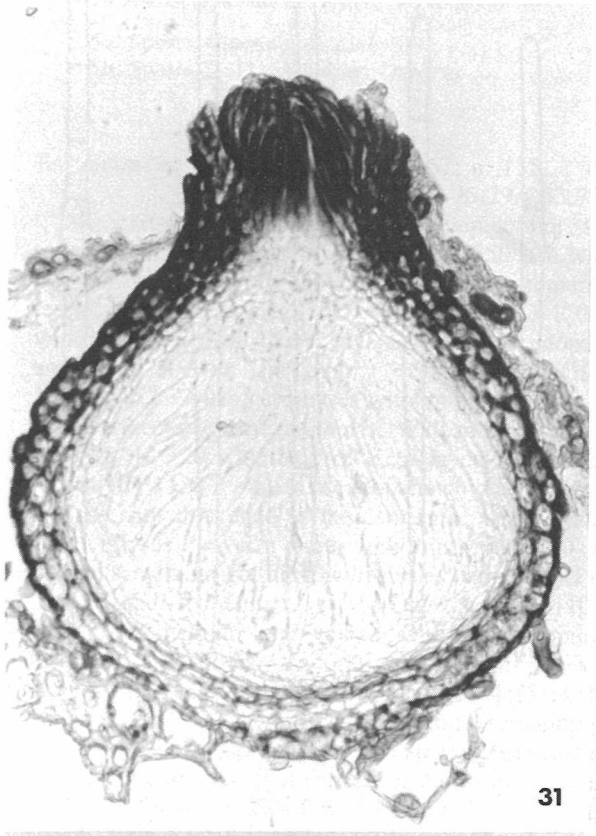


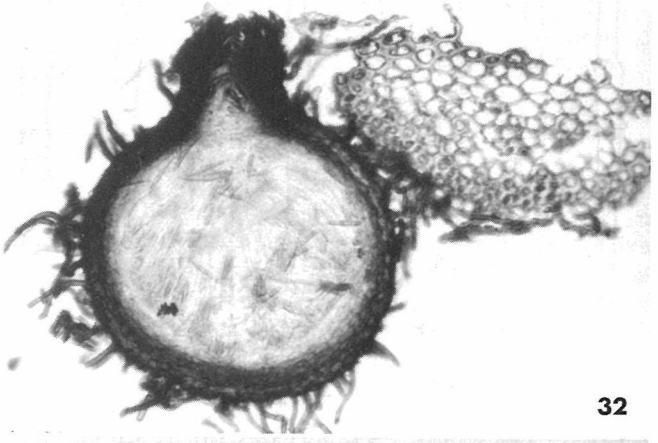
FIGS. 29 and 30. Stages in ascospore development. ×1000. Fig. 29A. *Entodesmium eliassonii*, 188696. Fig. 29B. *E. mayorii*, 188710, 188711. Fig. 30A. *E. niessleanum*, 90400. Fig. 30B. *E. multiseptatum*, 121677.

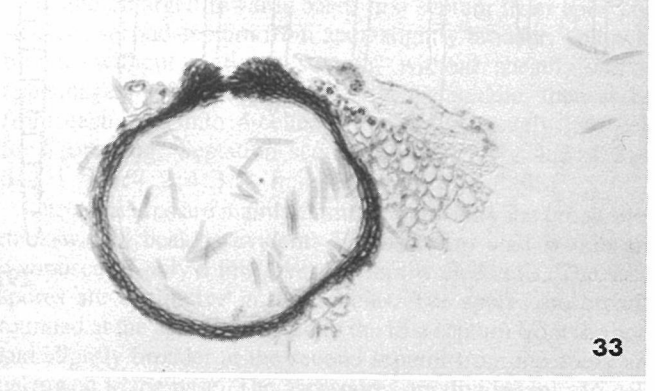
drical, (96)120−130 × 9−11(14) μm, moderately long stalked, with 8 linearly fascicled ascospores. Ascospores filiform, 70−85(100) × 2.5−3.5 μm, 8(10) septate in sequence 4:3:4:1:4:3:(5):2:(5):4, fifth cell from apex longer than wide and enlarged towards apex, first septum supramedian (0.36), yellowish brown, without guttules, smooth, without sheath, without appendages at ends, with a lateral appendage at the broadest part of the spore and covering less than half the circumference.

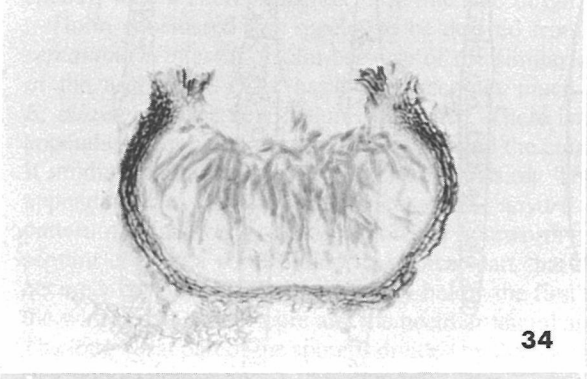
Holm considered the ascospore form of this species to have evolved from *E. multiseptatum* (Winter) L. Holm which has a two-celled apical part, by the insertion of two additional septa. It seems to me to be closest to *E. eliassonii* L. Holm. Both have ascospores with an apically enlarged cell just below the first-formed septum, and the enlarged cell bears a peculiar lateral appendage that goes less than half way around the spore. The first-formed septum is at 0.14 in *E. eliassonii* and at 0.36 in *E. mayorii*. The second septum in *E. mayorii* is less than 1/3 from base and the long basal segment is often subdivided by 4 septa, an unusual number.

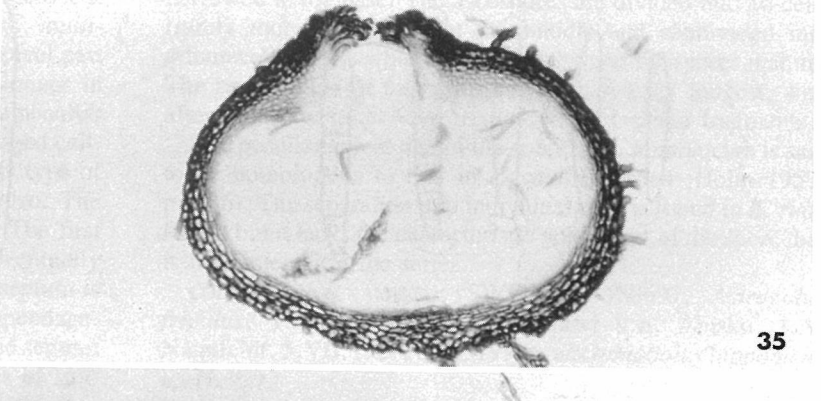
COLLECTIONS EXAMINED: SWITZERLAND: 188709, Schuls, Jon-vrai, 17.7.1948; 188710, Remüs, oberhalb Vna, Piz Arina, 16.7.1949, TYPUS; 188711, Val Tuors, Bergün, 19.7.1953; all on *Astragalus penduliformis* Lam. as *Phaca alpina* [L.] Kt. Graubünden, coll. E. Müller, ex ZT, as *Ophiobolus mayori* E. Müller.

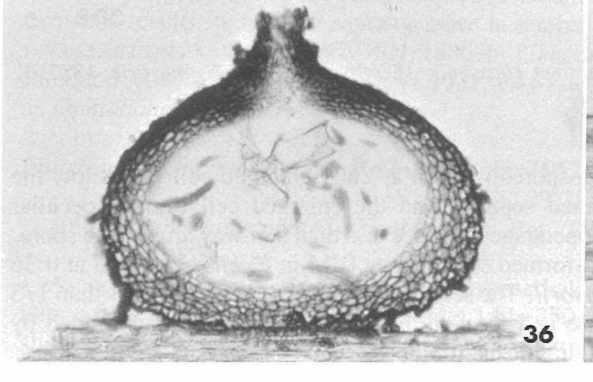


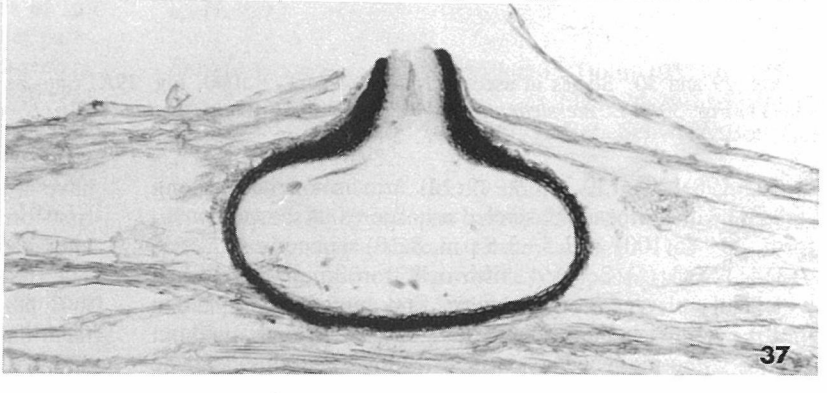




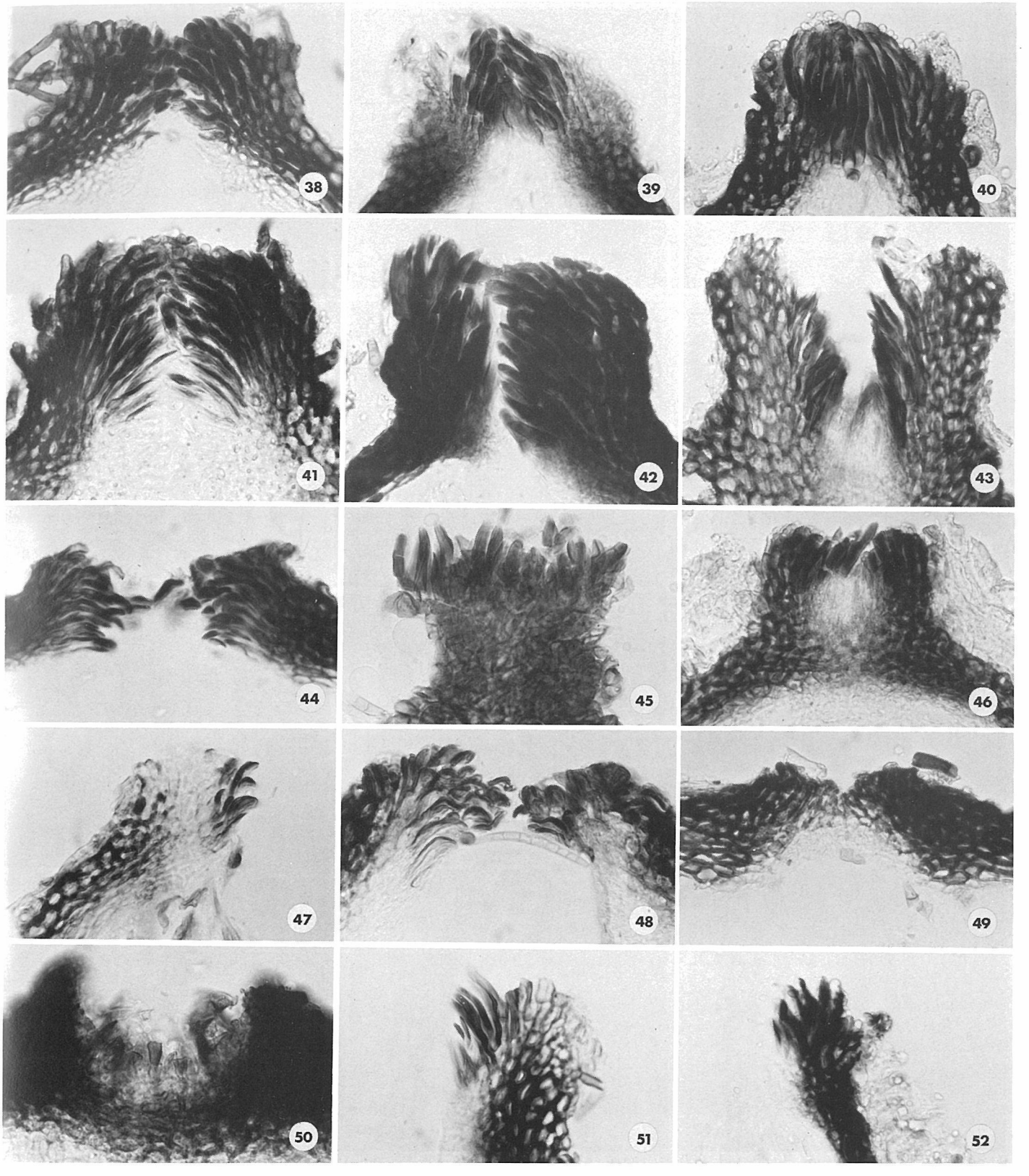




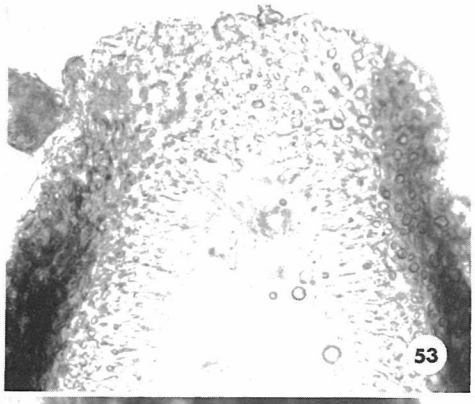


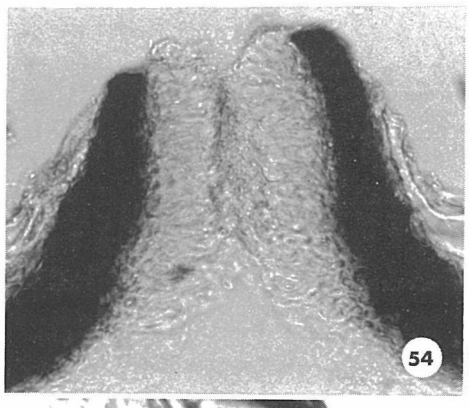


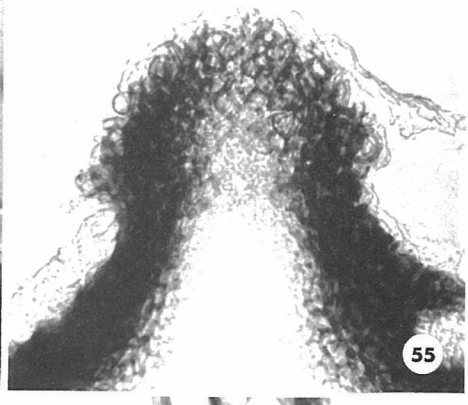
FIGS. 31–37. Ascocarps in vertical section ×140 except Fig. 31. Fig. 31. *N. centaureae*, 90278, ×340. Fig. 32. *N. derasa*, 97970. Fig. 33. *N. aquilana*, 74283. Fig. 34. *N. modesta*, 180120. Fig. 35. *N. octoseptata*, 120199. Fig. 36. *N. olivacea*, 121604. Fig. 37. *E. multiseptatum*, 121677.

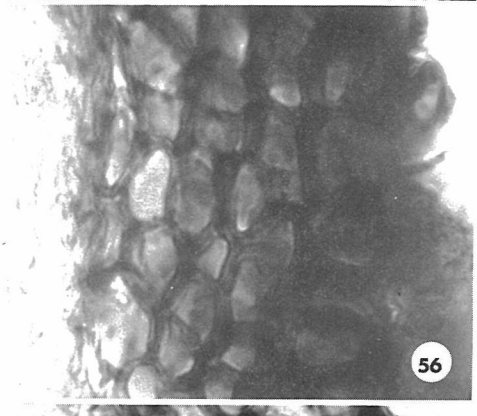


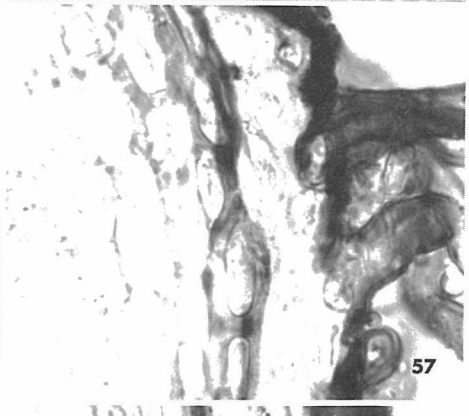
FIGS. 38–52. Ascocarp beaks in vertical section ×430. Fig. 38. *N. aquilana*, 36844. Fig. 39. *N. aucta*, 187592. Fig. 40. *N. centaureae*, 90278. Fig. 41. *N. derasa*, 97970. Fig. 42. *N. dolioloides*, 85689. Fig. 43. *N. epilobii*, 123554. Fig. 44. *N. franconica*, 184935. Fig. 45. *N. ladina*, 123633. Fig. 46. *N. megalospora*, 151574. Fig. 47. *N. modesta*, 180120. Fig. 48. *N. octoseptata*, 120199. Fig. 49. *N. olivacea*, 120236(*a*). Fig. 50. *N. revelstokensis*, 106210. Fig. 51. *N. spectabilis*, 185000. Fig. 52. *N. succisae*, 188302.

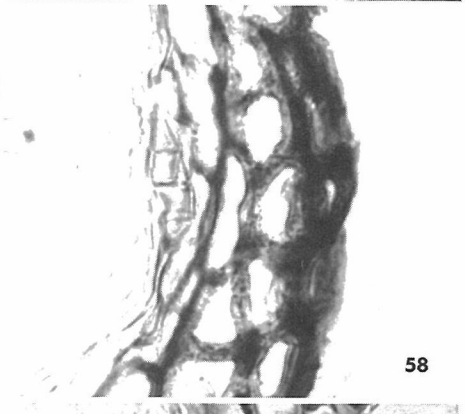


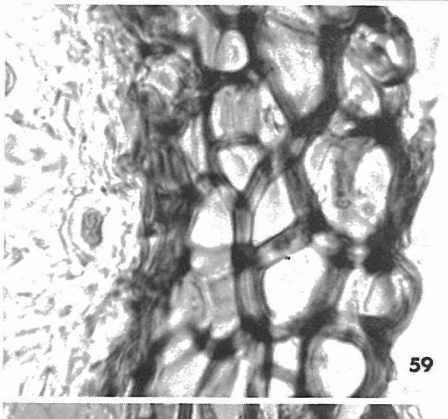


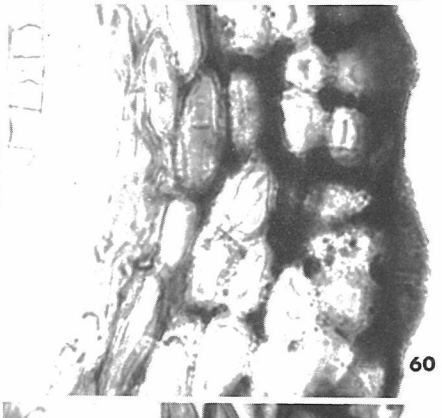


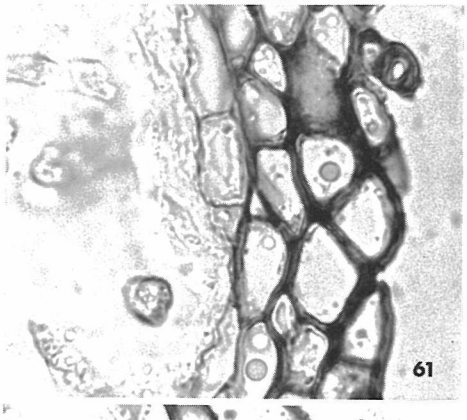


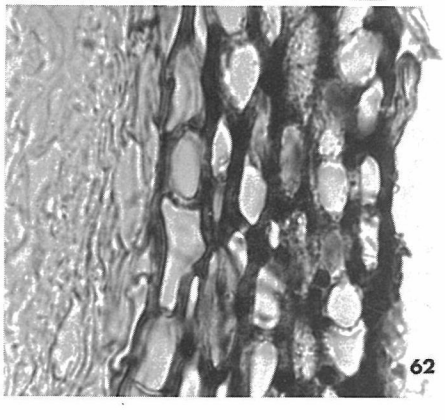


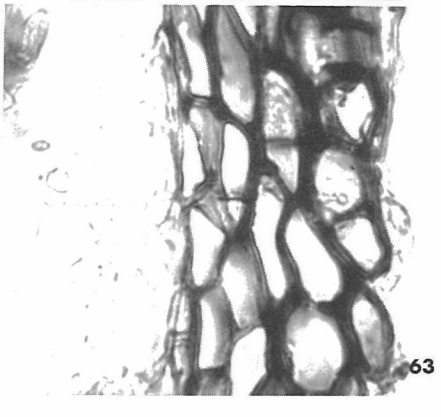


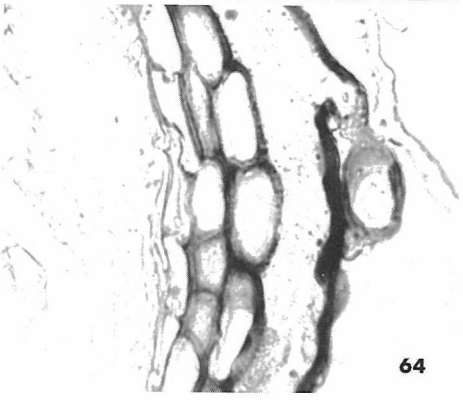




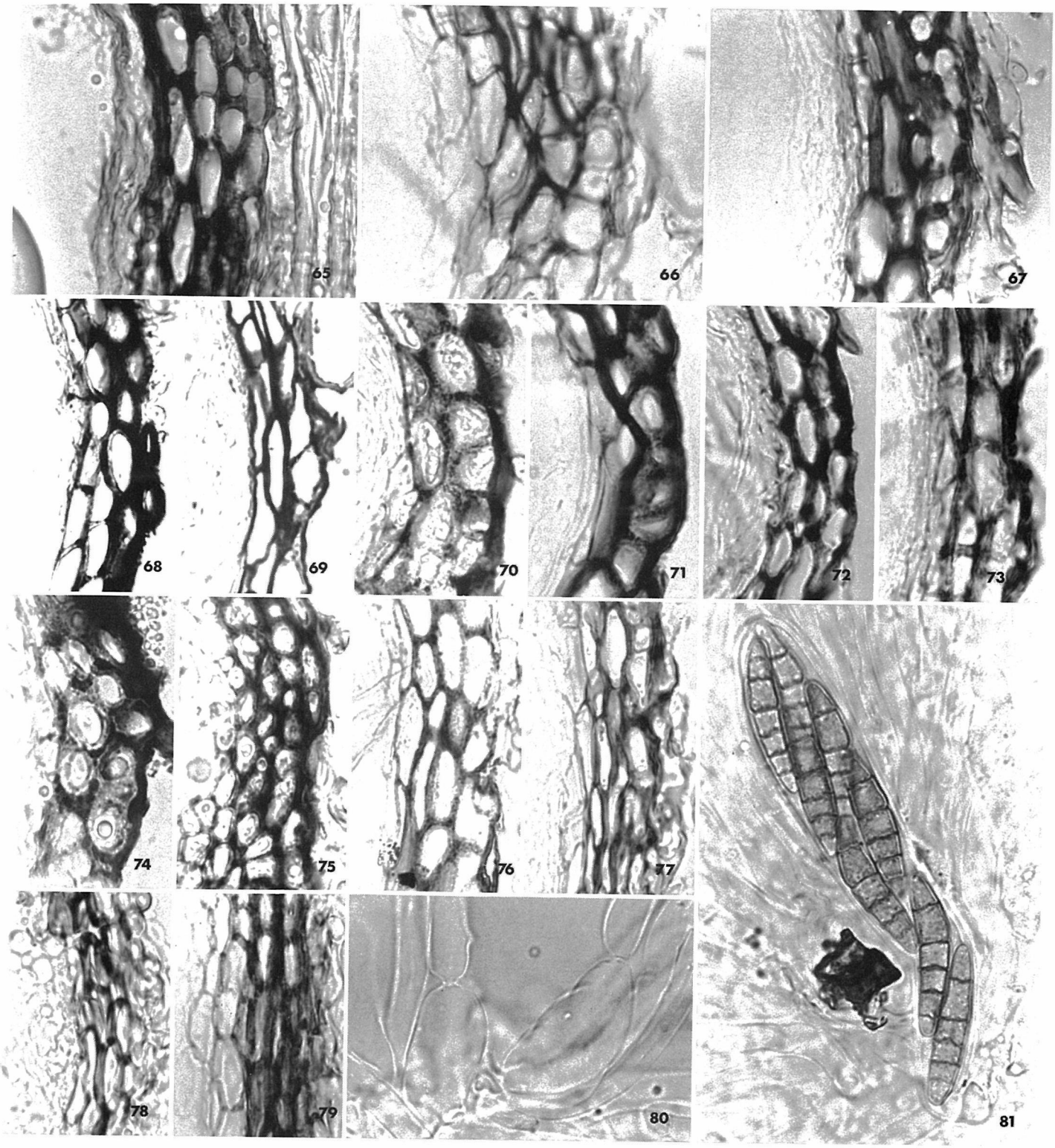




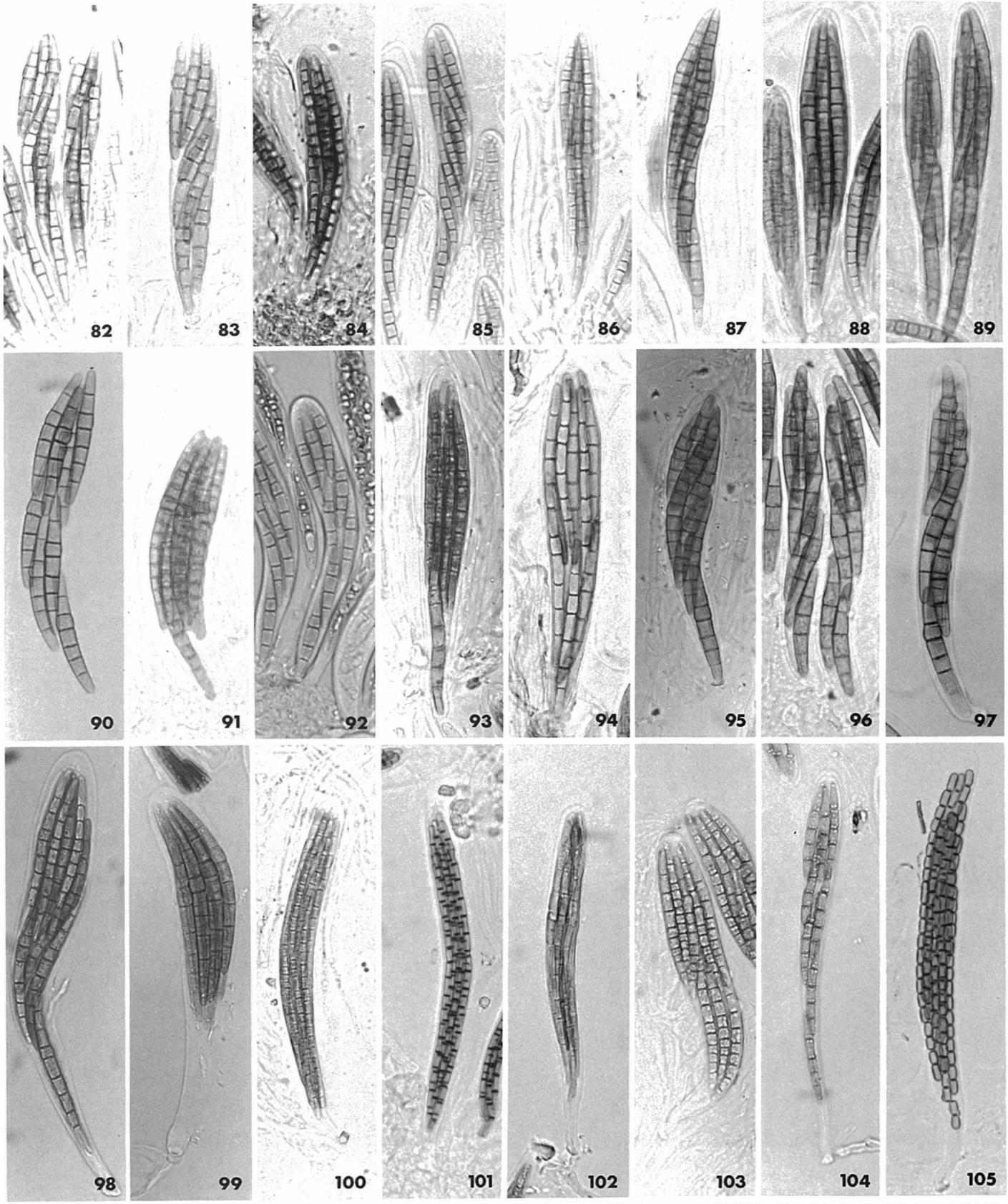




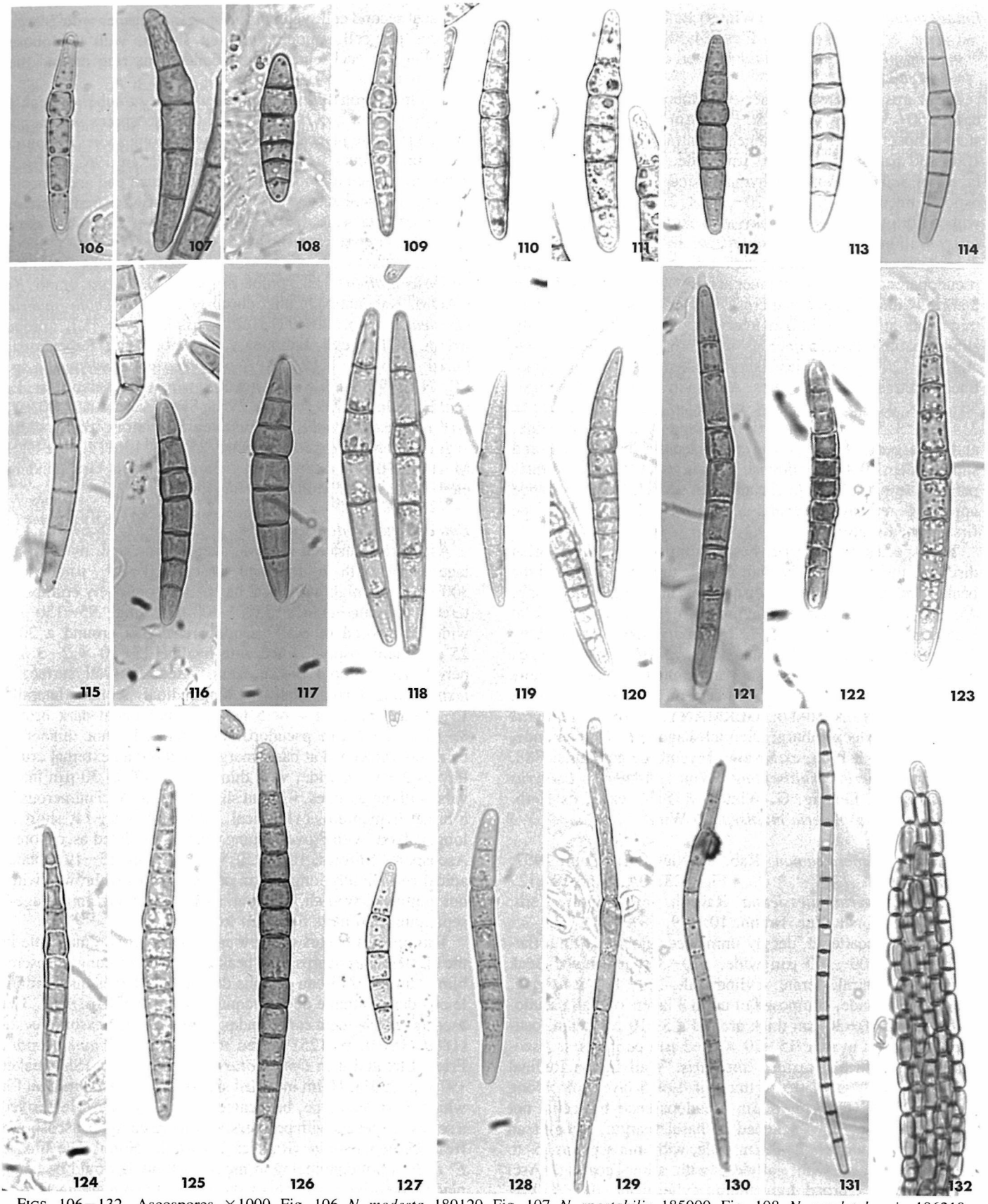
FIGS. 53–55. Ascocarp beaks, ×430. FIGS. 56–64. Ascocarp lateral wall. ×1000. Fig. 53. *E. eliassonii*, 188696. Fig. 54. *E. multiseptatum*, 121677. Fig. 55. *E. niessleanum*, 90400. Fig. 56. *N. cadubriae*, 188199. Fig. 57. *N. derasa*, 97970. Fig. 58. *N. dolioloides*, 85689. Fig. 59. *N. epilobii*, 123554. Fig. 60. *N. jaceae*, 15837. Fig. 61. *N. ladina*, 123633. Fig. 62. *N. octoseptata*, 120199. Fig. 63. *N. olivacea*, 107857. Fig. 64. *N. pellita*, 121670.



FIGS. 65–79. Ascocarp lateral wall. ×1000. FIG. 80. Physes. ×1000. FIG. 81. Ascus. ×1000. Fig. 65. *E. mayorii*, 188709. Fig. 66. *E. niessleanum*, 90400. Fig. 67. *E. rude*, 151642. Fig. 68. *N. aquilana*, 180649. Fig. 69. *N. aucta*, 187592. Fig. 70. *N. centaureae*, 90278. Fig. 71. *N. franconica*, 184935. Fig. 72. *N. megalospora*, 151574. Fig. 73. *N. modesta*, 180120. Fig. 74. *N. revelstokensis*, 106210. Fig. 75. *N. septemcellulata*, 123637. Fig. 76. *N. spectabilis*, 185000. Fig. 77. *E. eliassonii*, 188696. Fig. 78. *E. lapponicum*, 188697. Fig. 79. *E. multiseptatum*, 121677. Figs. 80 and 81. *N. revelstokensis*, 106210.



FIGS. 82–105. Asci and ascospores. ×520. Fig. 82. *N. aquilana*, 74283. Fig. 83. *N. aucta*, 187592. Fig. 84. *N. cadubriae*, 188199. Fig. 85. *N. centaureae*, 90278. Fig. 86. *N. derasa*, 97970. Fig. 87. *N. dolioloides*, 92138. Fig. 88. *N. epilobii*, 123553. Fig. 89. *N. jaceae*, 15837. Fig. 90. *N. ladina*, 123633. Fig. 91. *N. megalospora*, 151574. Fig. 92. *N. modesta*, 180120. Fig. 93. *N. octoseptata*, 120199. Fig. 94. *N. olivacea*, 121616. Fig. 95. *N. septemcellulata*, 123637. Fig. 96. *N. spectabilis*, 185000. FIG. 97. *N. succisae*, 188301. Figs. 98 and 99. *N. pellita*, 114078, 105092. Fig. 100. *E. eliassonii*, 188696. Fig. 101. *E. lapponicum*, 188697. Fig. 102. *E. mayorii*, 188710. Fig. 103. *E. multiseptatum*, 121677. Fig. 104. *E. niessleanum*, 90400. Fig. 105. *E. rude*, 151624.



FIGS. 106–132. Ascospores. ×1000. Fig. 106. *N. modesta*, 180120. Fig. 107. *N. spectabilis*, 185000. Fig. 108. *N. revelstokensis*, 106210. Figs. 109 and 110. *N. aquilana*, 180649, 74283. Fig. 111. *N. succisae*, 188302. Fig. 112. *N. centaureae*, 90278. Fig. 113. *N. franconica*, 184935. Fig. 114. *N. ladina*, 123633. Fig. 115. *N. aucta*, 187592. Figs. 116 and 117. *N. septemcellulata*, 123637. Fig. 118. *N. olivacea*, 121604. Fig. 119. *N. dolioloides*, 170047. Fig. 120. *N. jaceae*, 15837. Fig. 121. *N. octoseptata*, 120199. Fig. 122, *N. cadubriae* (spore inverted), 188199. Fig. 123. *N. pellita*, 123598. Fig. 124. *N. derasa*, 97970. Fig. 125. *N. epilobii*, 123553. Fig. 126. *N. megalospora*, 151574. Fig. 127. *E. niessleanum*, 90400. Fig. 128. *E. multiseptatum*, 121677. Fig. 129. *E. mayorii*, 188710. Fig. 130. *E. eliassonii*, 188696. Fig. 131. *E. lapponicum*, 188697. Fig. 132. *E. rude*, 151624.

Entodesmium multiseptatum (Winter) L. Holm 1957, p. 133 Figs. 24,30B,37,54,79,103,128
≡*Leptosphaeria multiseptata* Winter, Hedwigia, 11: 148. 1872

Ascocarps scattered, immersed, globose with a flattened base, 250–350 μm wide, 250–300 μm high with some red stain in host tissue. Beak erumpent, central, terete, cylindrical, 100–130 μm long, 90–120 μm wide, composed of 8–12 layers of wall pseudoparenchyma around a 15–20 μm diam. ostiole, lined with hyaline 20–30 × 2–3 μm periphyses, without brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 12–15 μm thick of 3 or 4 layers of polygonal dark brown 8–10 × 4–6 μm pseudoparenchyma cells, thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, without guttules, with slime coating. Asci numerous in a broad hymenium, clavate, 80–120 × 9–13 μm, short stalked,with 8 overlapping linearly tetraseriate ascospores. Ascospores narrowly fusiform, 45–55 × 4.5–5 μm, 7–11 septate in sequence 4:3:1:4:3:4:2:4:3:5:4:5, third cell from apex longer than wide, and enlarged towards base, first septum constricted and supramedian (0.40), yellowish brown, with 2 large guttules per cell, smooth, without sheath, with a small cushion-shaped appendage at each end and a gelatinous band around the first-formed septum.

This species on *Lathyrus* has a prominent beak and often discolors the host red. The wall is quite thin except around the beak. The ascospores are distinctive in being fairly long, 45–55 μm, with variable numbers of septa, at least 7 at maturity but often with 9 or 11 by subdivision of some cells. The apical part resembles that of *N. niessleanum* (Rab. ex Niessl) L. Holm, but the basal part is much longer and more frequently septate. Both species occur on *Lathyrus* in Europe.

COLLECTIONS EXAMINED: GERMANY: 121677, *Lathyrus silvestris* L., Mecklenburg: Diedrichshagen bei Warnemünde, H. Sydow, 14.8.1909, ex Sydow, Mycotheca germanica 888, as *Leptosphaeria multiseptata* Wint.; 184970, *Lathyrus silv*[*estris* L.], Leipzig, G. Winter, 7[18]74, ex S, ex Herb. Rehm, as *Leptosphaeria multiseptata* Wint.

Entodesmium niessleanum (Rab. ex Niessl) L. Holm 1957, p. 133 Figs. 23,30A,55,66,104,127
≡*Leptosphaeria niessleana* Rabenh. ex Niessl, Verh. Naturforsh. Ver. Brünn, 10: 179. 1872

Ascocarps scattered, deeply immersed, globose with a flattened base, 200–300 μm wide, 200–300 μm high. Beak erumpent, central, terete, cylindrical, 140–180 μm long, 90–110 μm wide, composed of up to 8 layers of wall pseudoparenchyma 10–30 μm thick around a 5–10 μm diam. ostiole, lined with hyaline 15–20 × 2–3 μm periphyses. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 25–30 μm thick of 4 or 5 layers of oblong dark brown 8–12 × 6–8 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 2–3 μm wide, with thin septa at 15- to 20-μm intervals, with guttules, with slime coating. Asci numerous in a broad hymenium, cylindrical, 100–130 × 8–10 μm, long stalked, with 8 overlapping linearly biseriate ascospores above reducing to one spore in stalk. Ascospores narrowly fusiform, 28–32(37) × 4–4.5 μm, 4 septate in sequence 1:3:2:3, apical cell longest and slightly enlarged towards base, first septum constricted and supramedian (0.29), widest at second cell, yellowish brown, sometimes with 2 large guttules per cell, smooth, without sheath, with a globose appendage at each end and a mucilaginous ring around the first septum.

This species on *Lathyrus* is marked by the protuberant beaks, the long slender asci, and the 4-septate ascospores with septa formed in the sequence 1:3:2:3. In very long spores a septum sometimes occurs in the long apical cell. In 1962 in fresh material, I noted a globose appendage at each end and a peculiar appendagelike band around the constricted first septum. These features were detected with azure A stain in the same collection after storage for over 20 years.

COLLECTIONS EXAMINED: CZECHOSLOVAKIA: 92135, *Lathyrus latifolius* [L]., prope Brünn, G. de Niessl, Junio, ex DAOM, Rabenhorst, Fungi europaei 1252, as *Leptosphaeria niessleana* n.sp.; 184971, *Lathyrus latifolius* [L]., prope Brünn, G. de Niessl, Junio, ex S, ex Herb. Rehm, Rabenhorst, Fungi europaei 1252, as *Leptosphaeria niessleana* n.sp. FRANCE: 92121, *Lathyrus heterophyllus*, Ste. Baum, Var, E. Müller, 7 June 1959, culture 2963; SWITZERLAND: 90397, *Lathyrus heterophyllus* L., Fussweg zu Wettingerhorn, Gde. Wettingen, Kt. Aargau, E. Müller, 25 Sept. 1961, culture ETH M 4607; 90400, *Lathyrus* sp., Bergün-Filisur, Graubünden, elev. 1200 m, E. Müller, 7 June 1962.

Entodesmium rude Riess 1854, p. 28 Figs. 28,67,105,132

Ascocarps clustered in rows, deeply immersed, pyriform to lageniform with a flattened base, 200–250 μm wide, 300–400 μm high with basal hairs. Beak obliquely erumpent, terete, truncate–conical, 200–300 μm long, 95–150 μm wide, composed of wall pseudoparenchyma around a 20–25 μm diam. ostiole, lined with hyaline 25–30 × 2–3 μm periphyses, without brown hairs. Ascocarp wall surface a *textura angularis*. Wall in longitudinal section laterally 15–20 μm thick of 4 or 5 layers of polygonal dark brown 8–11 × 3–4 μm pseudoparenchyma cells, not thinner at base, not thickened at basal margin, without an external crust. Physes 3–9 μm wide, with thin septa at 17- to 30-μm intervals, without guttules, without slime coating. Asci numerous in a broad hymenium, cylindrical, 120–160 × 9–14, short or long stalked, with 8 overlapping linearly fascicled ascospores. Ascospores filiform, 100–120 × 3–3.5 μm, 15–19 septate, apical cell slightly longer than others, yellowish brown, without guttules, smooth, without sheath, without appendages, separating into parts 6–8 μm long.

This species occurs on various legumes. It is remarkable in the clustered ascocarps with beaks set at various angles resembling "un nid d'oiseau remplis de petites affamés que tendrait le cou dans l'attente de la becquée" (Holm 1957, p. 137). The ascospores fragment early, and probably for this reason, Fuckel (1869 (1870), p. 125) placed the species in *Rhaphidospora* Fries. I treated it in *Ophiobolus* following Rehm (Shoemaker 1976, p. 2391). Holm included six species in *Entodesmium* for which *E. rude* is type, but scarcely representative. He derived a series of species with progressively more complex ascospores from *E. niessleanum* (Rab. ex Niessl) L. Holm. The link to *E. rude* is not convincing to me and I think it would be better placed in *Ophiobolus*. This would leave the remaining species without a generic name. The species are mainly known from Europe and revisionary studies seem more appropriate there.

COLLECTION EXAMINED: AUSTRIA: 151642, *Astragalus glycophyllos*, Mähren: Usti bei Mähr.-Weisskirchen, F. Petrak, July 1924, ex DAOM, Petrak, Mycotheca generalis

549, as *Entodesmium rude* Riess.

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