

Spermospora ciliata (Sprague) Deighton and *Scolecotrichum graminis* Fuckel on Finnish grasses

Kaiho Mäkelä

Department of Plant Pathology, University of Helsinki

Abstract. — The material (c. 3770 samples) for this study was collected from planted grasslands or the borders of fields throughout the country in 1966—1970. Collections of the Plant Pathology Department of Helsinki University were also examined.

Spermospora ciliata (Sprague) Deighton was found on 58 grass samples involving 11 grass species, most often on *Festuca rubra* L., from several localities ranging from Helsinki to Lapland.

Scolecotrichum graminis Fuckel was found on 28 grass samples involving 7 grass species, most often on *Phleum pratense* L., from southern Finland.

Materials and methods

Grass samples were collected during the period between spring thaw and the first heavy snowfall in autumn from 1966 to 1970. The grasses (c. 3770 samples) were collected from planted grasslands and the borders of fields in many localities throughout the country (Fig. 1). Collections of the Plant Pathology Department of Helsinki University (HPP) were also examined. Conidia produced in natural infestations were examined. The slides of the fungus material were prepared from fresh grass leaves. The fungi on the slides were preserved in lactic-acid and lactophenol solutions with trypanblue. The conidia were also measured and photographed on the slides. The fungi were not grown in pure culture.

Results and Discussion

Spermospora Sprague, Mycologia 40: 177, 1948a. It is a genus of the order *Moniliales* and the family *Moniliaceae* (SPRAGUE 1948a: 177).

Spermospora ciliata (Sprague) Deighton, Trans. Brit. Mycol. Soc. 51: 44, 1968; Syn.

Spermospora subulata Sprague forma *ciliata* Sprague, Mycologia 41: 495, 1949; *Spermospora subulata* (Sprague) Sprague, Mycologia 29: 202, 1937; *Cercospora subulata* Sprague, Mycologia 29: 202, 1937. SPRAGUE (1949) regards *Spermospora subulata* f. *ciliata* as a morphological form of *S. subulata*, whereas DEIGHTON (1968) regards them as distinct species.

S. subulata was originally found on an herbarium specimen of *Melica subulata* (Griseb.) Scribn. (SPRAGUE 1937). *S. subulata* f. *ciliata* was originally found on leaves of *Agrostis alba* L. and *Calamagrostis rubescentis* Buckl. (SPRAGUE 1949). The fungus has since been found on a large number of hosts e.g. on *Agrostis stolonifera* L., *Bromus vulgaris* (Hook.) Shear, *Deschampsia caespitosa* (L.) PB., *Festuca rubra* L., *Phleum pratense* L. and *Poa trivialis* L. in the USA, Canada and Britain (SPRAGUE 1950, DEIGHTON 1968) as well as on *Festuca rubra* and *Lolium perenne* L. in New Zealand (LATCH 1966). The fungus is definitely parasitic, causing severe leaf scald, but it is never abundant (cf. SPRAGUE 1948b, DEIGHTON 1968). It is probably of little or no economic importance on grasses (cf. LATCH 1966). The

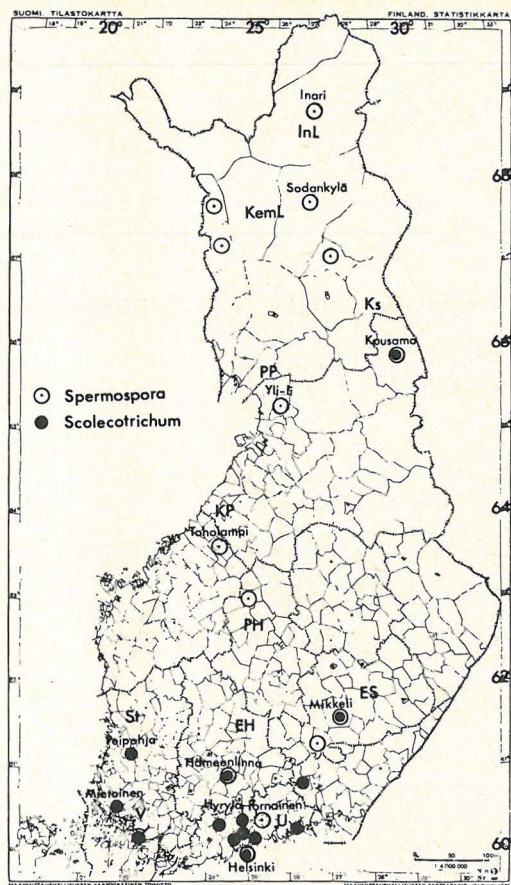


Fig. 1. Original of the material.

fungus has not been previously described in Finland. In the Collections of HPP there is only one sample: leg. Putkonen on *Calamagrostis epigeios* (L.) Roth. 9. VI. 1916, from Pornainen, in the province of Uusimaa (Fig. 3 C).

In the present study the fungus was found on 58 grass samples involving 11 grass species and from several localities ranging from Helsinki to Lapland (at Inari). Conidia of the fungus were found during the period between early spring (March), and late autumn (November). They were found least frequently in midsummer. As a rule conidia were found in small numbers. Also the material examined usually contained other fungi besides *Spermospora* (cf. DEIGHTON 1968).

In the present study conidia of *Spermospora* spp. were observed in approximately 1.5 % of the 3770 samples examined. The

fungus was found most frequently (c. 16 %) on *Festuca rubra* at Viikki (Helsinki) (cf. MÄKELÄ 1972). Lesions were especially distinct on leaves of *Festuca rubra* (Fig. 2 A) in spring and autumn. They varied from small spots to lesions covering large portions of the leaves and averaged (1) 3 (9) mm long and (0.5) 1—2 mm wide. Lesions were umbra to dark brown-black in colour with a white centre (Fig. 2 F) and sometimes framed with yellow tissues (Fig. 2 A). Conidia were hyaline, subulate to subulate-filiform, tapering to a whip-like distal portion which was sometimes straight, usually curved or flexuous, 13—36 μ long and about 0.3—4 μ wide (Figs. 2, 3). Conidia narrowed gradually at the base towards the unthickened truncate hilum (Figs. 2 B, G, 3 C). The whole conidium (about 450 examined) including the rostrum was (28) 45.7 (76) μ long, (2) 3.9 (8) μ wide, (3) 3.9 (5) -septa. Material on *Alopecurus pratensis* had 3-septate spores (32) 38.7 (46) μ long, (3) 3.6 (4) μ wide; on *Calamagrostis epigeios* they were (20) 48.4 (71) μ long, (2) 4.9 (8) μ wide, 4 (5) -septa; on *Dactylis glomerata* (35) 51.5 (76) μ long, (3) 3.9 (5) μ wide, (3) (3.9) (5) -septa; on *Deschampsia caespitosa* (30) 44.8 (55) μ long, (2) 3.2 (4) μ wide, 4-septa; and on *Festuca rubra* (28) 44.9 (65) μ long, (2) 3.9 (5) μ wide, (3) 3.7 (5) -septa. The form and size of the conidia showed moderate variation between the different grasses (Figs. 2, 3). The size and the form of conidia resembled more those described by SPRAGUE (1948a, b, 1949) than those described by DEIGHTON (1968). In the present study conidia were in particular narrower and longer than those of the last mentioned.

Material examined (HPP):

On *Agropyron repens*:

U: Helsinki, Viikki 4. VI. 1968; EH: Hämeenlinna 25. V. 1969; ES: Mikkeli 21. V. 1968.

On *Agrostis tenuis*:

InL: Inari 28. VII. 1969.

On *Alopecurus pratensis*:

U: Helsinki, Viikki 18. XI. 1966, 20. XI. 1969; EH: Hämeenlinna 11. V. 1968; InL: Inari 17. VII. 1967, 13. VI. 1969 (leg. Salonen).

On *Bromus inermis*:

U: Helsinki, Viikki 22. X. 1968.

On *Calamagrostis epigeios*:

U: Pornainen 9. VI. 1916, leg. Putkonen; Helsinki 27. IX. 1968; EH: Hämeenlinna 4. VII. 1970.

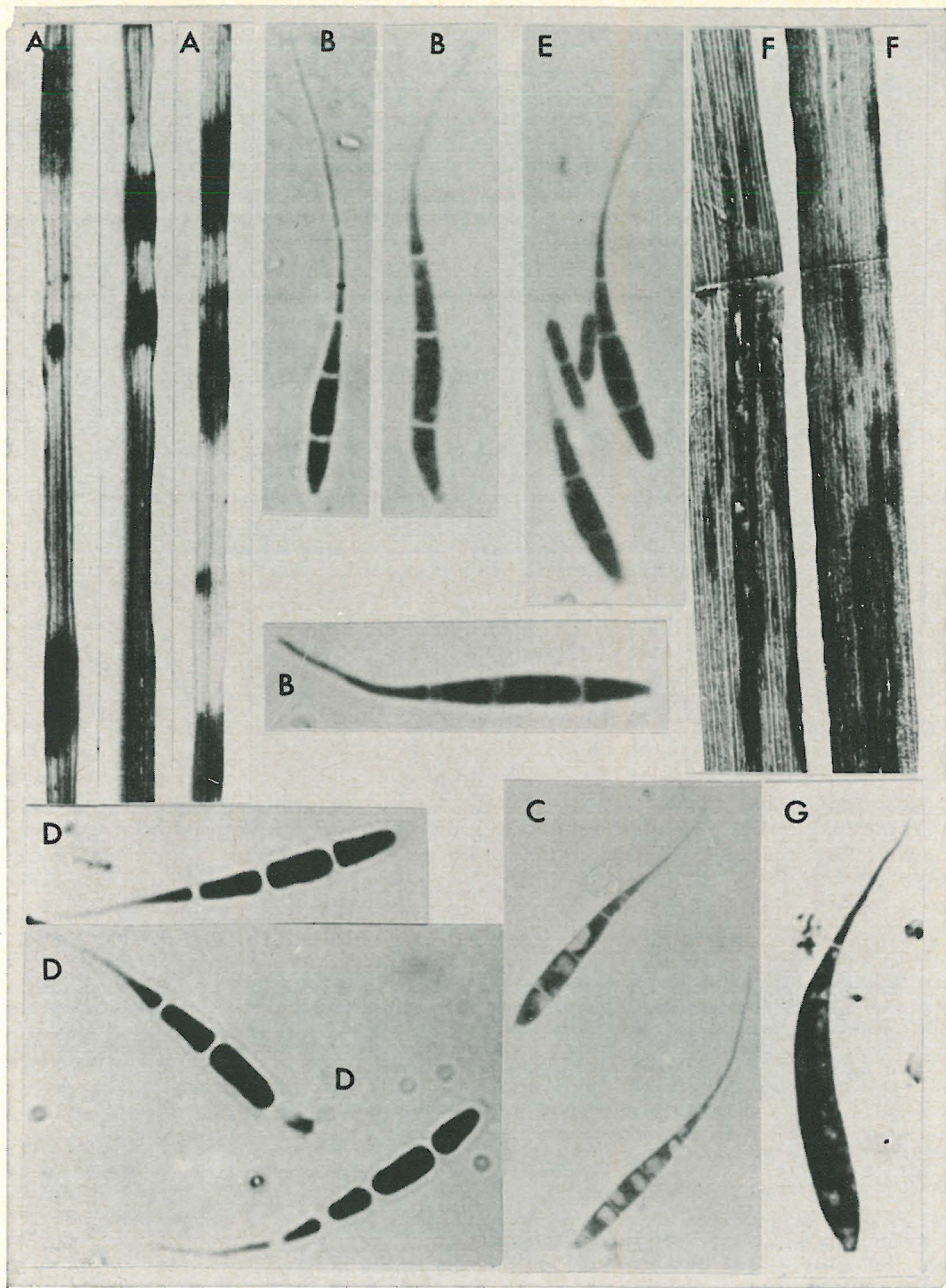


Fig. 2. *Spermospora ciliata*, A-D: on *Festuca rubra*, A-C: at Hämeenlinna, B: 11. V. 1968, C: 3. XI. 1968, D: at Inari 15. IX. 1969; E: on *Alopecurus pratensis* at Viikki 28. III. 1968; F, G: on *Calamagrostis epigeios* at Viikki 27. IX. 1968. A, F: $\times 2$; B, C, E: $\times 1000$; G, D: $\times 2000$.

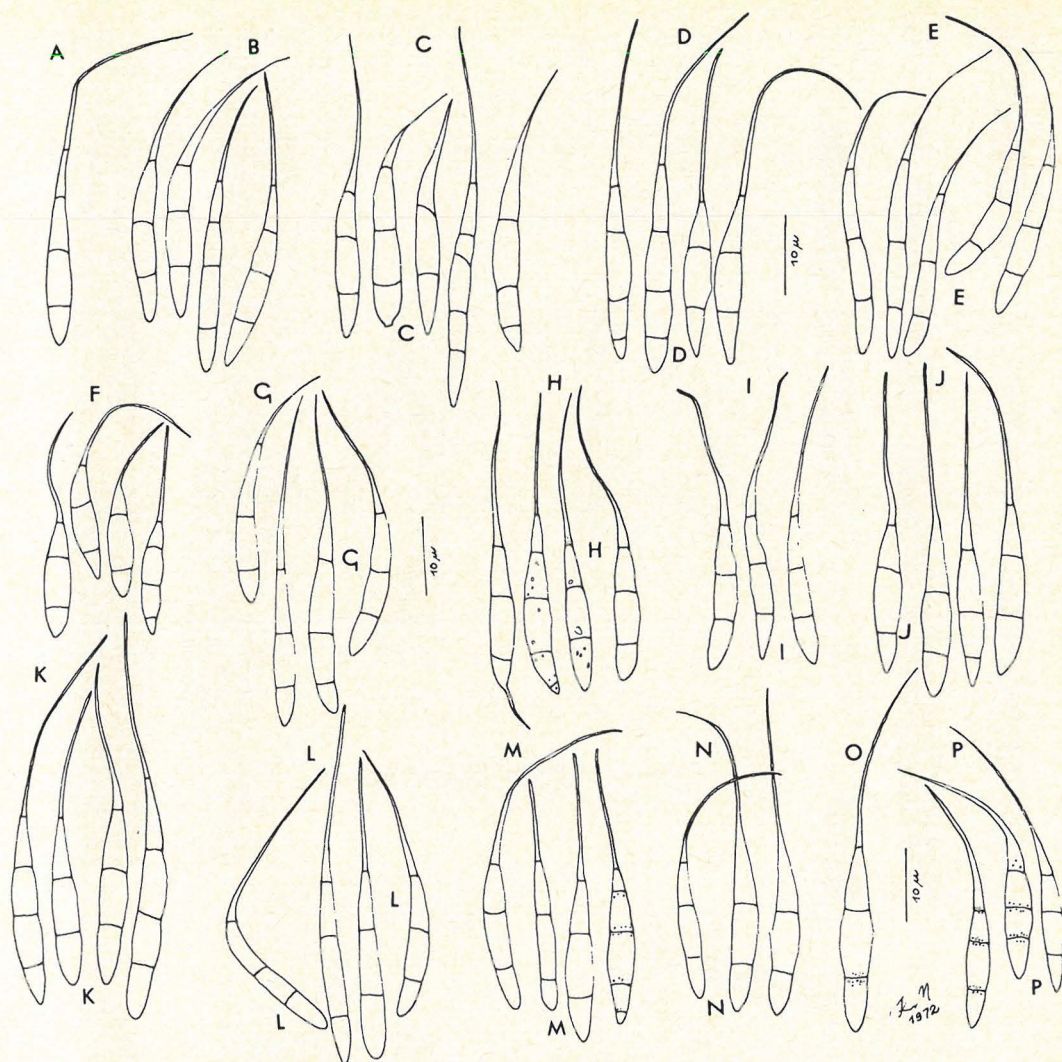


Fig. 3. Conidia of *Spermospora ciliata*, A: on *Agrostis stolonifera* at Viikki 11. XI. 1967; B: on *Alopecurus pratensis* in Hämeenlinna 11. V. 1968; C: on *Calamagrostis epigeios*, at Pornainen 9. VI. 1916; D: on *Dactylis glomerata* in Hämeenlinna 13. IV. 1968; E: on *Deschampsia caespitosa* at Inari 21. VII. 1968; F: on *Festuca ovina* at Inari 15. IX. 1969; G-M: on *Festuca rubra*; G: at Viikki 17. V. 1968; H, I: in Hämeenlinna, H: 13. IV. 1968, I: 3. XI. 1967; J: at Sodankylä 21. IX. 1966; K: at Kuusamo 21. IX. 1966; L, M: at Inari, L: 22. VII. 1968, M: 15. IX. 1969; N: on *Phleum pratense* at Inari 20. VII. 1968; O, P: on *Poa pratensis*, O: in Hämeenlinna 11. V. 1968, P: at Inari 14. VII. 1969.

On *Dactylis glomerata*:

EH: Hämeenlinna 3. XI. 1967, 15. IV. 1968, 11. V. 1968; KP: Toholampi 10. VII. 1969.

On *Deschampsia caespitosa*:

KemL: Pelkosenniemi 21. VII. 1970 (leg. Ilon-oja); InL: Inari 21. VII. 1968.

On *Festuca ovina*:

InL: Inari 15. IX. 1969 (leg. Salonen).

On *Festuca rubra*:

U: Helsinki, Viikki (13 specimens), Vantaa (1 specimen); EH: Hämeenlinna (6 specimens); ES: Mäntylharju (1 specimen); Mikkeli (1 specimen);

PH: Kivijärvi (1 specimen); PP: Yli-Ii (1 speci-

men); Ks: Kuusamo (1 specimen); KemL: Sodankylä (1 specimen), Kolari (1 specimen), Muonio (1 specimen); InL: Inari (4 specimens); in 1967—1969; HPP.

On *Phleum pratense*:

U: Helsinki, Viikki 7. X. 1968; InL: Inari 20. VII. 1968.

On *Poa pratensis*:

U: Hyrylä 14. VII. 1970; EH: Hämeenlinna 11. V. 1968; InL: Inari 22. VII. 1968, 13. VI. 1969, 14. VII. 1969 (leg. Salonen).

Scolecotrichum graminis Fuckel, Fungi Rhenani Exsiccati, Hedwigia 2: 134, 1863; Saccardo, Syll. Fung. IV: 347—348, 1886; Syn. *Passalora graminis* (Fuckel) v. Höhnelt, Centralbl. Bakt. Abt. 2, 60: 1—9, 1923 (cf. SPRAGUE 1950: 427—428).

The fungus is the causal agent of a foliar disease of numerous grasses (about 160 species) throughout the world and particularly in Europe and the United States (LINDAU 1907: 795, SPRAGUE 1950, BRAVERMAN 1958). Included in the host range are many forage species especially *Phleum pratense* L. and *Dactylis glomerata* L. (BUCHOLTZ 1902, ERIKSSON 1910, MORTENSEN et al. 1911, LIND 1913, JOHNSON & HUNGERFORD 1917, DENNIS & FOISTER 1941—42, JØRSTAD 1945, SPRAGUE 1950, ROBERTS et al. 1955, WENHAM & LATCH 1958, ELLIOTT 1962). Sometimes *S. graminis* may be one of the most important of the pathogens which produce leaf spots on the grasses above mentioned (MELCHERS 1925, BRUMMER 1937, SAMPSON & WESTERN 1942, SPRAGUE 1950). In many regions the fungus is less serious and develops saprophytically on many hosts on which it is only mildly parasitic (JØRSTAD 1930, 1945, SPRAGUE 1950, ELLIOTT 1962, LATCH 1966). Morphological variants of the fungus occur (SPRAGUE 1950) as well as variants which differ in pathogenicity (BRAVERMAN 1958, GRAHAM et al. 1963).

In Finland the fungus has been known to occur on *Phleum pratense* L. at least since 1927 and was common and economically very important in the 1930's in particular in fields being grown for seed production (BRUMMER 1937). The earliest sample of this fungus in the Collections of HPP is on *Glyceria remota* Fr. 23. VII. 1908 at Pernaja in Uusimaa, legg. Liro & Ryselin. At the present time *Scolecotrichum graminis* occurs very infrequently and is rather insignificant (cf. MÄKELÄ 1972).

In the present study the fungus was found on 20 grass samples involving 4 grass species from only a few localities. Conidia of the fungus were found during the period between early spring (April) and late autumn (October). In midsummer, its occurrence was infrequent (cf. BUCHOLTZ 1902, BRUMMER 1937). As a rule, the fungus was found in small numbers.

On grass leaves the fungus produces grey — greyish to orange — oak brown elongated streaks having golden yellow — apricot to

bronze-brown borders in which the olive black tufts of conidiophores develop in parallel rows as minute dots along the surface (Fig. 4 A). The conidiophores were (50—150 × 5—10 μ) fasciculate, olive black, unbranched, irregular or slightly geniculate, sometimes thickened on the tip (Fig. 4 B, D, E). They may grow from little brown black, subepidermal stroma, especially in spring (Fig. 4 D, E) (cf. BRAVERMAN 1958). Conidia were light olive grey, elongate, bottle-shaped, base broadly rounded with prominent hilum (Fig. 4 B, C, F). The size of the conidia (about 200 examined) on *Alopecurus geniculatus* L., *Phleum pratense* L. and *P. alpinum* L. averaged (16) 37.9 (56) μ long, (4) 9.3 (12) μ wide and had (1) 2 (3) -septa. The size of conidia was nearly the same as in SPRAGUE's (1950) material, but longer than those described by LINDAU (1907: 795) and BRUMMER (1937). Size and morphology of conidiophores, conidia and spores of isolates from different grasses did not differ significantly (cf. BRAVERMAN 1958). However, according to SPRAGUE (1950) morphological variants have been found, but whether they are anything more than variations due to host and humidity is not known.

Material examined (HPP):

On *Alopecurus geniculatus*:

V: Parainen 18. VI. 1910, legg. Liro & Linkola; U: Helsinki 13. X. 1970; St: Peipohja 15. V. 1968, 27. VI. 1968.

On *Alopecurus pratensis*:

U: Helsinki 5. VI. 1967; ES: Mikkeli 28. VI. 1968.

On *Dactylis glomerata*:

St: Peipohja 15. V. 1968.

On *Glyceria fluitans*:

U: Espoo 23. VII. 1923, legg. Liro & Aalto-Setälä.

On *Glyceria remota*:

U: Pernaja 23. VII. 1908, legg. Liro & Ryselin.

On *Phleum alpinum*:

Ks: Kuusamo 17. VII. 1931, legg. Liro & Heikinheimo.

On *Phleum pratense*:

U: Tammisto 1934 (4 specimens), legg. Brummer.

V: Mietoinen (3 specimens); U: Helsinki (3 specimens), Vihti 15. VIII. 1968; EH: Hämeenlinna (4 specimens), Iitti (2 specimens); St: Peipohja 15. V. 1968; ES: Mikkeli 14. X. 1968; in 1966—1968, HPP.

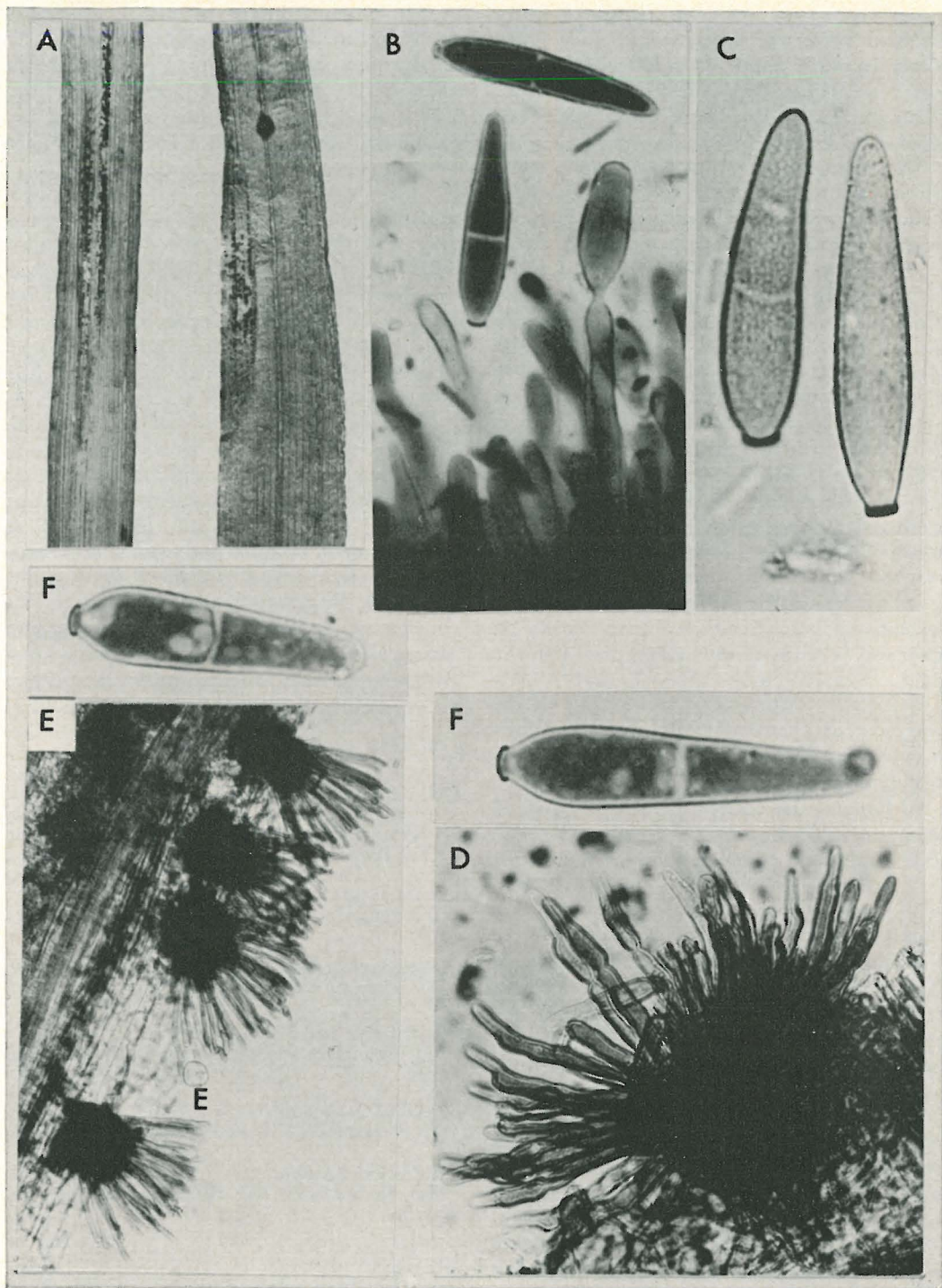


Fig. 4. *Scolecotrichum graminis*, A-D: on *Phleum pratense*, B, C: at Hämeenlinna, B: 31. X. 1969, C: 11. V. 1968; D: at Mietoinen 30. XI. 1968; E, F: on *Alopecurus geniculatus* at Peipohja 27. VI. 1968. A: $\times 1\frac{1}{2}$, B: $\times 1000$, C, F: $\times 2000$; D: $\times 500$; E: $\times 100$.

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