

## STUDIES ON HYPHOMYCETES—II

Cordella

BY C. V. SUBRAMANIAN, F.A.Sc.

(Department of Botany, University of Rajasthan, Jodhpur)

Received September 5, 1961

THE genus *Cordella* was established by Spegazzini (1886) for two species: *C. coniosporioides* Speg. and *C. spinulosa* Speg. Spegazzini's diagnosis of his genus was as follows: Hyphæ fuscae, bifurmes; steriles elongatæ, fertiles breves v. vix evolutæ, monosporæ, omnes e strato prolifero tenuissimo, contextu parum distincto donato, submucedineo oriundæ. Conidia globosa v. ellipsoidea, fuliginea, simplicia, in hyphis fertilibus acrogena. Genus habitum *Torulæ* v. *Helminthosporii* eximie referens (see Saccardo, 1892, p. 586). Spegazzini added four more species to the genus later, viz., *C. tomentosa* Speg., *C. chætomioides* Speg., *C. argentina* Speg. and *C. magna* Speg.

Through the courtesy of Dr. J. C. Lindquist, I have been able to examine type material of all the species except *C. argentina*, ex Colecciones micologicas, Museo-Instituto Spegazzini, and my observations on these are given below.

1. *Cordella coniosporioides* Speg., 1886, *Anal. Soc. cientif. Arg.*, 22: 210.  
Saccardo, 1892, *Sylloge Fungorum*, 10: 588.

Spegazzini described the fungus as follows: "Acervulis superficialibus linearibus, sæpe longissimus ac dense aggregatis, atro-subvelutinis; hyphis

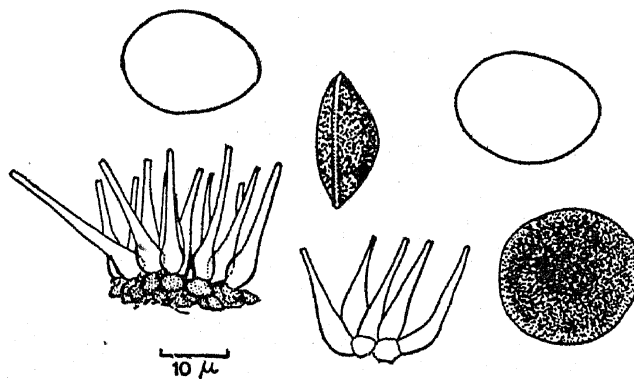


FIG. 1. *Cordella coniosporioides* (= *Papularia? vinosa*, see text): conidiophores and conidia drawn from the type specimen.

sterilibus numerosissimis densissimisque, conoideo-elongatis,  $15-24 \times 1.5-4 \mu$ , continuis, sæpe flexuosulis, obtusis, fuligineo-atris, pellucidis; fertilibus parcissimis, sparsis, minutis, globosis v. subangulosis,  $5-8 \mu$  diam., levibus, hyalinis v. fuscidulis, 1-sporis; conidiis globosis,  $11-17 \mu$  diam., rarius obtusis angulosis, episporio tenui, levibus, obscure fuligineis, nubilosus, pellucidis. Hab. ad folia et culmos dejectos putrescentes Bambusæ sp. cujusdam pr. Guarapi et Caã-guazu Brazilæ" (Saccardo, 1892, p. 588).

I have examined type material of this fungus. The fungus forms linear, black, apparently powdery colonies on the substratum. The conidiophores arise from a stromatic base composed of somewhat dark brown polygonal cells. The conidiophores are distinctly swollen at the base but then immediately attenuated above so that the upper part is tubular and gradually narrowed towards the tip. The conidiophores are short, brown, non-septate,  $15.4-26.6 \mu$  long,  $2.8-4.9 \mu$  wide at the swollen base and up to  $1.4 \mu$  wide at the tip. The conidia are one-celled, brown, lenticular, circular in outline, pale-coloured at the peripheral rim, smooth, mostly  $19-20 \mu$  in diameter and about  $9-10 \mu$  thick when viewed from a side. No conidia were seen attached to a conidiophore, but it is quite logical to consider that the conidia are produced singly and acrogenously.

The lenticular dark-coloured conidia of the fungus, borne singly on simple conidiophores, suggest the genus *Papularia* Fries (1849, Summa Veg. Scand., Sect. post., p. 509). *Papularia* spp. are well known on bamboo (and other Gramineæ) which is also the substratum of Spegazzini's fungus. I consider *Cordella coniosporioides* to be a *Papularia*, but a formal transfer is not made since this may prove to be indistinguishable from *Papularia vinosa* (Berk. & Curt.) Mason in which the lenticular conidia are known to be  $18-26 \mu$  in diameter and up to  $14 \mu$  in thickness (see Mason, 1933, pp. 21-22).

Type specimen : On *Bambusa*, Paraguay, Guarapi, 1881, leg. Balansa, nro. 2804 ex Universidad Nacional de La Plata Museo-Instituto Spegazzini, Colecciones micologicas.

2. *Cordella spinulosa* Speg., 1886, *Anal. Soc. cientif. Arg.*, **22**: 210. Saccardo, 1892, *Sylloge Fungorum*, **10**: 586.

This is the second of the two original species for which Spegazzini established the genus *Cordella*. Spegazzini's description was as follows: "Cæspitulis hispido-velutinis, ozoniaceis, latissime effusis, superficialibus, matrici arcte adnatis, fuligineo-atris; hyphis e strato prolifero crassiusculo;

indistincte parenchymatico oriundis, sterilibus densissimis, gracilibus, longissimis,  $500-800 \times 3 \mu$ , erectis v. vix flexuosis, densiuscule septulatis, olivaceo-fuligineis, apice subclavulatis, obtusissimis,  $5-8 \mu$  cr. atque pallidioribus; fertilibus numerosis, brevissimis, cylindraneo-flexuosis, continuis, apice  $18-20 \times 2.5 \mu$ , obscure fumosis; conidiis ellipticis v. ovoideis, rectis vel navicularibus, utrinque acutis sæpeque subapiculatis,  $18-20 \times 13-15 \mu$ , non v. grosse 1-guttulatis, levibus, opaque fuligineis. Hab. ad cortices ramorum truncorumque putrescentes pr. Guarapi Brasiliæ" (Saccardo, 1892, p. 586).

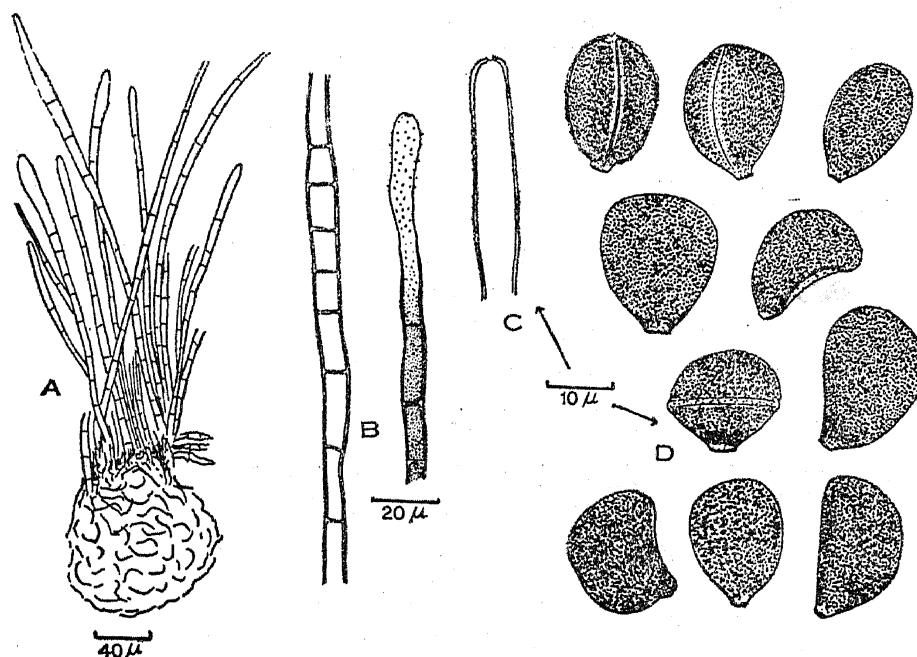


FIG. 2. *Cordella spinulosa* drawn from the type specimen. A, diagrammatic sketch of a fascicle of conidiophores; B, conidiophores; C, tip of a conidiophore; D, mature conidia.

I have examined type material of this fungus and the following description is based on the type. The fungus forms broadly effuse, fuliginous-black, somewhat velvety colonies on the substratum. The conidiophores arise from a stromatic base; they are fasciculate, simple, erect, straight or flexuous, subcylindrical, brown, paler towards the tip, often wider towards the tip and slightly long-clavate, many-septate, mostly  $200-500 \mu$  long,  $4.2-5.6 \mu$  wide at the base and  $5.6-11.2 \mu$  wide at the tip. The conidia are one-celled, dark brown, thick-walled, somewhat narrowly or broadly lozenge-shaped or obovate, flattened with a longitudinal (rarely transverse) germ slit, with a pale ridge on the convex side and a scar  $2.1-2.8 \mu$  wide at the base indicating the point of attachment to the conidiophore,  $16.8-22.4 \mu$  long and  $11.2-16.8 \mu$  wide. No conidia were seen attached to the conidiophore in the type material.

Mason (1933, pp. 26–29) thought that *Cordella spinulosa* Speg. may be an earlier name for *Pseudocamptoum fasciculatum* (Cke. & Mass.) Mason (= *Pseudocamptoum citri* Frag. & Cif., the type species of the genus *Pseudocamptoum*). That this is so has been shown by Hughes (1958, p. 783) who considered the following also identical with *Cordella spinulosa*: *Melanographium spleniosporum* Sacc., the type species of the genus *Melanographium* Sacc., and *Sporostachys maxima* Sacc., lectotype species of the genus *Sporostachys* Sacc. I have examined type material of *Sporostachys maxima* (C. F. Baker, Fungi Malayana no. 394, on dead *Arenga saccharifera*, Los Banos, Philippines. Determined by Saccardo. Oct. 13. Herb. Otto A. Reinking, ex U.S.D.A. National Fungus Collections), but not of *Melanographium spleniosporum* which has not been available. *Sporostachys maxima* is indistinguishable from *Cordella spinulosa* except for the fact that the conidiophores of the former are produced in fascicles simulating synnemata. In *Sylogae Fungorum*, 25: 937 (1931), *Sporostachys* Sacc. was reduced to synonymy with *Melanographium* Sacc.

What, then, is the correct name to be applied to this fungus? As already pointed out in this paper, *Cordella coniosporioides* Speg. is a *Papularia* and therefore cannot be chosen lectotype species of the genus *Cordella*. *C. spinulosa* then becomes the lectotype species of the genus; it also provides the earliest name available for the fungus under discussion.

Although no conidia attached to the conidiophore were seen in the type material of *C. spinulosa*, the development of conidia has been seen in material referable to this species but recorded by me as *Pseudocamptoum fasciculatum* from this country (Subramanian, 1955). The development of conidia seen in the Indian material corresponds to that described by Hughes (1953, p. 607) who classified this species in his Section II in which the conidia are acrogenous but there is a succession of solitary conidia developing at the tips of successive growing points formed immediately below successive scars of fallen conidia.

In the light of these observations, it becomes necessary to emend the diagnosis of the genus *Cordella*.

*Cordella* Speg. emend.

Spegazzini, 1886, *Anal. Soc. cientif. Arg.*, 22: 210.

= *Melanographium* Sacc., 1913, *Ann. mycol., Berl.*, 11: 558.

= *Sporostachys* Sacc., 1917, *Atti Accad. Sci. Ven.-Trent.-Istr.*, III, 10: 92.

= *Pseudocamptoum* Frag. and Cif., 1925, *Bol. R. Soc. Espanola*, 25: 454.

Fungus imperfectus, Hyphomycete. Conidiophores arising from a stromatic basal stratum, typically fasciculate, usually simple, dark-coloured, septate. Conidia produced singly at the tip of the conidiophore and its successive growing points arising immediately below the scar of a previous conidium, one-celled, dark-coloured, usually lozenge shaped or obovate and somewhat flattened with a longitudinal germ slit.

Original species: *C. coniosporioides* Speg., *C. spinulosa* Speg.

Lectotype species:

*Cordella spinulosa* Speg., 1886, *Annal. Soc. cientif. Arg.*, 22: 210.

= *Melanographium spinulosum* (Speg.) Hughes, 1958, *Canad. J. Bot.* 36: 783.

= *Trichosporium selinioides* Sacc. and Paol., 1888, *Atti. R. Istit. Ven. Sci., Lett., Arti*, VI, 6: 414.

= *Monotospora fasciculata* Cke. & Mass., 1892, *Grevillea*, 21: 29.

= *Pseudocampoum fasciculatum* (Cke. & Mass.) Mason in Ciferri, 1929, *Estac. Agron. de Moca*, 14 B: 155.

= *Melanographium spleniosporum* Sacc., 1913, *Ann. mycol., Berl.*, 11: 558.

= *Sporostachys maxima* Sacc., 1917, *Atti Accad. Sci. Ven.-Trent.-Istr.*, III, 10: 92.

= *Melanographium maximum* (Sacc.) Sacc., 1931, *Sylloge Fungorum*, 25: 937.

= *Pseudocampoum citri* Frag. & Cif., 1925, *Bol. R. Soc. Espanola*, 25: 454.

= *Campoum reniformis* Boedijn, 1929, *Rec. Trav. Bot. neerl.*, 26: 432.

= *Monotospora reniformis* Teng., 1932, *Contr. biol. Lab. Sci. Soc. China*, 8: 42.

Type material of *Cordella spinulosa*: (on ?), Paraguay, Guarapi, 1881, leg. B. Balansa, nro. 2793 ex Universidad Nacional de La Plata Museo-Instituto Spegazzini, Colecciones micologicas no. 1001.

3. *Cordella tomentosa* Speg., 1888, *Anal. Soc. cientif. Arg.*, 26: 70. Saccardo, 1892, *Sylloge Fungorum*, 10: 587.

Spegazzini's diagnosis of this species was as follows: "Cæspitulis irregulariter lateque effusis sæpe totam matricem obtegentibus tenuibus, olivaceis e pulverulento tomentosis; strato prolifero v. epidochio carnosulo-membranaceo effuso olivaceo contextu indistincto, ubique hyphis sterilibus,

erectis, 150–200 × 5–10  $\mu$ , flaccidulis 3–5-septatis sæpe hinc inde torulosis, articulis alternatim in sicco laminari-compressis, apice obtusis rarius subcircinatis non v. præcipue apicem versus sparce verruculosus pallide olivaceis pellucidis vestito; sterigmatibus crasse brevissimeque papillæformibus ad basin hypharum steriliū exurgentibus, fuscidulis, monosporis; conidiis obovatis v. grosse 1-guttulatis, minute denseque verruculosus, opace fuliginis. Hab. ad ramos emortuos putrescentes in silvis prope Calle-poi et Yagnaron Brasilæ” (Saccardo, 1892, p. 587).

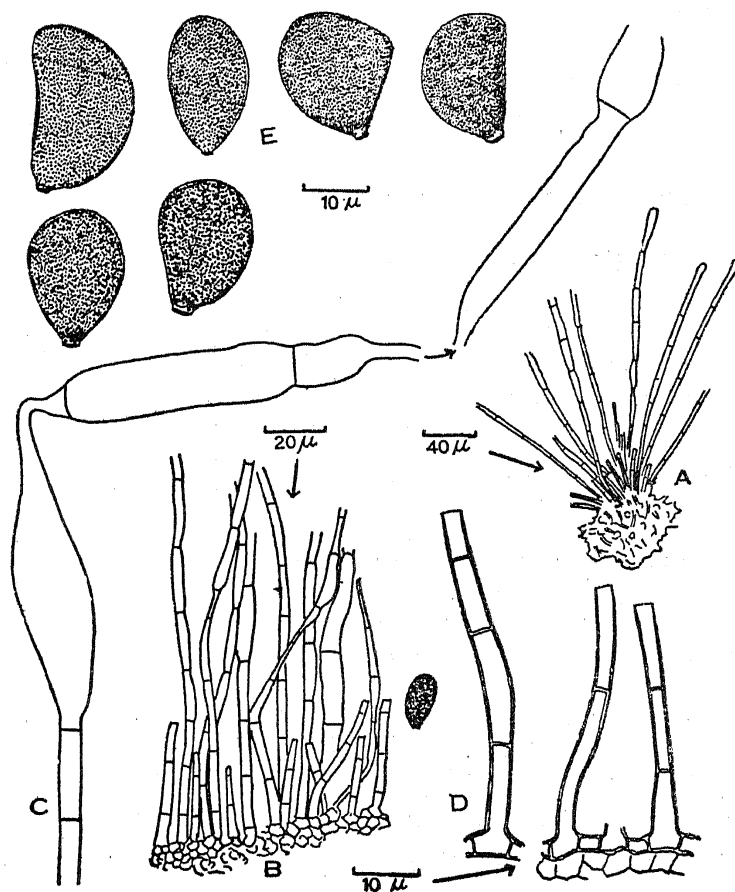


FIG. 3. *Cordella tomentosa* drawn from the type specimen. A, diagrammatic sketch showing the long and the short hyphæ and their origin; B, an enlarged view of the same; C, one of the longer erect hyphæ; D, the shorter hyphæ (conidiophores?); E, mature conidia.

I have examined the type and the following description is based on the type. The fungus forms effuse, somewhat olivaceous, tomentose colonies on the substratum. As described by Spegazzini, two kinds of hyphæ arise from a basal stromatic stratum: very long hyphæ and distinctly shorter ones. The longer hyphæ are erect, mostly flexuous and often bent or curved, septate, somewhat cylindrical at the base, with distinct constrictions here and there

and lending sometimes a torulose appearance to the hyphæ, pale brown in colour, 280–350  $\mu$  long, 2.1–2.8  $\mu$  wide towards the base, 5.6–11.2  $\mu$  wide in swollen parts above. The shorter hyphæ are erect, mostly straight, of nearly uniform width throughout and hence nearly cylindrical, brown, septate, 42–56  $\mu$  long, and about 3.5  $\mu$  wide. I have not seen any conidia attached to the short or long hyphæ, although Spegazzini thought they are attached to the shorter hyphæ. This, of course, was in keeping with his original diagnosis of the genus *Cordella*, but will not fit in with the emended diagnosis of the genus given in this paper with *C. spinulosa* as lectotype species. The conidia of *C. tomentosa* resemble those of *C. spinulosa*, being one-celled, dark brown, thick-walled, somewhat narrowly or broadly lozenge-shaped or obovate, somewhat flattened with a longitudinal germ slit, with a pale ridge on the convex side, a basal scar indicating point of attachment to the conidiophore, and 19.6–25.2  $\mu$  long and 14.0–15.4  $\mu$  wide.

The shorter cylindrical hyphæ (*i.e.*, the structures considered to be conidiophores by Spegazzini) are perhaps conidiophores or are perhaps basal parts of the longer hyphæ from which the upper portions have been detached. In any case, with the material on hand it appears difficult to decide whether this species is the same as *Cordella spinulosa* or if it is at least congeneric with *C. spinulosa*. The name *C. tomentosa* may, therefore, be provisionally retained.

Type material: s/. hojas podridas de Laurinea Paraguay, Call-poi y Yaguaron, 20. xi. 1887, leg. Balansa, nro. 4002 ex Universidad Nacional de La Plata Museo-Instituto Spegazzini, Colecciones micologicas no. 12926.

4. *Cordella chætomioides* Speg., 1887, F. Fueg. No. 445 (*Bol. Acad. Nac. cienc. Cordoba*, 11: 135–311). Saccardo, 1892, *Sylloge Fungorum*, 10: 587.

Spegazzini's description of this species was as follows: "Cæspitulis hinc inde sparsis majusculis 1 mm. d. laxe villosulis, olivaceis; hyphis sterilibus erectis flexuosulis longiusculis ac crassiusculis 200–950  $\times$  5–10  $\mu$ , apice obtusis parce septatis, olivaceis; hyphis fertilibus sterilibus intermixtis, vix papillato-prominulis, stratum proligerum tenuissimum submucoso-membranaceum efficientibus; conidiis globosis 12–15  $\mu$  diam., in sicco sæpius dimidiato-collabascentibus, grosse 1-guttulatis, densissime minuteque asperulis subopace fuligineis. Hab. ad folia Mayteni ac graminacearum coacervata et putrescentia in silvis prope Shammacus Fuegiæ.- Pulvinuli primo intuitu pro Chætomio quodam facillime sumendi lente tamen inspecti mox diagnosendi" (Saccardo, 1892, p. 587).

I have examined the type material (on *Maytenus* sp., Tierra del Fuego, Shammacus, V. 1882, leg. C. Spegazzini ex Universidad Nacional de La Plata Museo-Instituto Spegazzini, Colecciones micologicas no. 12931). Study of type material revealed only a *Chatomium*. The name *Cordella chatomioides* Speg. should be rejected.

5. *Cordella? magna* Speg., 1919, *Bol. Acad. Nac. cienc. Cordoba*, 23: extr. p. 167. Saccardo, 1931, *Sylloge Fungorum*, 25: 771–72.

Spegazzini's description of his fungus was as follows: "Pulvinuli superficiales elliptici majusculi (1–2.5×1 mm.) hispido-velutini aterrimi; setulis praelongis simplicibus subopaces septulatis, 250–500×10 μ; conidiis globosis catenulatis laevibus olivaceo-fuligineis, 8–10 μ diam., catenulis sporophora simplicia breviuscula concoloria fultis, 30–50×10 μ. Hab. ad culmos aredos Graminacearum, prope Asunciōn Paraguay, America aust. (J. D. Ansitz)" (Saccardo, 1931, p. 771–72).

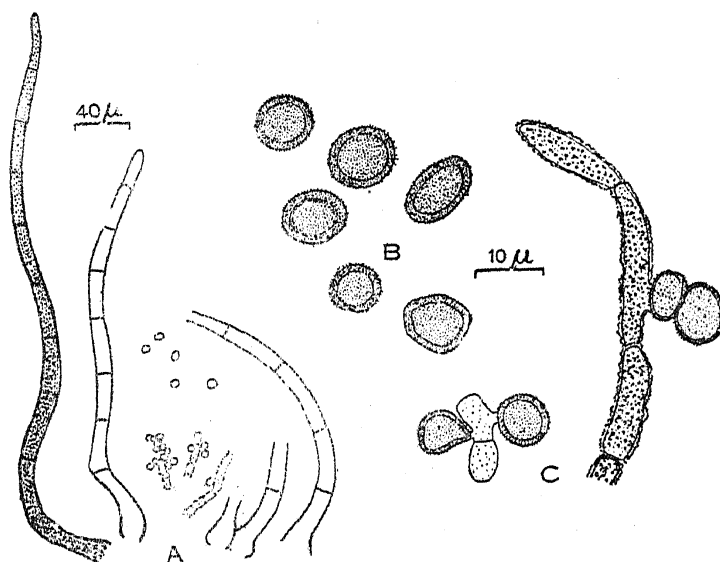


FIG. 4. *Lacellina magna* drawn from the type specimen. A, setae, parts of conidiophores and conidia; B, mature conidia; C, conidiophores and conidia.

I have examined type material of this fungus and the following description is based on the type. The colonies are superficial, black, velvety. The conidiophores are produced intermixed with sterile setae. The setae are stiff, straight, dark brown to brownish-black, opaque, thick-walled, simple, subulate, somewhat swollen at the base, 185–495 μ long, 12.5–17.5 μ wide at the base and 7–8 μ wide near the tip. The conidiophores are subhyaline to pale brown in colour, mostly simple, verrucose but later becoming distinctly warty, septate, clearly constricted at the septa. The conidia are produced



acropleuragenously, formed directly on the conidiophore singly or in simple or branched chains, brown, thick-walled, verruculose, subglobose or ovate or sometimes irregular in shape,  $7.7-10.0 \times 6.2-7.5 \mu$ , or  $6.2-10.0 \mu$  in diameter.

This fungus is a *Lacellina*. Only broken conidiophores and a few intact setae have been seen. The conidia are clearly larger than those of *Lacellina graminicola* (Berk. & Br.) Petch. *Cordella magna* is now placed in *Lacellina* as

*Lacellina magna* (Speg.) Subramanian comb. nov.

= *Cordella? magna* Speg., 1919, *Bol. Acad. Nac. cienc. Cordoba*, 23: extr. p. 167.

Type specimen: on Gramineæ, Paraguay, Asunción, 1891, leg. Anisitz, nro. 49 ex Universidad Nacional de La Plata Museo-Instituto Spegazzini, Colecciones micologicas no. 12933.

6. *Melanographium fasciculatum* Hughes, 1958, *Canad. J. Bot.*, 36: 783.

I have not seen a specimen of *Monotospora fasciculata* Sacc. (1917, *Atti Accad. Sci. Ven.-Trent.-Istr.*, III, 10: 87, non Cooke & Masee, 1892) for which Hughes proposed the new name *Melanographium fasciculatum*. However, since *Cordella* is considered here to be an earlier name for *Melanographium*, the following combination is proposed:

*Cordella fasciculata* (Hughes) Subramanian comb. nov.

= *Melanographium fasciculatum* Hughes, 1958, *Canad. J. Bot.*, 36: 783.

= *Monotospora fasciculata* Sacc., 1917, *Atti Accad. Sci. Ven.-Trent.-Istr.*, 10 87, non Cooke & Masee, 1892. See Saccardo, 1931, *Sylloge Fungorum*, 25: 772.

#### SUMMARY

This paper presents the results of a taxonomic study of some species of *Cordella*, a genus established by Spegazzini in 1886 for two species: *C. coniosporioides* Speg. and *C. spinulosa* Speg. On the basis of study of type material *C. coniosporioides* is considered to be a *Papularia*; this may be indistinguishable from *P. vinosa* (Berk. & Curt.) Mason. *Cordella spinulosa* is chosen lectotype species of the genus and to meet the requirements of proper typification, an emended generic diagnosis is given. *Cordella* is considered to provide the earliest generic name available for the type

species of the genera *Melanographium* Sacc., *Sporostachys* Sacc. and *Pseudocampylopus* Frag. & Cif. *Cordella tomentosa* Speg. is provisionally retained in *Cordella*. Type material of *C. chaetomioides* Speg. revealed only a *Chaetomium* and it is suggested that the name may be rejected. *Cordella magna* Speg. is considered to be a *Lacellina* and the new combination *Lacellina magna* (Speg.) Subram. is proposed for this fungus. *Melanographium fasciculatum* Hughes is transferred to *Cordella* as *C. fasciculata* (Hughes) Subram.

## ACKNOWLEDGEMENTS

I am grateful to Dr. J. C. Lindquist of the Instituto de Botanica "Spegazzini", University of La Plata, Argentina, for loan of Spegazzini's types and to Mr. John A. Stevenson of the National Fungus Collections, U.S.D.A., Beltsville, Maryland, U.S.A., for loan of type material of *Sporostachys maxima*.

## REFERENCES

- Hughes, S. J. .. "Conidiophores, conidia and classification," *Canad. J. Bot.*, 1953, **31**, 577-659.
- .. "Revisiones hyphomycetum aliquot cum appendice de nominibus rejiciendis," *Ibid.*, 1958, **36**, 727-836.
- Mason, E. W. .. "Annotated account of fungi received at the Imperial Bureau of Mycology, List II, (Fascicle 2)," *Mycol. Pap.*, 1933, **3**, 1-67.
- Saccardo, P. A. .. *Sylloge Fungorum*, 1892, **10**.
- .. *Ibid.*, 1931, **25**.
- Spegazzini, C. .. "Fungi Guaranitici. Pugillus I," *Anal. Soc. cientif. Arg.*, 1886, **22**, 186.
- Subramanian, C. V. .. "Fungi imperfecti from Madras—VII," *Proc. Indian Acad. Sci.*, 1955, **42 B**, 283-92.