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ON THE ANAMORPH GENERA *HELICOSPORIUM* AND *DREPANOSPORA*

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ABSTRACT

This paper reviews the status of all known species currently assigned to the genus *Helicosporium*. The generic concept is modified to include species with hyaline conidia whose filaments do not exceed 3 μm diam. Sixteen species are recognized. *Helicosporium murinum* and *H. talbotii* are proposed as *nomen novo* to replace *H. griseum* Bonorden and *H. ramosum* Talbot, which are homonyms of previously named species. *Helicosporium lumbricoides* is considered a synonym of *H. griseum*. Revised descriptions and a key to the species are given. Species resembling *Helicosporium* but having fuscous to dark conidia with filaments exceeding 5 μm in width have been assigned to the genus *Drepanospora*, as *D. pannosa* and *D. viride*. These are described and illustrated. Thirty-six names of doubtful or excluded species are treated.

Key Words: *Helicosporium, Drepanospora,* taxonomy, Hyphomycetes.

The genus *Helicosporium* was established in 1817 by Nees (**1817**), based on *H. vegetum* Nees. Our current concept of the genus stems from Linder (**1929**), who redefined the generic concepts of the overlapping genera *Helicomyces, Helicosporium* and *Helicoma,* separating *Helicomyces* and *Helicosporium* from *Helicoma* on the basis of the relatively thick-walled, non-hygroscopic conidia found in *Helicoma,* and the thin-walled, hygroscopic conidia found in the former two genera. *Helicosporium* was separated from *Helicomyces* . . ." in a purely arbitrary manner on the basis of the presence of elongate and conspicuous conidiophores". . . in *Helicosporium.* Linder's concepts have been generally accepted by most students of the Hyphomycetes. The taxonomic status of *Helicomyces* and *Helicoma* has been reviewed recently (Goos, **1985**, **1986**).

As presently conceived, the genus *Helicosporium* contains 16 species (TABLE I). Linder (**1929**) recognized 14 species in his treatment, listing seven species as questionable. Moore (**1955**) included 17 species in his key, listing eight species as questionable.

With the evidence now available, it is possible to relegate to synonymy some previously recognized species. Sivanesan's (**1984**) reassignment of *Helicosporium vegetum* Nees, the type species, as a synonym of *Helicosporium virescens* (Pers.) Sivanesan, based upon a study of the teleomorphs, is accepted. *Helicosporium neesii* Moore is also regarded as a synonym of *H. virescens. Helicosporium aureum* (Corda) Linder, which Hughes (**1958**) and Sivanesan (**1984**) considered as a synonym of *H. virescens,* is maintained as a distinct species, however, because the teleomorph differs from that of *H. virescens* (Barr, **1980**, pers. comm.). *Helicosporium citreoviride* is treated as a synonym of *H. aureum.*

The suggestion of Hughes (**1953**, **1978**) and Pirozynski (**1972**) that those species producing dark conidia on upright multiseptate conidiophores, whose conidial filaments exceed 5 μm in width and whose conidia frequently bear secondary conidia be assigned to the genus *Drepanospora* Berk. & Curt. (orthographic variant: *Drepanispora*) has also been accepted. *Helicosporium* thus becomes a genus with hyaline, thin-walled, hygroscopic conidia, whose conidial filaments are less than 5 μm diam. The species included in *Drepanospora* may be viewed as intermediate between those included in *Helicosporium* and those placed in *Helicoma.*

To illustrate the principle differences in generic characteristics, a key to *Helicomyces, Helicosporium, Helicoma* and *Drepanospora* follows:

1. Conidia hyaline, thin-walled, hygroscopic, coiled 1–8 times 2
1. Conidia hyaline to dark, thick-walled, non-hygrosopic 3
   2. Conidiophores lacking or formed as short, lateral branches of repent mycelium .... *Helicomyces*

TABLE I

DIAGNOSTIC CHARACTERISTICS OF THE SPECIES *HELICOSPORIUM*

Species	Conidiophores	Conidium diam	Filament width	Number of coils	Colony color
H. abuense	5.5–7 × 95–150	12–24	2.0–2.7	2–3½	Brown
H. aureum	5–7.2 × 390–650	10–20	1–2	2½–3	Yellow to olive
H. decumbens	3.6–5.4 × 25–200	6–10	0.75–1.5	3–4	Brown
H. gracile	2.5–5 × 150	10–15	1.0–1.5	3–3¼	Yellow
H. griseum	3.5–4.5 × 400	18–25	1–2	3–4	Pinkish gray
H. guianenses	3.6–4.5 × 480	21–22	1.4–1.6	3–3½	Yellow
H. hiospiroides	5.5–8.5 × 150–256	21–35	1.4–2.8	1–4	Yellow
H. indicum	3–7.5 × 47–145	25–36	1.4–2.5	1½–3½	Brown
H. lumbricopsis	3.5–5.5 × 25–200	21–28	1.8–2.5	3–4	Gray
H. murinum	3.6–4.5 × 100–250	12–14.4	1–1.5	2¼–4	Gray
H. nizamabadense	3–5.7 × 200	18–28	1.4–2.2	2–3½	Gray to white
H. pallidum	1.5–4 × 580	10–15	1–1.5	2–3½	Gray
H. panacheum	4–6 × 40–70	20–30	2.5–4.5	2–4	White
H. phragmitis	2.5–4.5 × 350	15–18	1.5–2	3–4	Brownish gray
H. talbotii	3.1–4 × 30–240	19–24	1.6	1½–2½	White
H. virescens	5–7 × 190–400	10–20	1–2.5	2–4	Yellow, brown, or gray

2. Conidia borne on differentiated, usually upright conidiophores ..... *Helicosporium*
3. Conidiophores macronematous, closely septate; conidia fuscous, borne on lateral tooth-like projections, coiled 2–11 times ..... *Drepanospora*
3. Conidiophores macronematous or lacking; conidiogenous cells integrated, not tooth-like; conidia rarely coiled more than 3 times . *Helicoma*

Teleomorphs are known for at least four of the anamorph species included in this review. *Tubeufia cerea* (Berk. & Curtis) Höhnel has been associated with *Helicosporium virescens* (=*H. vegetum*) (Hughes, **1953**; Booth, **1964**; Sivanesan, **1984**; Barr, **1980**). *Tubeufia scopula* (Cooke & Peck) Barr is the teleomorph of *H. aureum* (Barr, **1980**), and *T. paludosa* (Crouan & H. Crouan) Rossman has been associated with *H. phragmitis* (Sivanesan, **1984**). *Tubeufia helicoma* (Phill. & Plowr.) Pirozynski has been shown to be the teleomorph of *Drepanospora pannosa* (= *H. pannosum*) (Sivanesan, **1984**) and was found often in New Zealand with its *Tubeufia* teleomorph (Hughes, **1978**).

Diagnostic characters used in distinguishing species of *Helicosporium* are listed in TABLE I. No single set of characters is adequate to separate clearly the different species, rather the species concept must be based upon a combination of characteristics, including gross appearance of the colony, conidiophores, conidiogenous cells and features of the conidia. Even so, it is difficult in many cases to distinguish species clearly. For example, I am in basic agreement with the synonymy set out by Sivanesan (**1984**) for *H. virescens*, but the fact that *H. aureum* has a teleomorph distinct from *T. cerea* compels one to recognize that the anamorphs must also be distinct, even though they appear to overlap in many characteristics.

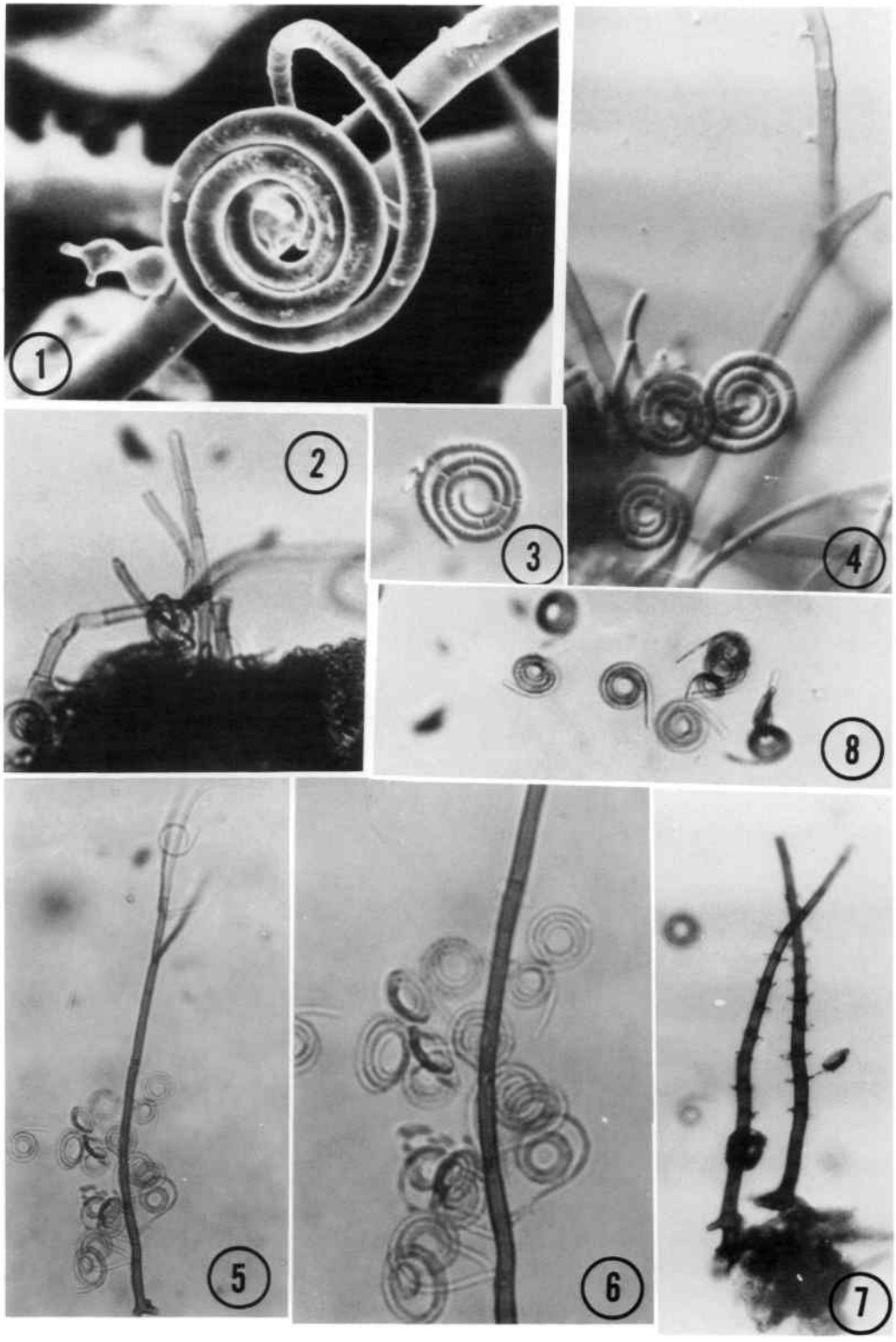
As with past reviews, Linder's monograph has been used as a point of departure. Pirozynski's (**1972**) provocative review has been a source of much inspiration, as have been comments by S. J. Hughes (**1953**, **1958**, **1978**). Descriptive terminology is that used by Goos (**1987**). Colony descriptions are based on appearance of the fungi on natural substrates.

Herbaria acronyms follow *Index Herbariorum* (Holmgren *et al.*, **1981**). Others are: IFO, Institute for Fermentation, Osaka; MFC, Matsushima Fungus Collections, Kobe.

HELICOSPORIUM *Nees, Das System der Pilze und Schwämme*, p. 63. **1817**. Figs. 1, 6, 9, 25, 26.

TYPE SPECIES: *Helicosporium vegetum* Nees, *Syst. Pilze Schwämme*, p. 68. **1817**. [=*Dematium* anamorph of *Tubeufia cerea* (Berk. & Curtis) Höhnell (Sivanesan, 1984).

Colonies effuse, bright colored to fuscous, hairy or cottony. *Mycelium* partly superficial, partly immersed, composed of branched, septate hyphae. *Conidiophores* macronematous, mononematous, unbranched or loosely branched; branches sometimes anastomosing, straight or flexuous; apical portion sometimes setiform.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Conidiogenous cells (FIGS. 1, 10) mono- or polyblastic, integrated, intercalary and sometimes terminal, occasionally small and discrete, sympodial or determinate, cylindrical, denticulate; denticles cylindrical, often narrow. *Conidia* solitary, pleurogenous or acropleurogenous, simple, planate to somewhat cochleate, colorless or brightly colored in mass. *Conidial filament* mostly multiseptate, smooth, hygroscopic; usually (0.75–)1–2.7(–4.5) μm wide (see TABLE I).

KEY TO THE SPECIES OF *HELICOSPORIUM*

1. Conidia yellow or greenish-yellow in mass 2
1. Conidia in mass some other color 6
2. Conidiophores fuscous or deep fuscous; at first simple or erect 3
2. Conidiophores dilute fuscous to subhyaline 5
3. Conidiophores up to 250 μm long, thick-walled at the base, ascending, usually branched; conidiogenous cells bladder-like ..... *H. hiospiroides*
3. Conidiophores exceeding 250 μm in length 4
4. Conidiophores mostly unbranched, up to 600 μm long ..... *H. virescens*
4. Conidiophores branching near the apex, up to 650 μm long ..... *H. aureum*
5. Conidiophores creeping to upright, up to 150 μm long; conidiogenous cells bearing tooth-like denticles, monoblastic ..... *H. gracile*
5. Conidiophores simple or branched in age, erect, up to 480 μm long; conidiogenous cells monoblastic, bearing minute teeth, or polyblastic, bladder-like cells ..... *H. guianenses*
6. Conidiophores much branched, anastomosing frequently 7
6. Conidiophores sparsely branched, or if branched then not anastomosing 8
7. Colonies velvety, up to 400 μm thick, easily separable from the substratum; conidiogenous cells with minute teeth, monoblastic; conidial filament 1–2 μm diam ..... *H. griseum*
7. Conidiophores upright, dark, up to 200 μm long; conidiogenous cells with tooth-like denticles, monoblastic, conidial filament 1.5–2.5 μm diam ..... *H. lumbricopsis*
8. Conidia 6–9 μm diam; filament 0.75–1.5 μm diam ..... *H. decumbens*
8. Conidia more than 10 μm diam 9
9. Colony brown 10
9. Colony white, gray or pinkish 11
10. Conidiogenous cells with minute teeth, monoblastic; conidia 12–24 μm diam, coiled 2–3½ times ..... *H. abuense*
10. Conidiogenous cells with blunt teeth or bladder-like, mono- or polyblastic; conidia 25–36 μm diam, coiled 1½ to 3½ times ..... *H. indicum*
11. Conidial filaments not exceeding 1.5 μm diam 12
11. Conidial filaments greater than 1.5 μm diam 13
12. Conidiophores upright, simple, distinctly septate (up to 250 μm long), not anastomosing; conidia 12–14 μm diam ..... *H. murinum*
12. Conidiophores indistinctly septate, elongate (up to 580 μm), occasionaly anastomosing; conidia 10–15 μm diam ..... *H. pallidum*
13. Conidiophores short, 40–70 μm long; conidiogenous cells polyblastic, bearing clusters of conidia ..... *H. panacheum*
13. Conidiophores longer 14
14. Conidia 15–18 μm diam; filament 1.5–2 μm diam ..... *H. phragmitis*
14. Conidia larger than 20 μm diam 15
15. Conidiophores hyaline to subhyaline; conidiogenous cells rectangular to cylindrical, tooth-like; conidia 18–28 μm diam ..... *H. nizamabadense*
15. Conidiophores fuscous to subhyaline; conidiogenous cells denticulate; conidia 19–29 μm diam ..... *H. talbotii*

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FIGS. 1–8. *Helicosporium* spp. 1. *Helicosporium* sp. SEM photo showing polyblastic conidiogenous cell and conidium (photo by E. E. Butler), *ca* ×2000. 2–4. *H. abuense* (from Type). 2. Conidiophores, *ca* ×200. 3. Conidium with apparent secondary conidium, *ca* ×1000. 4. Conidiophore with conidiogenous cells, *ca* ×500. 5, 6. *H. aureum* (Rhode Island specimen). 5. Setiform conidiophores, *ca* ×400. 6. Polyblastic conidiogenous cells and conidia, *ca* ×650. 7, 8. *H. aureum* (Type of *H. citreoviride* Tubaki). 7. Conidiophores with polyblastic conidiogenous cells, *ca* ×350. 8. Conidia, *ca* ×400.

HELICOSPORIUM ABUENSE Chouhan & Panwar, *Indian Phytopath.* **33**: 289. **1980.**

FIGS. 2–4

Colonies effuse, dark-brown. *Mycelium* superficial, composed of pale brown hyphae, 2.5–5.5 μm diam. *Conidiophores* well developed, mostly simple, rarely branched, light-brown, pale towards the apex, septate, smooth, 95–100 μm long by 5.5 μm diam at base, tapering to 2–3.5 μm at apex. *Conidiogenous cell* simple; tooth-like denticles borne directly on the conidiophore, monoblastic, pleurogenous. *Conidia* hyaline, 12–24 μm diam. *Conidial filament* 2–2.7 μm diam, 6–18-septate, tightly coiled 2–3½ times.

ILLUSTRATIONS: Chouhan and Panwar, **1980**.
SUBSTRATE AND DISTRIBUTION: Wood; India.
TELEOMORPH: Unknown.
SPECIMENS EXAMINED: INDIA: on dead wood, IMI 199276, TYPE.

The original authors compared this fungus to *H. neesii* from which they said it differs in having smaller conidiophores and larger conidia. *Helicosporium neesii* is regarded here as a synonym of *H. virescens*.

HELICOSPORIUM AUREUM (Corda) Linder, *Ann. Missouri Bot. Gard.* **16**: 279. **1929** (*sensu* Linder, **1929**). FIGS. 5–8

≡*Helicomyces aureus* Corda, *Icones Fung.* **1**: 9. **1837.**
=*Helicosporium pilosum* Ellis & Everhart, *Bull. Torrey Bot. Club* **24**: 476. **1877** (*fide* Linder, **1929**).
=*Helicosporium citreoviride* Tubaki, *Trans. Mycol. Soc. Japan* **5**: 2–3, **1964.**

Colonies hairy, yellow to greenish yellow or olive-brown, forming a loose, cottony layer separable from substrate. *Mycelium* superficial, composed of branched, septate hyphae. *Conidiophores* dark, erect, often branched and entangled above, 5–7 μm diam at base, up to 650 μm long. *Conidiogenous cells* bearing minute teeth or bladder-like outgrowths, borne pleurogenously on the lower portions of the conidiophores. *Conidia* dilute yellow to hyaline, 10–20 μm diam. *Conidial filament* 1–2 μm diam, coiled 2½–3 times, indistinctly 10–20 septate.

ILLUSTRATIONS: Linder, **1929**; Goos, **1987**; Tubaki, **1964**; Barr, **1980**.
SUBSTRATE AND DISTRIBUTION: Decaying vegetation and coniferous wood; widespread.
TELEOMORPH: *Tubeufia scopula* (Cooke & Peck) Barr (Barr, **1980**).
SPECIMENS EXAMINED: JAPAN. Kyoto Prefectural University, X.61, Tubaki 10253, on rotten wood (TYPE, *H. citreoviride*) (IFO). PANAMA. Ft. Sherman, Canal Zone, G. W. Martin 6180, on wood (BPI); Canal Zone, 7.VII.37, G. W. Martin 3986, on milled wood (BPI). UNITED STATES. ALABAMA; Montgomery County, date unknown, leg. R. P. Burke, Missouri Bot. Gard. Herb. 57241a, on wood (BPI); Montgomery County, date unknown, R. P. Burke 661 (Missouri Bot. Gard. No. 63075), on wood (BPI). ARIZONA; Pima County, Santa Catalina Mts., VIII.67, R. L. Gilbertson 7106, on *Pinus ponderosa* (BPI). CONNECTICUT; Milford, V.1891, R. Thaxter, on milled wood (FH). FLORIDA; Avon Park, III.37, C. L. Shear 916, on wood (BPI); Eustis, X.1897, R. Thaxter, on wood (BPI); Plant City, II.29, C. L. Shear, on *Pinus* (BPI). IOWA; Iowa City, VII.28, G. W. Martin 1489, on wood (NY); Milford, University of Iowa Lakeside Lab., VII.28, G. W. Martin 1429, on wood (BPI). LOUISIANA; Colleston, IV.32, C. L. Shear, on *Pinus* (BPI); Sterlington, X.34, C. L. Shear 4014, on wood (BPI). MARYLAND; Bellgrove, V.31, C. L. Shear, on coniferous wood (BPI); Beltsville, V.47, L. S. Olive (det. W. W. Diehl), on canvas (BPI). MASSACHUSETTS; Canton, VII.25, D. H. Linder 1051, on pine board (FH); Sharon, date unknown, Farlow Herb. 253 (det. D. L. Linder), on coniferous board (BPI).

HELICOSPORIUM DECUMBENS Linder, *Ann. Missouri Bot. Gard.* **16**: 284–285. **1929.** (FIG. 26)

Colonies effuse, stiff-velvety, dark-brown. *Mycelium* composed of branched, septate hyphae. *Conidiophores* erect, simple at first, later branched and decumbent, fuscous below, paler toward the apex, 4–5 μm diam at base and 75–200 μm long. *Conidiogenous cells* mono- or polyblastic, bearing minute, hyaline teeth or bladder-like cells which may elongate to form short branches. *Conidia* borne pleurogenously, hyaline, 6–9 μm

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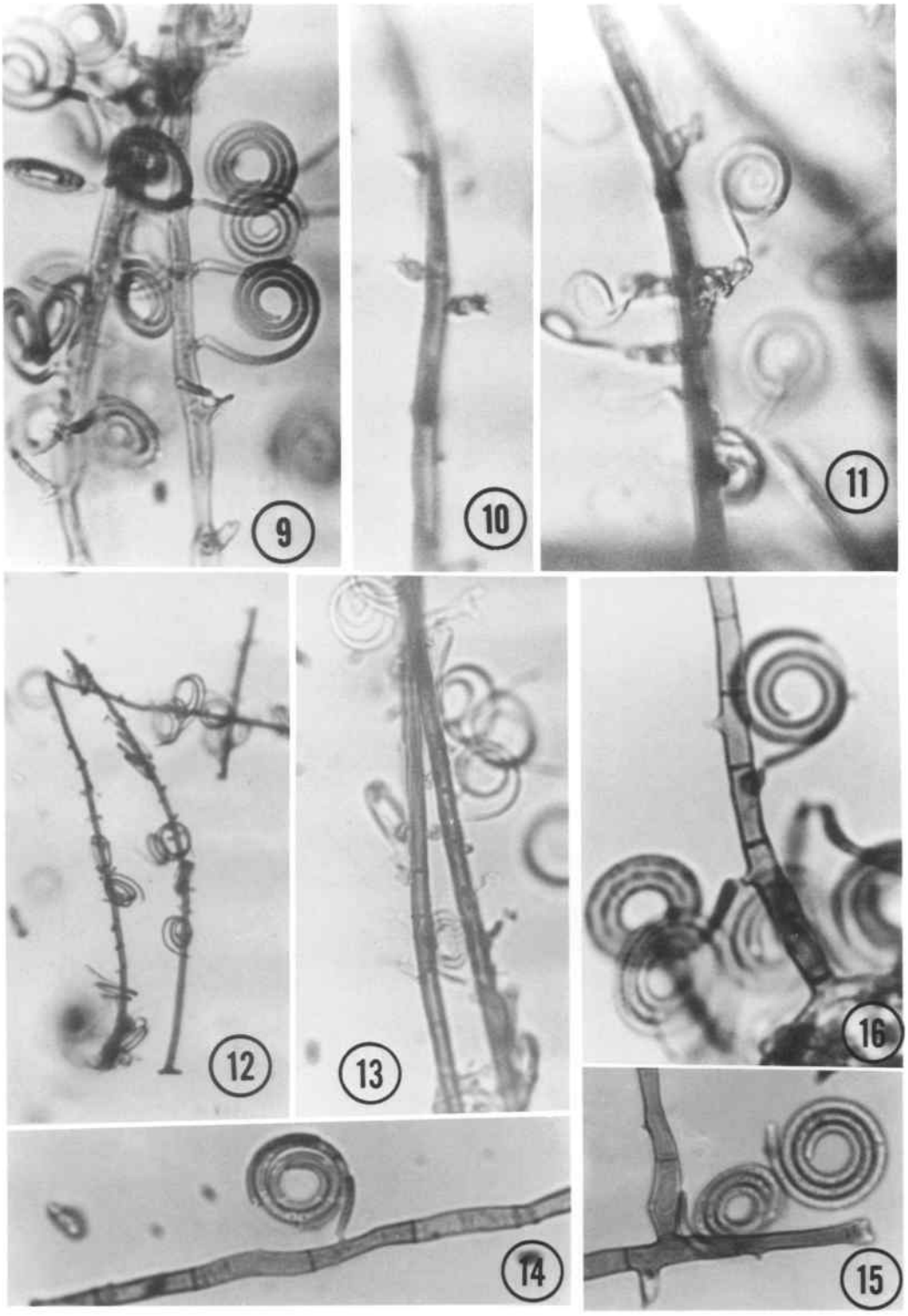
FIGS. 9–16. *Helicosporium* spp. 9. *H. gracile* (Linder No. 779). Conidiophores and conidia, *ca* ×1000. 10. Polyblastic conidiogenous cell of an unidentified species. 11. *H. murinum* (G. W. Martin No. 1269). Conidiophore and conidia, *ca* ×1000. 12, 13. *H. guianenses* (from Type). 12. Conidiophores and conidia, *ca* ×250. 13. Conidiogenous cells and conidia, *ca* ×750. 14, 15. *H. griseum* (TRTC No. 38561). 14. Conidiogenous cell and conidium, *ca* ×1000. 15. Base of conidiophore, showing conidiogenous cell and conidia, *ca* ×1000. 16. *H. lumbricopsis* (Linder No. 727). Conidiophores and conidia, *ca* ×1000.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diam. *Conidial filament* 0.75–1.5 μm diam, coiled 1–2 times.

ILLUSTRATIONS: Linder, **1929.**
SUBSTRATE AND DISTRIBUTION: On *Carpinus,* Austria (Linder, **1929**).
TELEOMORPH: Unknown.

NOTE: Description based on Linder's account.

SPECIMENS EXAMINED: None.

HELICOSPORIUM GRACILE (Morgan) Linder, *Ann. Missouri Bot. Gard.* **16**: 281. **1929.** FIG. 9

≡*Helicomyces gracilis* Morgan, *J. Cincinnati Soc. Nat. Hist.* **15**: 40. **1892.**

Colony effuse, arachnoid, yellow. *Mycelium* composed of branched, septate hyphae. *Conidiophores* creeping, giving rise to erect, simple or branched, fuscous or dilute olivaceous branches up to 150 μm long and 2.5–5 μm diam. *Conidiogenous cells* bearing minute, hyaline, cylindrical teeth on creeping mycelium or on lower portions of erect conidiophores, monoblastic. *Conidia* hyaline or yellow in mass, 10–15 μm diam. *Conidial filament* 1–1.5 μm diam, coiled 3–3¼ times, indistinctly multiseptate.

ILLUSTRATIONS: Linder, **1929**; Morgan, **1892.**
SUBSTRATE AND DISTRIBUTION: Decaying wood and dung; United States (Massachusetts, Ohio, Iowa), Africa.
TELEOMORPH: Unknown.

NOTE: At NY and FH, there are specimens collected by J. B. Ellis in Newfield, New Jersey, labelled "*Helicosporium lilacinum.*" The name *H. lilacinum* is evidently a *nomen nudum,* as it was not taken up by Linder (**1929**) and is not listed by Saccardo (**1882–1931**) or Cash (**1953**). The fungus bears hyaline to dilute-fuscous, upright, frequently septate conidiophores with conidia borne on minute hyaline teeth. The conidia are hyaline, about 15 μm diam, with the filament 1.5–2.0 μm wide and coiled 3–3.5 times. The fungus appears to be conspecific with *Helicosporium gracile.*

SPECIMENS EXAMINED: SOUTH AFRICA. Transvaal, 18.II.49, Talbot No. 36949, on *Acacia mollisima* (FH). UNITED STATES. NORTH CAROLINA; Rockingham, V.34, C. L. Shear (BPI). MASSACHUSETTS; Canton, 20.V.23, Linder No. 779, on moist oak bark (FH); same location, VI.23, Linder No. 787, on rabbit dung (FH); location and date unknown, E. T. Harper 918 (FH).

HELICOSPORIUM GRISEUM Berkeley and Curtis, *Grevillea* **3**: 51. **1874.** [*non H. griseum* (Bon.) Sacc. 1886]. FIGS. 14, 15

=*Helicosporium lumbricoides* Saccardo, *Michelia* **1**: 86. **1877.**
≡*Helicosporium lumbricoides* Sacc. *emend.* Matruchot, *Rech. Devel. Quel. Mucid.* 5-37. **1892.**
=*Helicosporium cinereum* Peck, *N.Y. State Bot. Rep.* **33**: 28. **1880.**
≡*Helicomyces cinereus* (Peck) Morgan, *Cincin. Soc. Nat. Hist. J.* **15**: 41. **1892.**
=*Helicosporium leptosporum* Saccardo, *Syll. Fung.* **4**: 559. **1886.**

Colony effuse, pinkish-gray, light gray, or brownish, cottony, easily separable from substratum. *Mycelium* partly superficial, partly immersed, composed of branched, septate, smooth-walled, subhyaline to dark brown hyphae. *Conidiophores* subhyaline to fuscous, ascending or more or less erect, much branched and frequently anastomosing, 3.5–5.0 μm diam. *Conidiogenous cells* situated on lower parts of conidiophores, monoblastic, bearing minute teeth, 0.5 × 1–2 μm. *Conidia* borne pleurogenously, hyaline, 18–25 μm. *Conidial filament* coiled 2–4 times, 1.0–2.5 μm diam, with 10–14 indistinct septa.

ILLUSTRATIONS: Linder, **1929**; Matsushima, **1971**, **1980**; Talbot, **1956**; Mercado Sierra, **1982**; Ichinoe and Kume, **1970.**
SUBSTRATE AND DISTRIBUTION: Decaying wood and other plant litter; widespread: Belgium, Germany, United States, Canada, Japan, Cuba, New Guinea, Taiwan, South Africa, Panama.
TELEOMORPH: Unknown.

NOTE: I am following Holubova-Jechova (**1980**) and Holubova-Jechova and Mercado Sierra (**1984**) in treating *H. lumbricoides* as a

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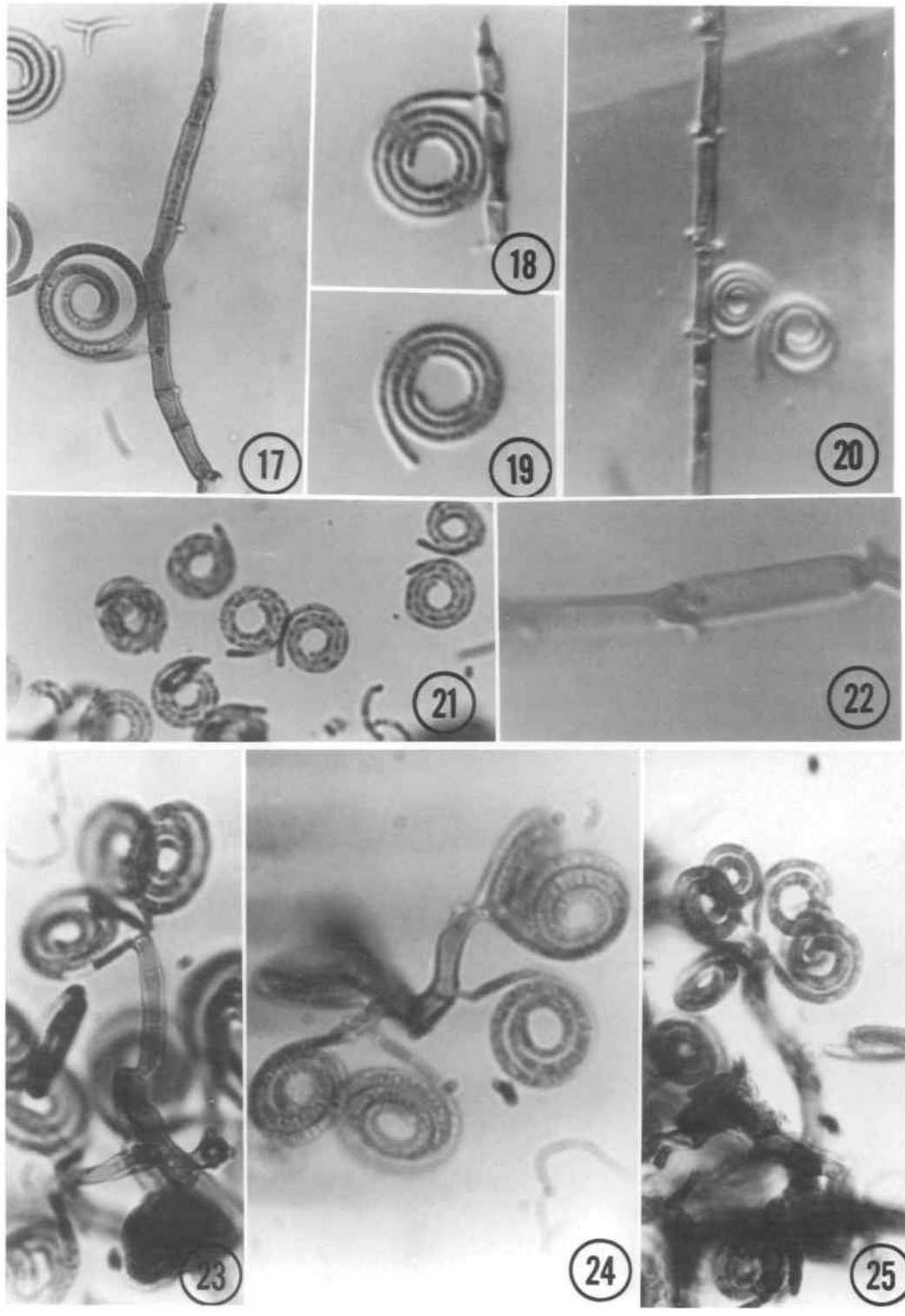
FIGS. 17–25. *Helicosporium* spp. 17–19. *H. lumbricopsis* (from Type). 17. Conidiophore with attached conidium, *ca* ×900. 18. Conidiogenous cell and conidium, *ca* ×900. 19. Conidium, *ca* ×900. 20–22. *H. pallidum.* 20. Linder specimen, Wakefield, Massachusetts; conidiophore showing numerous monoblastic conidiogenous denticles, *ca* ×800. 21. Cesati No. 62 (Type ?); conidia, *ca* ×800. 22. Cesati No. 62 (Type ?); conidiogenous cells, *ca* ×1400. 23–25. *H. panacheum.* 23, 24. Type; conidiophores and conidia, *ca* ×725. 25. R. J. Bandoni No. 7367; conidiophores and conidia, *ca* ×550.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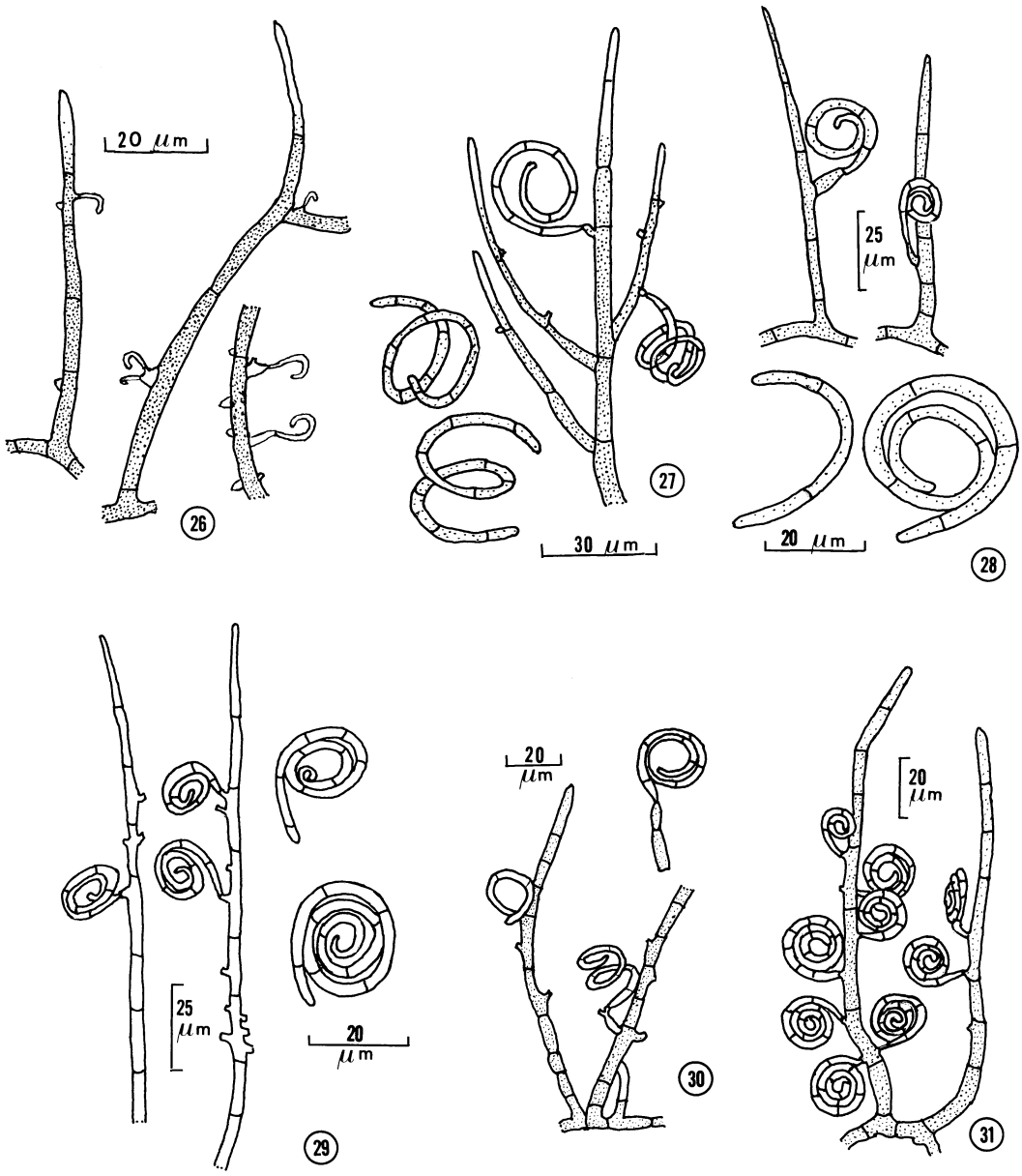


FIGS. 26–31. *Helicosporium* spp. 26. *H. decumbens.* Redrawn from Linder (**1929**). 27. *H. hiospiroides*; redrawn from Reddy, Rao, and Dev Rao (**1970**). 28. *H. nizamabadense*; redrawn from Rao and Dev Rao (**1964**). 29. *H. indicum*; redrawn from Rao and Dev Rao (**1964**). 30, 31. *H. talbotii.* 30. Redrawn from Talbot (**1956**). 31. Redrawn from Ichinoe and Kume (**1970**).

synonym of *H. griseum* Berk. & Curt., which appears to be the earliest name for this species.

SPECIMENS EXAMINED: CANADA. ONTARIO; Nashville, 8.IX.56, TRTC 38561, on branches and sawdust (FH, BPI). CUBA. Trinidad Mountains, White 763, on decayed log (FH). JAPAN. University of Kanazawa, IX.83, K. Siefert 270, on seeds of *Paiclonia tomentosa* (KIRI); Mt. Sengenyama, VII.83, R. Goos JA-8, on milled wood in stream (KIRI). PANAMA. Canal Zone, VII.35, G. W. Martin 6134, on wood (BPI). PUERTO RICO. University of Puerto Rico, Mayaguez, VI.87,

R. Goos, on decayed fruit of *Ficus* (KIRI). RAROIA ATOLL. VII.52. Doty 11269 & 11270, on *Cocos* spathe (BPI). UNITED STATES. MAINE; Kittery Point, FH 841, on wood (FH, BPI); FH slide no. 58 (FH); FH slide no. 17, from oak bark (FH); 30.VII.21, FH slide no. 15, from red oak bark (FH). MASSACHUSETTS; Canton, VI.23, FH 785, on chestnut bark (FH); III.25, FH 1917, on chestnut bark (FH); VII.25, FH 1030, on decaying oak bark (FH); IX.25, FH 1258, on chestnut bark (FH); Sharon, XII.22, FH 464, on edge of oak plank (FH); Waverly, date unknown, FH slide no. 17 (FH); X.1899, FH slide no. 93, on *Ulmus* (FH). NEW HAMPSHIRE; Mt. Chocurua, date unknown, leg. W. G. Farlow, on bark (FH). NEW JERSEY; Newfield, Ellis & Everhart 90, on old cornstalk (BPI). OHIO; Preston, A. P. Morgan, slide no. 3 (FH). PENNSYLVANIA; Olivet, date unknown, Overholts 16846, on *Quercus* bark (FH).

HELICOSPORIUM GUIANENSES Linder, *Ann. Missouri Bot. Gard.* **16**: 280. **1929** (as *H. guianensis*).

FIGS. 12, 13

Colony effuse, yellow, somewhat cottony. *Mycelium* composed of branched, septate hyphae. *Conidiophores* at first simple, erect, later becoming bent, somewhat loosely branched below and occasionally anastomosing, up to 480 μm long, 2.5–4.5 μm diam. *Conidiogenous cells* bearing hyaline teeth or bladder-like projections, mono- or polyblastic. *Conidia* borne pleurogenously, yellow in mass, 20–22 μm diam. *Conidial filament* 1–5 μm diam, coiled 3–3½ times, hygroscopic.

ILLUSTRATIONS: Linder, **1929**; Matsushima, **1971**.
SUBSTRATE AND DISTRIBUTION: Decaying wood, leaf of *Cocos nucifera*; British Guiana, Cuba, Panama, New Guinea, India.
TELEOMORPH: Unknown.

NOTE: Type not seen.

SPECIMENS EXAMINED: CUBA. Soledad, Cienfuegas, 12.VI.41, W. L. White 193, on decaying decorticated limb (FH). PANAMA. Canal Zone, 18.VII.35, G. W. Martin, on old pine board (FH, BPI).

HELICOSPORIUM HIOSPIROIDES Reddy *et al., Curr. Sci.* **39**: 215. **1970**. FIG. 27

Colonies superficial, floccose, deep yellow, becoming brown on drying. *Mycelium* septate, smooth, branched, composed of thin-walled hyphae 3.5–5.5 μm diam. *Conidiophores* well developed, erect, ascending, usually branched, rarely simple, light fuscous and thick-walled at base, becoming thin-walled and hyaline toward apex, 150–250 μm long, 5.5–8.5 μm diam at base. *Conidiogenous cells* of main axis and its branches bear bladder-like projections; projections smooth, hyaline, 4–16 μm long, 1.5–4.5 wide, monoblastic. *Conidia* hyaline, 21–35 μm diam. *Conidial filament* 1.5–3.0 μm diam, 1–4-septate, coiled 1–4 times, cochleate.

ILLUSTRATIONS: Reddy *et al.*, **1970**.
SUBSTRATE AND DISTRIBUTION: Dead wood; India.

NOTE: There seems little reason to distinguish this species from *H. virescens*, except possibly because of the branched conidiophores, but because I have not seen material of it, the species is retained. The description is based on that of Reddy *et al.* (**1970**). The fungus is known only from the type.

SPECIMENS EXAMINED: None.

HELICOSPORIUM INDICUM Rao and Dev Rao, *Mycopath. Mycol. Appl.* **24**: 32. **1964**. FIG. 29

Colonies effuse, brown, velvety to subfloccose. *Mycelium* composed of creeping branched, septate hyphae, 3–5 μm diam. *Macroconidiophores* erect, pointed, dark to yellowish-brown, 5–15 septate, 45–145 μm long, 3–7.5 μm wide at base. *Microconidiophores* light brown to subhyaline, usually continuous, rarely septate, 19–43 μm long, 3–5 μm wide throughout length. *Conidiogenous cells* bearing mono- or polyblastic denticles, 4–14 μm long, 2–6 μm wide. *Conidia* planate, 25–36 μm diam, hyaline to subhyaline. *Conidial filament* coiled 1½ to 3½ times, 1.4–2.5 μm diam, 5–12 septate.

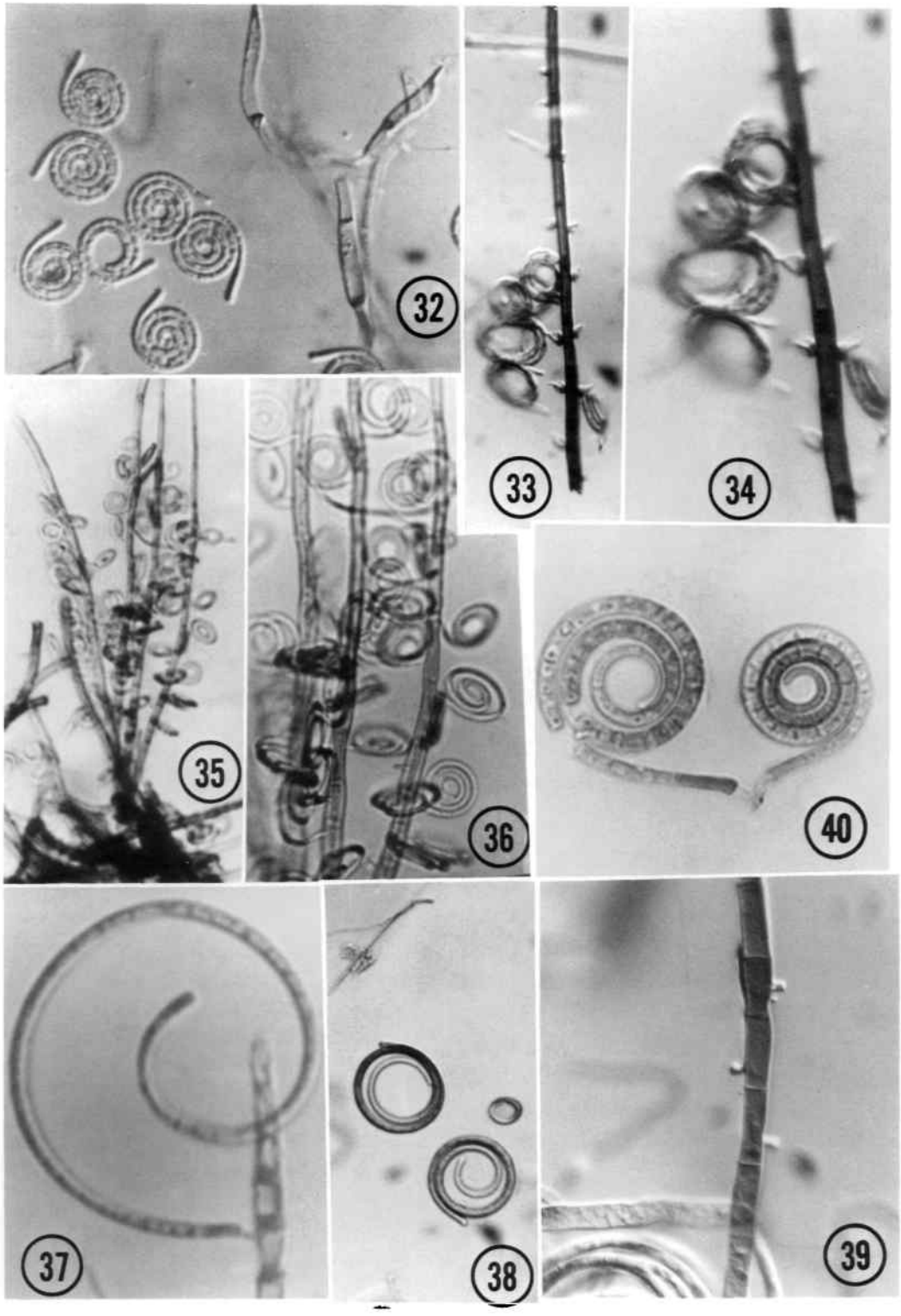
ILLUSTRATIONS: Rao and Dev Rao, **1964**.
SUBSTRATE AND DISTRIBUTION: Old bamboo thatch; India.
TELEOMORPH: Unknown.

NOTE: Pirozynski (**1972**) regarded this species as near *Drepanospora pannosum*. The above description is based on that of Rao and Dev Rao (**1964**). This species is known only from the type, which I have not seen.

SPECIMENS EXAMINED: None.

HELICOSPORIUM LUMBRICOPSIS Linder, *Ann. Missouri Bot. Gard.* **16**: 284. **1929**. FIG. 16

Colonies effuse, olive or gray, occasionally with a pinkish tinge. *Mycelium* fuscous, composed of branched, septate hyphae. *Conidiophores* erect, dark, at first simple, later branching and anas-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tomosing. *Conidiogenous cells* bearing short, hyaline teeth. *Conidia* hyaline, 20–28 μm diam. *Conidial filament* coiled 3–4 times, 1.5–2.5 μm diam, with 18–25 indistinct septa.

ILLUSTRATIONS: Linder, **1929**.

SUBSTRATE AND DISTRIBUTION: Decaying wood; British Guiana, United States (New York, Hawaii), Trinidad.

TELEOMORPH: Unknown.

NOTE: Type not seen. Moore (**1955**) questioned whether this species was distinct from *H. lumbricoides,* but the upright, dark conidiophores found in *H. lumbricopsis* (FIG. 16) seem adequate to distinguish it.

SPECIMENS EXAMINED: PANAMA. PROV. CHIRIQUI, date unknown, G. W. Martin 2791b, on palm stem in moist chamber (FH). TRINIDAD: St. Ann's Valley, Port-of-Spain, date unknown, R. Thaxter (det. D. H. Linder), on decaying wood (FH, BPI). UNITED STATES. FLORIDA; Coconut Grove, I.1898, R. Thaxter, on decayed wood, TYPE (FH). HAWAII; Manoa, Oahu, XII.45, D. P. Rogers 638, on fruit of *Delonix regia* (FH). NEW YORK; Allegheny State Park, 11.VI.61, C. T. Rogerson, NY 1430, on wood (NY).

Helicosporium murinum Goos, *nom. nov.*
FIG. 11

=*Helicosporium griseum* (Bon.) Saccardo, *Syll. Fung.* **4**: 559. **1886**.
≡*Helicoma griseum* Bonorden, *Handbuch,* p. 74. **1851**.

Colony effuse, cottony, gray. *Mycelium* composed of branched, septate, dilute-fuscous hyphae, often ascending and then tending to become fasiculate. *Conidiophores* erect or bent, simple or rarely branched, dilute-fuscous, becoming hyaline near apex, conspicuously septate, 108–250 μm long, 3.5–4.5 μm wide at base, tapering to 1–1.5 μm diam at apex. *Conidiogenous cells* hyaline, bearing tooth-like denticles, monoblastic. *Conidia* borne pleurogenously, hyaline, 12.5–14.5 μm diam. *Conidial filament* 1–1.5 μm diam, coiled 2½–4 times, indistinctly many-septate.

ILLUSTRATIONS: Linder, **1929**.

SUBSTRATE AND DISTRIBUTION: On leaf, wood and grass; Austria, Canada, United States, Cuba.

TELEOMORPH: Unknown.

NOTE: A new name is required for this species, as *H. griseum* (Bon.) Sacc. is a later homonym of *H. griseum* Berk. and Curtis.

SPECIMENS EXAMINED: CANADA. BRITISH COLUMBIA; Vancouver, Univ. of British Columbia, III.77, R. Goos, on bark of *Alnus* (KIRI); ONTARIO; Toronto, date unknown, T. Langton, on bark (FH). UNITED STATES. IOWA; Iowa City, 1933, G. W. Martin 1269, on dead grass (FH). MASSACHUSETTS; Dorchester, IV.38, Linder slide no. 2730, on decaying wood (FH). NEW YORK (?); date unknown, J. S. Billings 156, on wood (FH, NY).

HELICOSPORIUM NIZAMABADENSE Rao and Dev Rao, *Mycopath. Mycol. Appl.* **24**: 34. **1964**.
FIG. 28

Colonies effuse, gray to white, powdery. *Mycelium* composed of branched, septate, hyaline hyphae, 3–5 μm broad. *Conidiophores* arising from repent mycelium, hyaline to subhyaline, 5–16 septate, 50–200 μm long, 3–5 μm wide at base, 2–3 μm wide at apex. *Conidiogenous cells* bearing tooth-like projections, rectangular to irregularly cylindrical, 2–14 μm long, 2–5 μm wide, mono- or polyblastic. *Conidia* subhyaline, 18–28 μm diam. *Conidial filament* coiled 2–3½ times, up to 15 septate, 1.4–2.2 μm diam.

ILLUSTRATIONS: Rao and Dev Rao, **1964**.

SUBSTRATE AND DISTRIBUTION: Old bamboo thatch; India.

TELEOMORPH: Unknown.

NOTE: Description and illustration after Rao and Dev Rao (**1964**).

SPECIMENS EXAMINED: None.

HELICOSPORIUM PALLIDUM Cesati *in* Rabenhorst, *Bot. Zeit.* **13**: 598. **1855**. FIGS. 20–22

Colonies effuse, tufted, gray, becoming pinkish. *Mycelium* composed of branched, septate

←

FIGS. 32–40. *Helicosporium* spp. and *Drepanospora pannosa.* 32. *H. phragmitis* (Linder specimen, Wakefield, Massachusetts). Conidia and conidiophores, *ca* ×600. 33, 34. *H. virescens* (from Type, *H. neesii*). 33. Conidiphore and conidia, *ca* ×550. 34. Conidiophore showing polyblastic conidiogenous cells, *ca* ×900. 35, 36. *H. virescens* [Linder and White No. 2839 (as *H. vegetum*)]. 35. Conidiophores and conidia, *ca* ×250. 36. Conidiophores, conidiogenous cells and conidia, *ca* ×550. 37–40. *D. pannosa.* 37. FH No. 7926; early stage in conidium development, *ca* ×850. 38. Type of *H. linderi*; conidia, *ca* ×300. 39. Type of *H. linderi*; conidiophore showing conidiogenous cells, *ca* ×500. 40. FH No. 7926; conidiogenous cells with mature conidia, *ca* ×800.

hyphae. *Conidiophores* dilute-fuscous to fuscous to subhyaline below, hyaline above, sparsely branched, occasionally anastamosing, up to 580 μm long, 1.5–4 μm diam, septa inconspicuous. *Conidiogenous cells* bearing hyaline, slender teeth. *Conidia* borne pleurogenously, hyaline, 10–15 μm diam. *Conidial filament* coiled 2–3½ times, 1 μm diam.

ILLUSTRATION: Linder, **1929.**

SUBSTRATE AND DISTRIBUTION: Decaying wood; Europe, United States (Massachusetts).

SPECIMENS EXAMINED: EUROPE. Cesati Herb. no. 62 (*ex* TYPE ?) (BPI). UNITED STATES. MASSACHUSETTS; Wakefield, X.42, D. H. Linder, on decaying bark of *Robinia pseudoacacia* (FH).

HELICOSPORIUM PANACHEUM Moore, *Mycologia* **46**: 92. **1954.** FIGS. 23–25

Colonies effuse, white, finely arachnoid, punctuated by prominent conidial clusters. *Mycelium* composed of branched, septate hyphae. *Conidiophores* short, 40–70 μm long, 4.5–6 μm wide, simple or sparsely branched, septate, fuscous; terminal cell usually hyaline. *Conidiogenous cells* mono- or more commonly polyblastic, terminating the conidiophore or branch, and bearing tooth-like projections. *Conidia* hyaline, white in mass, (15–)20–30 μm diam. *Conidial filament* tightly coiled 2–4 times, multiseptate, 2.5–4.5 μm diam.

ILLUSTRATIONS: Moore, **1954**; Tubaki, **1958**.

SUBSTRATE AND DISTRIBUTION: Decaying stems of *Zea mays*; decaying leaves. Japan (Tubaki, **1958**), United States (Iowa, Moore, **1954**; Hawaii, Goos, **1980**).

SPECIMENS EXAMINED: CANADA. BRITISH COLUMBIA; Vancouver, Univ. of British Columbia, R. J. Bandoni 7367-c, on woody flower stalk (KIRI). UNITED STATES. HAWAII; Nuuanu Trail, Oahu, 28.IV.77, R. Goos H-367, on fruit of *Casuarina equisetifolia* (KIRI). IOWA; Iowa City, IX.51, G. W. Martin 6454, on old corn stalks, TYPE (NY).

HELICOSPORIUM PHRAGMITIS von Höhnel, *Ann. Myc.* **3**: 338. **1905.** FIG. 32

Colonies effuse, cottony, brownish-gray, tinged pink by the conidia. *Mycelium* composed of branched, septate hyphae. *Conidiophores* up to 350 μm long, 2.5–4.5 μm diam, dilute-fuscous and branched below, hyaline above. *Conidiogenous cells* bearing slender, hyaline teeth, 1 × 1–2.5 μm, monoblastic. *Conidia* light pink in mass, 15–18 μm diam. *Conidial filament* coiled 3–4 times, hyaline, multiseptate, 1.5–2 μm diam.

ILLUSTRATIONS: Linder, **1929**; Webster, **1951**; Chouhan and Panwar, **1980**; Ellis, **1971**.

SUBSTRATE AND DISTRIBUTION: Decaying grasses; widespread.

TELEOMORPH: *Tubeufia paludosa* (Crouan & Crouan) Rossman (Sivanesan, **1984**).

NOTE: In Höhnel's description, the specific epithet is spelled as above; Linder (**1929**) spelled it "*phragmites.*"

SPECIMENS EXAMINED: CANADA. BRITISH COLUMBIA; Vancouver, Univ. of British Columbia, V.82, K. A. Seifert, on acorn in moist chamber (KIRI); III.77, R. Goos, on dead stem of *Cirsium* (KIRI). JAPAN. Boso Peninsula, Tokyo University Experimental Forest, VIII.83, R. Goos JA-23, on sodden wood (KIRI). UNITED STATES. MAINE; Kittery Point, VI.1893, R. Thaxter, slide no. 30, on old *Carex* (FH). MASSACHUSETTS; Wakefield, VII.40, slide no. 4148, on dead grass stems (FH). VIRGINIA; Hopewell, XII.36, slide no. 2090, on old cornstalks (FH).

HELICOSPORIUM anamorph of *Tubeufia helicomyces* Höhnel. 1909.

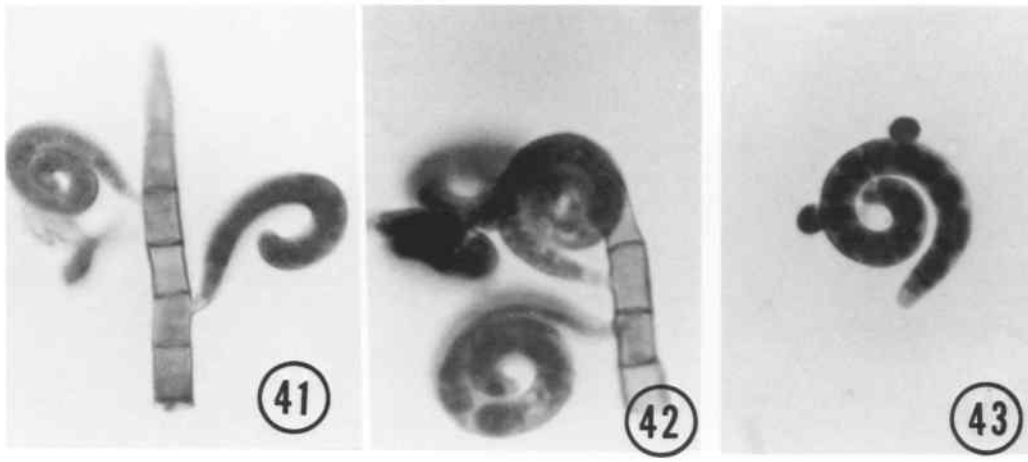
Webster (**1951**) considered *Tubeufia helicomyces* to be the teleomorph of *H. phragmitis.* Sivanesan (**1984**) treated *T. helicomyces* as a synonym of *T. paludosa.* Booth (**1964**) recognized *T. helicomyces* as a distinct species and gave the following description of the *Helicosporium* anamorph.

Conidiophores up to 200 μm long and 4 μm wide at base; branched or unbranched. *Conidiogenous cells* bearing lateral pegs. *Conidial filament* 1–1.5 μm diam, coiled 4–5 times, with 3–11 transverse septa. *Conidia* hyaline, 14–18 μm diam.

Helicosporium talbotii Goos, *nom. nov.* FIGS. 30, 31

≡ *Helicosporium ramosum* Talbot, *Bothalia* **6**: 489–500. **1956.**

Colonies white, pulverulent. *Mycelium* composed of repent, subhyaline to fuscous, branched, septate hyphae, 2.5–4.5 μm diam. *Conidiophores* arising from repent mycelium, fuscous and branching below, hyaline and often anastomosing above, 30–240 μm long, 3.2–4 μm wide. *Conidiogenous cells* denticulate, 1–1.5 × 2–3 μm, on lower parts of conidiophores, monoblastic. *Conidia* white in mass, 19–29 μm diam, mostly 22–24 μm. *Conidial filament* coiled 1½–2½ times, 14–20 septate, hyaline, 1.5–2.5 μm diam.



FIGS. 41–43. *Drepanospora viride* (DAOM 63882). 41, 42. Conidiophores with developing conidia, *ca* ×900. 43. Mature conidium with secondary conidia, *ca* ×900.

ILLUSTRATION: Talbot, **1956**; Ichinoe and Kume, **1970**.

SUBSTRATE AND DISTRIBUTION: Dead wood and leaves; South Africa, Japan.

NOTE: The description above is based on that by Talbot (**1956**) and Ichinoe and Kume (**1970**). A new name is required for this species because *H. ramosum* Talbot is a later homonym of *H. ramosum* (Berk. & Curt.) Massee.

SPECIMENS EXAMINED: None.

HELICOSPORIUM VIRESCENS (Pers.) Sivanesan, *Bitunicate Ascomycetes*, pp. 591–592. **1984**.
FIGS. 33–36

≡*Dematium virescens* Persoon, *Römers Neues Mag. Bot.* **1**: 121. **1794**.
=*Helicosporium vegetum* Nees, *Syst. Pilze Schwämme*, p. 68. **1817**.
≡*Helicotrichum vegetum* (Nees) Wallr., *Fl. Crypt. German.* **2**: 161. **1833**.
≡*Helicomyces vegetus* (Nees) Corda, *Icon. Fung.* **1**: 9. **1837**.
≡*Helicomyces vegetus* (Nees) Pound & Clem., *Bull. Minn. Geol. Nat. Hist. Surv.* **9**: 659. **1896**.
=*Helicotrichum pulvinatum* Nees & T. F. L. Nees, *Nova Acta Acad. Caes. Leop.* **9**: 246. **1818**.
=*Helicosporium olivaceum* Peck, *Rep. N.Y. State Mus.* **27**: 102. **1877**.
=*Helicosporium neesii* Moore, *Mycologia* **49**: 582. **1957**.

Colonies effuse, hairy, yellow to greenish yellow to gray in age, forming a loose, cottony layer. *Mycelium* up to 5–10 mm thick, composed of branched, septate, hyaline to fuscous hyphae. *Conidiophores* dark, erect, septate, mostly unbranched, 4–7 μm wide at base and up to 600 μm long, the terminal portion setiform and lacking conidia. *Conidiogenous cells* mono- or polyblastic, bearing denticles or bladder-like cells, produced laterally on lower portion of conidiophores. *Conidia* planate to cochleate, hyaline, 10–20 μm diam. *Conidial filament* coiled 2–3 (–4) times, septate, 1–2.5 μm diam.

ILLUSTRATIONS: Linder, **1929**; Tubaki, **1964**; Sivanesan, **1984**.

SUBSTRATE AND DISTRIBUTION: Decaying wood; worldwide.

TELEOMORPH: *Tubeufia cerea* (Berk. & Curt.) Höhnel. 1919. (Sivanesan, **1984**).

NOTE: Production of the *H. vegetum* anamorph in culture from ascospores of *T. cerea* was reported by Hughes (**1953**) and by Booth (**1964**). Hughes (**1958**) also listed *D. virescens* as an earlier name for *H. vegetum*.

SPECIMENS EXAMINED: CANADA. ONTARIO; Richmond Hill, York County, V.36, D. H. Linder, on oak bark (FH). GUYANA (British Guiana). Georgetown, 20.X.23, Linder 234A, on decaying seed pods and twigs (FH). THE NETHERLANDS. Groenveld, VII.84, K. Seifert, on underside of bark of deciduous tree (KIRI). UNITED STATES: FLORIDA; Grasmere, III.1893, W. C. Sturgis, on dead *Pinus palustris* (as *H. olivaceum*) (NY); Gainesville, XII.38, E. West, on rotten wood (NY). IOWA; Esterville, VII.33, D. P. Rogers 357, on *Quercus* (FH); Iowa City, V.36, G. W. Martin, on wood (NY). LOUISIANA; St. Martinsville, Langlois 2484, on planks (NY). MAINE; Kittery Point, 1923, R. Thaxter 0-788, on hickory nuts (FH). MARYLAND; Kensington,

TABLE II

DIAGNOSTIC CHARACTERISTICS OF THE SPECIES OF *DREPANOSPORA*

Species	Conidiophores (μm)	Conidium diam (μm)	Filament width (μm)	Number of coils in conidia
D. pannosa	6–8 (10) × 150–300	20–50	5–8 (11)	2–5
D. viride	5–7 × 75–175	15–25	4–7	1½–2

III.68, R. Goos 139, on *Prunus* stump (KIRI). MASSACHUSETTS; Canton, III.25, Linder 1014, on inner bark of chestnut; VII.25, Linder 1025, on bark of oak twig (FH). MISSOURI; Grey's Summit, IV.28, Missouri Bot. Gard. 66538 (leg. Linder), on fallen limbs (BPI); Meramec Highlands, IV.28, Linder, on fallen limbs of deciduous trees (FH). NEBRASKA; Weeping Water, V.1895, C. L. Shear, on rotting oak (FH, BPI). NEW JERSEY; Newfield, 8.VI.1892, J. B. Ellis 258, on wood (TYPE of *H. neesii*) (NY); Newfield, 1898, Ellis & Everhart 1361, on pine board (NY). NEW YORK; Van Etten, IV.26, L. White 2839, on beech wood (FH). OHIO; Preston, A. P. Morgan 641, on wood (as *H. olivaceum*) (NY).

THE GENUS *DREPANOSPORA*

This genus includes two species with fuscous conidia, having conidial filaments in excess of 5 μm diam. The two species can be distinguished on the basis of conidiophore size and characteristics of the conidia (TABLE II).

DREPANOSPORA Berkeley and Curtis, *Grevillea* **3**: 105. **1875**.

TYPE SPECIES: *D. pannosa* Berk. & Curt., Anamorph of *Tubeufia helicoma* (Phill. & Plowr.) Pirozynski (Sivanesan, **1984**) (=*Tubeufia rugosa* Booth, *fide* Pirozynski **1972**).

Colonies effuse, dark, often hairy. *Mycelium* immersed and/or superficial, composed of branched, septate, brownish hyphae. *Conidiophores* macronematous, closely septate, simple or rarely branched, bearing conidia pleurogenously; apical region often setiform. *Conidiogenous cells* mono- or polyblastic, consisting of lateral, tooth-like projections. *Conidia* subhyaline to pale brown, often minutely echinulate. *Conidial filament* cochleately coiled, hyaline to dilute-fuscous usually 4–8(–11) μm diam. *Secondary conidia* frequently present. *Sclérotes pédicellés* sometimes present.

DREPANOSPORA PANNOSA Berkeley & Curtis, *Grevillea* **3**: 105. **1875**. FIGS. 37–40

≡*Helicosporium pannosum* (Berk. & Curt.) Moore, *Mycologia* **49**: 582. **1957**.

=*Helicosporium elinorae* Linder, *Ann. Missouri Bot. Gard.* **16**: 289. **1929**.

=*Helicosporium nematosporum* Linder, *Ann. Missouri Bot. Gard.* **16**: 288–289. **1929**.

=*Helicosporium serpentinum* Linder, *Ann. Missouri Bot. Gard.* **16**: 288. **1929**.

=*Helicosporium linderi* Moore, *Mycologia* **46**: 90. **1954**.

Colonies dense, effuse, velvety, brown to olive-brown. *Mycelium* immersed and superficial, composed of branched, septate, brownish hyphae. *Conidiophores* macronematous, stout, setiform, closely septate, simple or rarely branched. *Conidiogenous cells* with tooth-like lateral projections, bearing 1–3 conidia. *Conidia* subhyaline to pale brown, minutely echinulate, 20–50 μm diam. *Conidial filament* coiled 1½–5 times, cochleate, 12–60 septate, up to 13.5 μm wide. *Secondary conidia* often present. *Sclérotes pédicellés* also formed.

ILLUSTRATIONS: Linder, **1929**; Pirozynski, **1972**; Sivanesan, **1984**; Matsushima, **1971**, **1975**; Hughes, **1978**; Romero, **1983**; Barr, **1980**.

SUBSTRATE AND DISTRIBUTION: Decayed wood; widespread: Australia, Brazil, British Guiana, Chile, Cuba, Great Britain, New Zealand, Hawaii, United States.

TELEOMORPH: *Tubeufia helicoma* (Phill. & Plowr.) Pirozynski. *CMI Mycol. Pap.* **129**: 30. **1972**.

NOTE: Ascospores of *T. helicoma* occasionally germinate by producing phialide-like structures which bear small, globose conidia, as illustrated by Sivanesan (**1984**).

SPECIMENS EXAMINED: GUYANA (British Guiana). Plantation Vryheid, Demerara River, 2.II.24, D. H. Linder 881, on sheath of manicole palm (TYPE of *H. nematosporum*) (FH); Georgetown X.23, Linder 236, on decaying palm sheath (as *H. nematosporum*) (FH). SURINAM. Upper Cottica River, 10.XI.23, Linder 382, on wood chips (TYPE of *H. elinorae*) (FH). UNITED STATES. ATCC No. 14498, dried culture from the TYPE of *H. linderi* (BPI). CONNECTICUT; New Haven, R. Thaxter, on rattan in greenhouse (FH). MISSOURI; Pacific, X.27, Linder, on decaying wood (TYPE of *H. serpentinum*) (FH); Grey's Summit, 21.V.28, Linder, on moist, decaying wood (FH). OHIO; Preston, A. P. Morgan, on wood of *Juglans* (det. D. H. Linder) (FH). VIRGINIA; Ewing, Lee County, 20.V.34, M. L. Lohman, on hardwood chips (det. D. H. Linder) (FH).

Drepanospora viride (Corda) Goos, *comb. nov.* FIGS. 41–43

Bas. *Helicoryne viride* Corda, *Icon. Fung.* **6**: 9. **1854**.
≡*Helicoma viridis* (Corda) Hughes, *Canad. J. Bot.* **36**: 772. **1958**.
≡*Helicosporium viride* (Corda) Sacc., *Syll. Fung.* **4**: 558. **1886**.
=*Helicosporium brunneolum* Berk. & Curt., *Grevillea* **3**: 51. **1874**.
≡*Helicomyces brunneolus* (Berk. & Curt.) Pound and Clements, *Bull. Minn. Geol. Nat. Hist. Survey* **9**: 658. **1896**.
=*Helicoma proliferens* Linder. *Ann. Missouri Bot. Gard.* **16**: 309. **1929**.
=*Helicosporium intermedium* Penzig & Saccardo, *Icon. Fung. Javan.*, p. 105. **1904**.
≡*Helicoma intermedium* (Penzig & Sacc.) Linder, *Ann. Missouri Bot. Gard.* **16**: 306. **1929**.

Colonies effuse, brownish, hairy. *Mycelium* immersed or superficial, composed of branched, septate hyphae. *Conidiophores* simple or branched, occasionally anastomosing, fuscous except for terminal cells, 45–175 × 5–7(–8) μm diam. *Conidiogenous cells* bearing simple or branched teeth, mono- or polyblastic, produced laterally. *Conidia* mostly planate, 15–25 μm diam. *Conidial filament* coiled 1½–2 times, hyaline to dilute-fuscous, 5–11 septate, sometimes minutely roughened. *Secondary conidia* often present; *sclérotes pédicellés* frequently present.

ILLUSTRATIONS: Pirozynski, **1972**; Linder, **1929** (as *Helicoma proliferens*); Goos, **1975** (as *H. proliferens*); Goos, **1986** (as *Helicosporium viride* and as *H. intermedium*).

SUBSTRATE AND DISTRIBUTION: Decaying wood; worldwide.

TELEOMORPH: Unknown.

NOTE: Pirozynski (**1972**) commented that "this species is probably conspecific with or at most represents a variant of the *Helicosporium* anamorph of *Tubeufia helicoma.* Until the association with *T. helicoma* is established, *H. viride* is treated separately." I am following Pirozynski's treatment of this species.

SPECIMENS EXAMINED: UNITED STATES. CONNECTICUT; West Haven, 10.XI.1888, R. Thaxter, on *Acer* (TYPE of *Helicoma proliferens* Linder) (FH). HAWAII (Oahu); Wahiawa, XI.68, R. Goos H-27, on bark (KIRI); Mt. Tantalus State Park, XII.68, R. Goos H-61, on bark of *Eucalyptus* (KIRI); Manoa Falls, IX.69, R. Goos H-241, on dead wood (KIRI); Auloa Road, IV.70, R. Goos H-301, on dead wood (KIRI). MAINE; Linnihen Bay, VII.24, F. O. Gropver 319, on bark of *Acer* (FH). MASSACHUSETTS; Amherst, X.1899, J. E. Humphrey, on wood (BPI); Belmont, IX.34, Linder 745 a, on chestnut bark (FH); Dedham, X.34, G. Darker 5226, on *Acer rubrum* (FH). NEW JERSEY; Newfield, X.1878, M. C. Cooke 3163, on *Acer* (as *Helicoma muelleri*) (BPI). NEW YORK; Albany County, X.16, H. D. House (Missouri Bot. Gard. 54378), on *Populus grandidentata* (BPI); Paul Smith College, VII.87, R. Goos, on *Acer* bark (KIRI); Pack Forest, Warrensburg, 10.III.59, W. B. Kendrick (DAOM 63882), on *Acer* ? bark (BPI).

EXCLUDED AND DOUBTFUL SPECIES

1. *Helicosporium albidum* Grove, *J. Bot.*, N.S. **15**: 204. **1886**.

Linder (**1929**) included a description of this species, but Moore (**1955**) regarded it as a *Species Inquirendae,* stating that material of the fungus was unavailable and that the description was inadequate. As I have not seen material of the fungus, I accept Moore's evaluation.

2. *Helicosporium albo-carneum* (Crouan) Sacc., *Syll. Fung.* **4**: 559. **1886**.

≡*Helicotrichum albo-carneum* Crouan, *Florule Finistere,* p. 12. **1867**.

Both Linder (**1929**) and Moore (**1955**) treated this species as imperfectly known. Linder implied that it was probably *Helicomyces roseus.*

3. *Helicosporium ambiens* (Morg.) Sacc., *Syll. Fung.* **11**: 639. **1895**.

See *Helicoma ambiens* Morgan, *Cincin. Soc. Nat. Hist. J.* **15**: 46 **1892**.

4. *Helicosporium auratum* Ellis, *Bull. Torr. Bot. Club* **6**: 10. **1876**.

See *Helicoon auratum* (Ellis) Morgan, *Cincin. Soc. Nat. Hist. J.* **15**: 50. **1892** (Goos *et al.*, **1986**).

5. *Helicosporium berkeleyi* (Curtis) Sacc., *Syll. Fung.* **4**: 560. **1886**.

≡*Helicoma berkeleyi* Curtis, *Amer. J. Sci.* II **6**: 352. **1848**.

See *Xenosporium berkeleyi* (Curt.) Pirozynski, *CMI Mycol. Pap.* **105**: 27 **1966**.

6. *Helicosporium binale* (B. & C.) Saccardo, *Syll. Fung.* **4**: 560. **1886**.

≡*Helicoma binale* Berk. & Curt. *in* Berkeley and Broome, *J. Linn. Soc. Bot.* **14**: 100. **1873**.

See *Xenosporium berkeleyi* (B. & C.) Pirozynski, *CMI Mycol. Pap.* **105**: 27. **1966**.

7. *Helicosporium boydii* Smith & Ramsbottom, *Trans. Brit. Mycol. Soc.* **5**: 168. **1915.**

See *Helicoma phaeosporum* Fresenius, *Beitr. Mykol.* **3**: 99. **1863.**

8. *Helicosporium brunneum* Schulzer & Saccardo, *Hedwigia* **23**: 126. **1884.**

Both Linder (**1929**) and Moore (**1955**) regarded this as an imperfectly known species.

9. *Helicosporium curtisii* (Berk.) Saccardo, *Syll. Fung.* **4**: 560. **1866.**

≡*Helicoma curtisii* Berkeley, *Grevillea* **3**: 106. **1875.**

See *Helicoma muelleri* Corda, *Icones Fung.* **1**: 15. **1837.**

10. *Helicosporium diplosporum* Ellis & Everhart, *Acad. Phila. Proc.* **1891**: 93. **1891.**

See *Xenosporium berkeleyi* (B. & C.) Pirozynski, *CMI Mycol. Pap.* **105**: 27. **1966.**

11. *Helicosporium ellipticum* Peck, *N.Y. State Mus. Rept.* **27**: 103. **1877.**

See *Helicoon ellipticum* (Peck) Morgan, *J. Cincin. Soc. Nat. Hist.* **15**: 50. **1892.**

12. *Helicosporium ellisii* Cooke, *J. Quekett Microsc. Soc.* **4**: pl. 26, fig. 24. **1877**; Sacc., *Syll. Fung.* **22**: 1436 **1913.**

Linder (**1929**) commented that this fungus was only figured by Cooke, and that Saccardo described it based on Cooke's figure. Linder regarded it as a questionable species.

13. *Helicosporium fasciculatum* (Berk. & Curtis) Saccardo, *Syll. Fung.* **4**: 560. **1886.**

≡*Helicoma fasciculatum* Berkeley & Curtis, *in U.S. N. Pacific Exped.* no. 142. **1853–1856.**

See *Trochophora fasciculatum* (Berkeley & Curtis) Goos, *Mycologia* **78**: 759. **1986.**

14. *Helicosporium fuckelii* Fresenius, *Beitr. Mykol.* **3**: 101. **1863.**

See *Helicosporium virescens* (Pers.) Sivanesan, *Bitunic. Ascomyc. & Anamorphs,* p. 591. **1984.**

15. *Helicosporium herbarum* Saccardo, Bommer & Rousseau *in* E. Bommer & M. Rousseau, *Bull. Soc. Roy. Bot. Belg.* **29**: 299. **1891.**

Linder (**1929**) commented that he was unable to obtain material of this species, and thus considered it of doubtful validity.

16. *Helicosporium insuetum* Petrak, *Sydowia* **4**: 579. **1950.**

See *Pseudocercospora insueta* (Petr.) Deighton, *CMI Mycol. Pap.* **140**: 28. **1976.**

17. *Helicosporium limpidum* (Morgan) Saccardo, *Syll. Fung.* **11**: 639. **1895.**

See *Helicoma limpidum* Morgan, *J. Cincin. Soc. Nat. Hist.* **15**: 47. **1892.**

18. *Helicosporium microscopicum* Ellis, *Bull. Torr. Bot. Club* **9**: 98. **1882.**

See *Helicoma microscopicum* (Ellis) Linder, *Ann. Missouri Bot. Gard.* **16**: 299. **1929.**

19. *Helicosporium monilipes* (Ellis & Johnson) Saccardo, *Syll. Fung.* **1**: 639. **1895.**

See *Helicoma monilipes* Ellis & Johnson, *Proc. Acad. Nat. Sci.* **1894,** p. 376. **1894.**

20. *Helicosporium muelleri* (Corda) Saccardo, *Michelia* **2**: 129. **1889.**

See *Helicoma muelleri* Corda, *Icones Fung.* **1**: 15. **1837.**

21. *Helicosporium nymphaearum* Rand, *J. Agric. Res.* **8**: 219–232. **1917.**

See *Dichotomophthoropsis nymphaearum* (Rand) Ellis, *CMI Mycol. Pap.* **125**: 22. **1971.**

22. *Helicosporium phaeosporum* (Fres.) Saccardo, *Syll. Fung.* **4**: 561. **1886.**

See *Helicoma phaeosporum* Fresenius, *Beitr. Mykol.* **3**: 99. **1863.**

23. *Helicosporium politulum* Schulzer, *Flora* **60**: 271. **1877.**

See *Helicoon politulum* (Schulz.) Lindau *in Rabenh. Kryptog. Fl. Deutschl.* **9**: 277. **1908.**

Linder (**1929**) regarded this as a questionable species.

24. *Helicosporium polysporum* (Morgan) Saccardo, *Syll. Fung.* **11**: 639. **1895.**

See *Helicoma polysporum* Morgan, *J. Cincin. Soc. Nat. Hist.* **15**: 46. **1892.**

25. *Helicosporium populi* (Crouan) Saccardo, *Syll. Fung.* **4**: 560. **1886.**

≡*Helicotrichum populi* Crouan, *Florule Finistere,* p. 12. **1897.**

Linder (**1929**) considered this a questionable species.

26. *Helicosporium prasinum* Preuss, *Linnaea* **24**: 111. **1851.**

Linder (**1929**) considered this a questionable species.

27. *Helicosporium pulvinatum* (Nees) Persoon, *Mycol. Eur.* **1**: 19. **1822.**

≡*Helicotrichum pulvinatum* C. G. Nees & T. F. L. Nees, *Nova Acta Acad. Caes. Leop.* **9**: 246. **1818.**

Linder (**1929**) regarded this species as questionable, but Hughes (**1958**) included it as the *Helicosporium* anamorph of *Ophionectria* (*Tubeufia*) *cerea.*

28. *Helicosporium ramosum* (Berk. & Smith) Massee, *Brit. Fung. Fl.* **3**: 440. **1893.**

≡*Helicoryne ramosa* Berkeley & Smith *in* Berkeley, *Gard. Chron., n.s.* **17**: 463. **1882.**

See *Helicoon ellipticum* (Peck) Morgan, *J. Cincin. Soc. Nat. Hist.* **15**: 50. **1892** (Goos *et al.,* **1986**).

29. *Helicosporium recurvum* Petch, *Ann. Roy. Bot. Gard. Peradeniya* **10**: 138. **1926.**

See *Helicoma recurvum* (Petch) Linder, *Ann. Missouri Bot. Gard.* **16**: 312. **1929** (Goos, **1986**).

30. *Helicosporium repens* (Morgan) Saccardo, *Syll. Fung.* **11**: 639. **1895.**

See *Helicoma repens* Morgan, *J. Cincin. Soc. Nat. Hist.* **15**: 47. **1892.**

31. *Helicosporium richonis* Boudier, *Icon. Mycol.* **4**: 349. **1910.**

See *Helicoon richonis* (Boud.) Linder, *Ann. Missouri Bot. Gard.* **16**: 323. **1929** (Goos *et al.,* **1986**).

32. *Helicosporium simplex* Sydow, *Mem. Herb. Boissier* **4**: 7. **1900.**

See *Trochophora fasciculatum* (B. & C.) Goos, *Mycologia* **78**: 759. **1986.**

33. *Helicosporium spectabile* Fautrey & Lambotte, *Rev. Mycol.* **17**: 70. **1895.**

See *Helicoma phaeosporum* Fresenius, *Beitr. Mykol.* **3**: 99. **1863.**

34. *Helicosporium thysanophorum* Ellis & Harkness, *Bull. Torr. Bot. Club* **8**: 27. **1881.**

See *Helicodendron fuscum* (Berk. & Curt.) Linder, *Ann. Missouri Bot. Gard.* **16**: 332. **1929** (Goos *et al.,* **1985**).

35. *Helicosporium tiliae* Peck, *Bull. Torr. Bot. Club* **34**: 103. **1907.**

See *Helicoma muelleri* Corda, *Icon. Fung.* **1**: 15. **1837.**

36. *Helicosporium velutinum* (Ellis) Saccardo, *Syll. Fung.* **4**: 561. **1886.**

See *Helicoma velutinum* Ellis, *Bull. Torrey Bot. Club* **9**: 134. **1882.**

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