ACTA MYCOLOGICA
VOL. XXV (1) 141-155,
1989

Helicosporous Hyphomycetes from Poland

ALICJA BOROWSKA

Institute of Botany, Warsaw University, 00-478 Warszawa,
al. Ujazdowskie 4, Poland

Borowska A.: *Helicosporous Hyphomycetes from Poland*. Acta Mycol. 25(I): 141-155, 1989.

Recent series of Goos's works (1985, 1986, 1987) on helicosporous *Hyphomycetes* have stimulied the studies of some material from the author's collection. The taxa presented in this paper, i.e. *Cirrenalia lignicola* Kirk, *Helicoon fuscosporum* Linder, *H. richonis* (Boudier) Linder, *H. sessile* Morgan, *Slimacomyces monospora* (Kendrick) Minter, and *Troposporella fumosa* Karsten, are recorded in Poland for the first time.

Cirrenalia lignicola Kirk, Trans. Brit. Mycol. Soc. 77: 283. 1981.
(= *Helicopsis punctata* Peck, N. Y. State Mus. Bull. 167: 26. 1912).

Colonies punctiform, pulvinate, scattered, 30-100(-300) μm diam, up to 40 μm thick, or effuse, olivaceous brown to dark brown. Mycelium minly immersed in the substratum, composed of septate, branched, brownish, up to 3 μm wide hyphae.

Conidiophores micronematous or semi-macronematous, simple or branched, usually fasciculate, smooth, subhyaline or pale brown, 10-36(-60) × 2-4 μm, sometimes moniliform up to 6(-8) μm wide. Conidiogenous cells monoblastic, integrated of discrete, determinal, solitary or in pairs, lageniform or occasionally cylindrical, subhyaline, 6-8(-10) × 2-5(-6) μm wide at the apex. Conidia simple, acrogenous, dry, olivaceous brown, thightly coiled $1^1/_2$-$1^3/_4$ (-2) times, with 6-13(-14) dark septa, constricted at the septa; (12-)16-20 μm diam, (-4)5-6 μm thick, apical cell rounded and at the periphery of the helix, basal cell tapering, slightly paler and in the centre of the conidium. (Fig. 1).

Specimens examined. On rotten wood of *Quercus* sp., reserve Sieraków, Kampinos National Park, 21.05.1971, WA 31848; on rotten wood of *Fagus sylvatica*, Swiętokrzyski National Park: Mt. Św. Krzyż, 23.09.1973, WA 31851, Mt. Łysica, 30.05.1974, WA 31852; on rotten wood of *Fagus sylvatica*, Reda near Gdynia, 15.06.1975, WA 31850; on rotten wood of *Quercus* sp.,

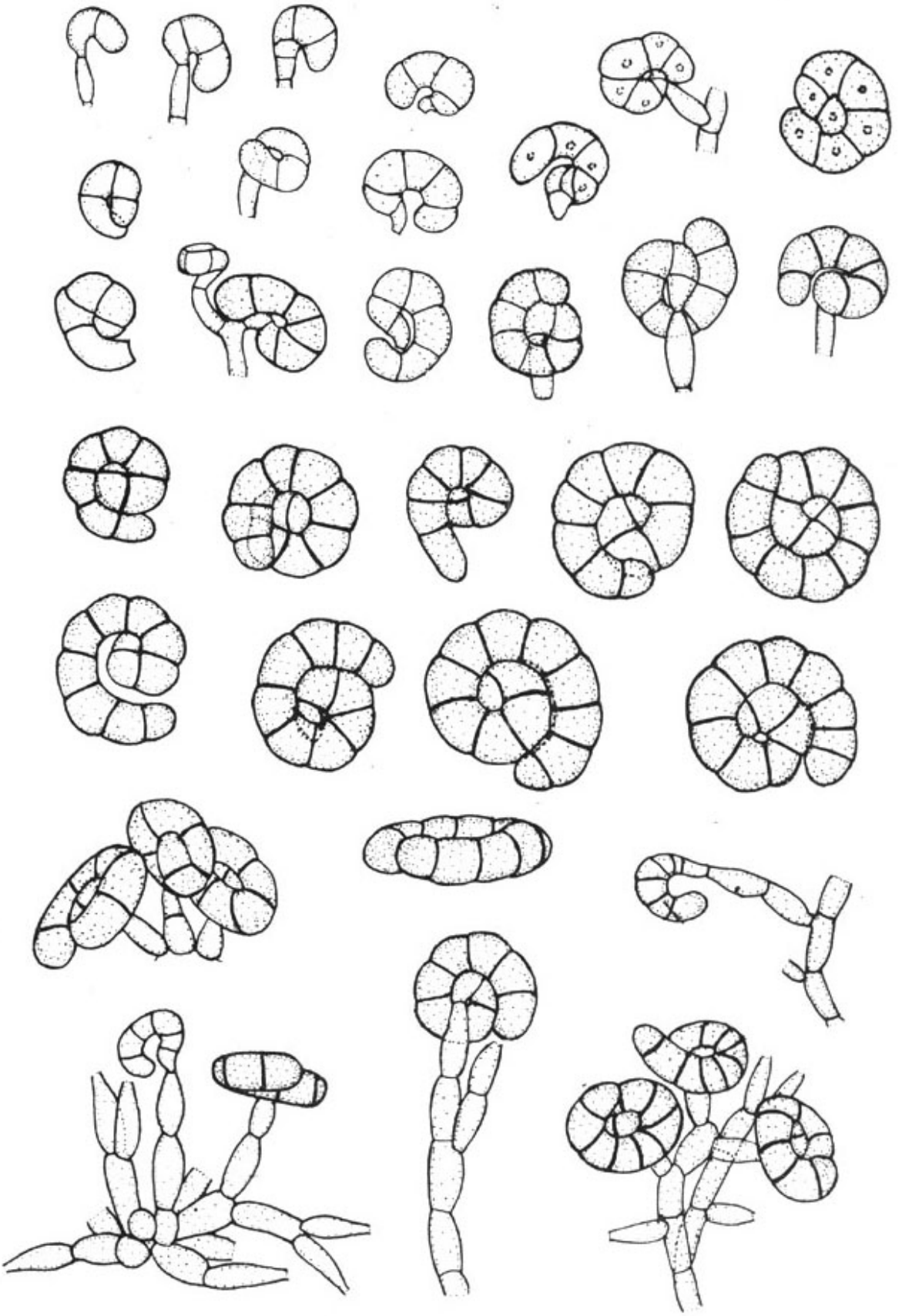

Fig. 1. *Cirrenalia lignicola* Kirk
conidiophores and conidia; WA 31852, WA 31853 (1200 ×)

Bodzentyn near Kielce, 28.05.1974, WA 31853; on rotten bark on branch of *Tilia cordata*, Mt. Chełmowa near Kielce, 30.05.1974, WA 31854.

From the analysis of numerous samples collected in Poland it may be inferred that the fungi under study have high morfological variation of their conidiophores. The features of colonies, mature conidia and common conidiogenesis type indicate that all samples represent a single species, which may be classified as *Cirrenalia lignicola* Kirk. Its conidia form holoblactically at the top of conidiogenous cell; the initial phase, when conidia are spherical, 1-celled and hyaline, is fairly short. Already in 2-celled phase conidium apex bents at an angle both to the long axis of conidiogenous cell and basal cell of conidium. In the further development, which is fairly rapid, condium elongates, twists and produces transverse septa. In conidium already separated from conidiogenous cell basal part is hardly visible. It is smaller, with its wall slightly thinner than those of other conidium cells, bent at different angle and located in the centre of tightly coiled cells ring. In slides from older colonies conidia with damaged basel cell have been observed, it suggests that under unfavourable conditions this cell, as more thin-walled, is susceptible to earlier damage. Conidia very rarely detach together with a conidiogenous cell.

One may consider *Cirrenalia lignicola* an epixylous fungi associated with wood and bark of deciduous trees, often encoutered in forests with *Fagus sylvatica* and *Quercus robur*. Besides Great Britain (Kirk 1981) and Poland it probably occurs also in other European (?Hungary: Holubová-Jechová 1979, sub *Helicoma olivaceum* (Karsten) Linder and non-European country but was mistaken for *Helicoma* species, especially for *H. olivaceum*, *H. monilipes* or *Troposporella ramosa*.

The classification by Kirk (1981) of a newly described fungus to *Cirrenalia* genus is justfied not only in distinctly different type of conidia maturation and location of conidium base in its centre (Sutton 1975, Kirk 1981), also conidiogenesis type, and that of maturation process, as well as the location of mature conidium against conidiogenous cell are in *Cirrenalia lignicola* similar to those that occur in *C. donnae* (Sutton 1973), *C. pygmea* (Kohlmeyer 1966), *C. japonica* (Goos 1985) or *C. basiminuta* (Raghm-Kumar et al. 1988).

Linder (1929) transferred *Helicopsis olivaceus* Karsten to *Helicoma* genus and cosidered this taxon as conspecific with *Helicopsis punctata* Peck. He also stressed its similarity to *H. monilipes* Ellis et Johnson. The diagnosis of *Helicoma olivaceum* (Karsten) Linder was done on the basis of the material from *Helicopsis olivaceus* Karsten and *Helicopsis punctata* Peck types. Conidiogenasis in *H. punctata* (Linder 1929: pl. 19, fig. 14) unequivocally indicates the same mode of conidium formation as in *Cirrenalia lignicola*, i.e. conidium base is located in its centre. Both the description and figure 15 (pl. 19) of conidia shows that they originated from a young fungus colony which may

be identified as *C. lignicola*. Unfortunately, unequivocal interpretation of figure 13 (pl. 19) is impossible. Only new analysis of *Helicopsis punctata* Peck type may elucidate its conspecifity with *Cirrenalia lignicola*.

Figure 16 (pl. 19) from Linder's (1929) work obtained on the basis of *Helicopsis olivaceus* Karsten type presents only single conidia which are so similar to those produced by *Troposporella fumosa* Karsten that even by Linder they could have been mistaken. Goos (1986) analysed *Helicoma olivaceum* type (from Farlow herbarium) and Taiwan strains (no 6678 from Matsushima (1980) collection). The figures in Goos's (1986 fig. 26; 1987, fig. 24) and Matsushima's (1980, fig. 24) works suggest that both these species shuld be classified into *Troposporella fumosa*. For Karsten's and Peck's type materials may include both *Helicopsis punctata* and *Troposporella fumosa*.

Helicoon fuscosporum Linder, Ann. Miss. Bot. Gdn. 16: 326. 1929.

Colonies on natural substrate effuse, pulverulent, dark brown, dry shining. Mycelium immersed and partly superficial, hyaline to brownish, composed septate, branched hyphae, up to 2-3 μm thick.

Conidiophores micronematous or macronematous, mononematous, erect or slightly curved, simple or sparingly branched, subhyaline or brownish, paler above, 12-40 × 2-3 μm. Conidiogenous cells blastic, terminal, integrated, subhyaline, 10-14 × 2-3 μm. Conidia ovoidal or fusiform, occasionaly cylindrical and curved, olivaceous brown, brown, or rarly fuscous, smooth (9-) 12-17 times tightly coiled in three planes, 32-50 × (12-)16-24 μm; conidial filament (3-)4 μm thick, with external wall thicker and darker than internal, up to 8 septa per coil. (Fig. 2).

Specimen examined. On dead branch of undetermined shrab, burned forest with *Pinus sylvestris* near Zielona Góra, 15.05.1984 (incubated one year), WA 31841.

Helicoon fuscosporum has been so far recorded from a few localities in Europe (The Netherlands, Great Britain and Sweden), in Japan, and the USA. It inhabits dead leaves of *Betula* sp., *Fagus* sp., *Salix* sp., and *Zelkova* sp. lying in damp sites or in water, also decomposing *Quercus* sp. and *Rubus* sp. twigs, and *Alnus glutinosa* fructifications (Beverwijk 1954, Ellis et Ellis 1986, Goos et al. 1986, Linder 1929, Matsushima 1975). The fungus recorded from Poland as *H. fuscosporum* exibits most common features with the strain described by Beverwijk (1954). This author, who also had Linder's type, found two fungi to be identical. In the Goos's et al. (1986) diagnosis of the species Beverwijk's information that conidia may be twisted even 14 times, though rarly, was not included. In Polish sample most conidia were 12-17 times twisted. Conidiophores were lower, lighter and

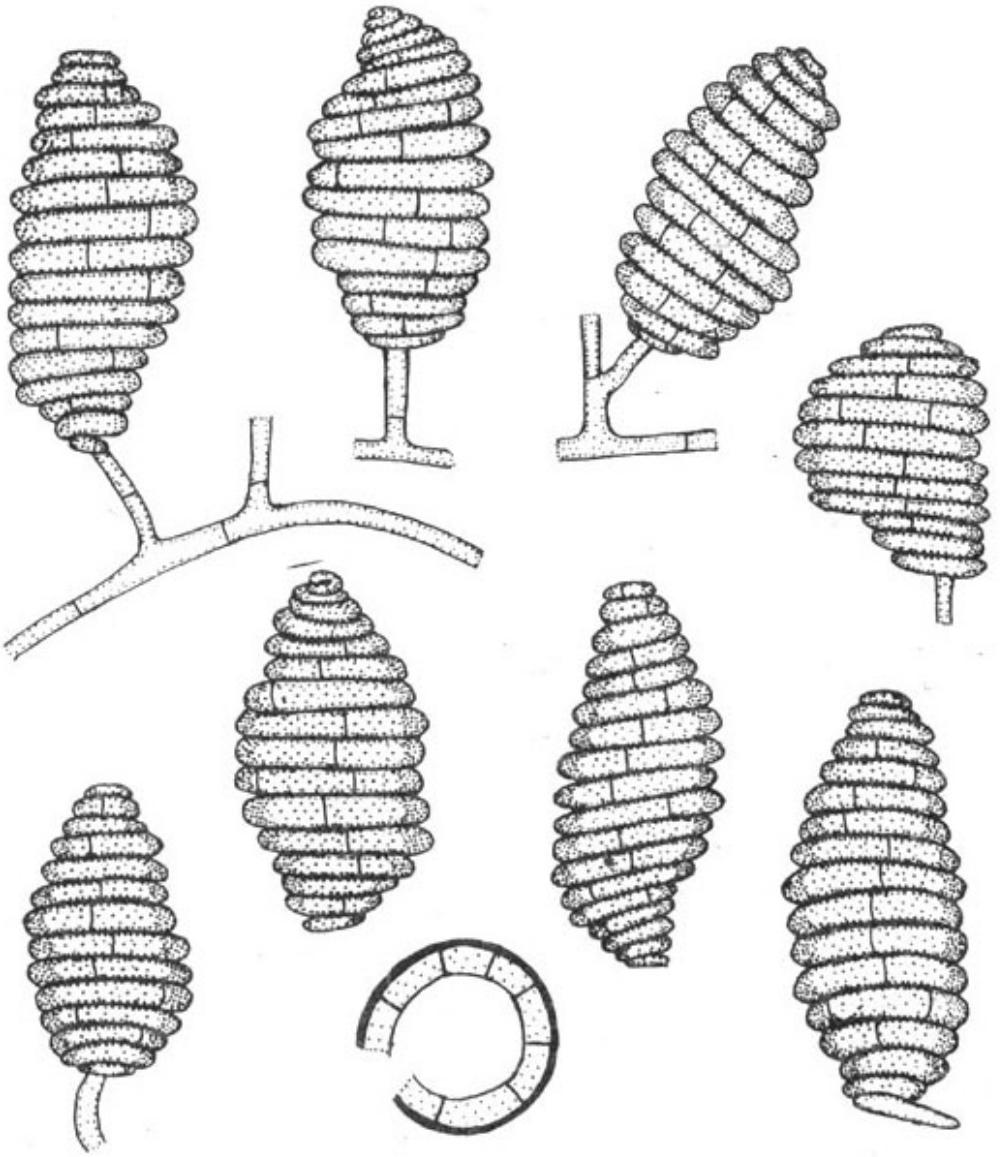

Fig. 2. *Helicoon fuscosporum* Linder
conidiophores and conidia; WA 31841 (1000 ×)

narrower than those described so far. It may result from the specific habitat (burned site) in which the analysed wood fragment was located.

Helicoon richonis (Boudier) Linder, Ann. Miss. Bot. Gdn. 16: 323. 1929.
(= *Helicoon elegans* Arnaud, Bull. Soc. Mycol. Fr. 69: 294. 1953).

Colonies on natural substrate effuse, velvety or cottony, dark brown to black brown, dry shining; on PDA up to 6 cm diam in 4 weeks at 18°C, greyish brown to brown, cottony, reverse dark brown to black. Mycelium

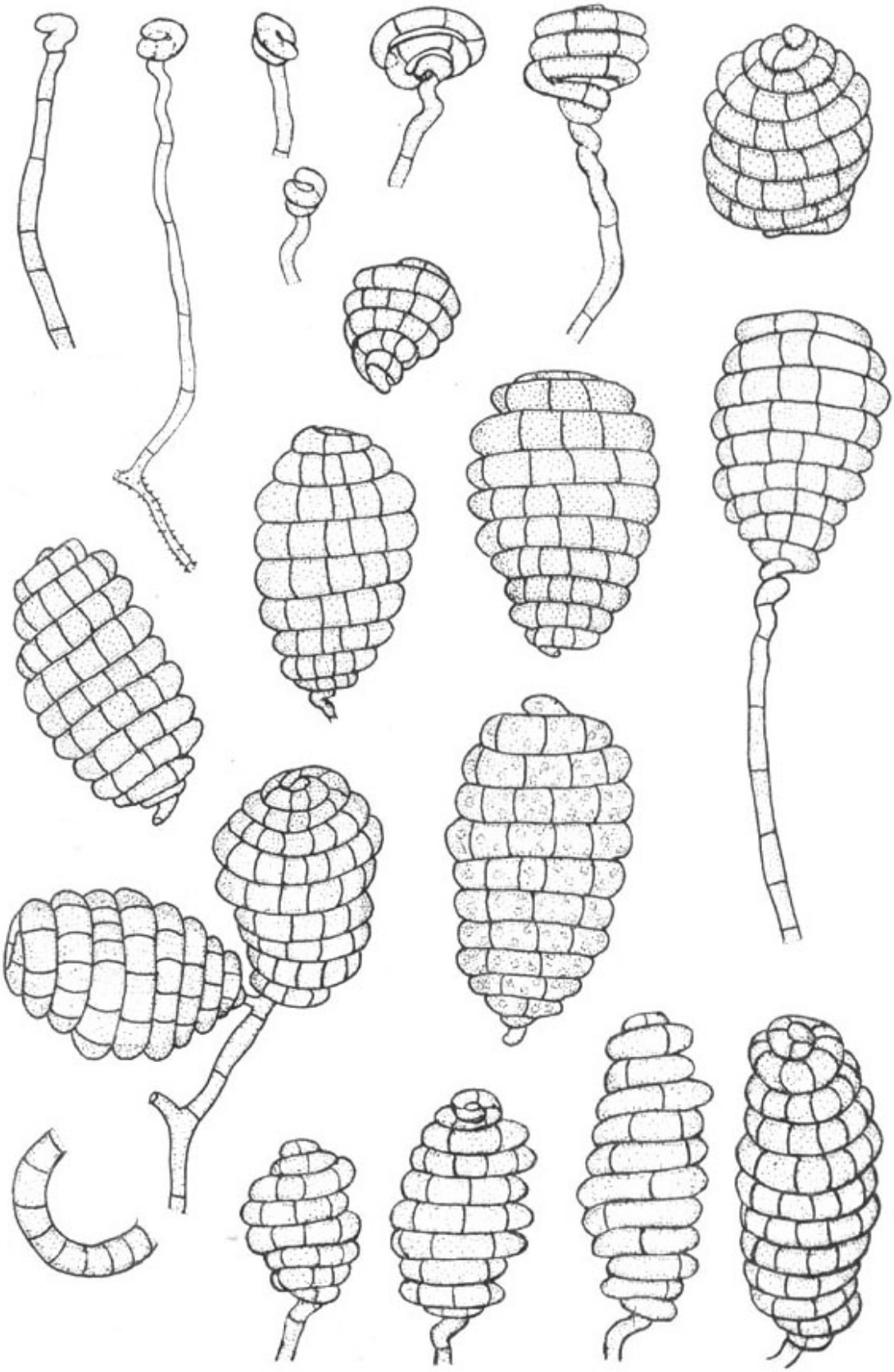

Fig. 3. *Helicoon richonis* (Boudier) Linder

conidiophores and conidia; WA 31846, WA 31847 (the last three on PDA) 1400 ×

superficial and immersed, pale brown to brown, composed of branched, smooth-walled, septate, up to 4 μm wide hyphae (on PDA thiner and superficial hyphae usually echinulate).

Conidiophores mononematous, macronematous, simple of rarly sparingly branched near the base, thick-walled, sometimes curved, usually coiled at the apex, pale olivaceous brown to brown, 30-120 × 4-5 μm (on PDA subhyaline up to 125 μm long). Conidiogenous cells integrated, monoblastic or rarly polyblastic, terminal or intercalary. Conidia usually acrogenous, dolliform or ovoidal (on PDA fusiform), brown to dark olivaceous brown, sometimes spotted, thick-walled, 56-90(-100) × 40-62 μm (on PDA 75-112,5 × 37,5-50 μm), thightly coiled (6-)7-10(-12) times (on PDA 8-12 times) in three planes; conidial filament up to 18-septate, 9-10(-12,5) μm wide. (Fig. 3).

Specimens examined. Culture isolated from rotten wood of *Alnus glutinosa*, reserve Sieraków, Kampinos National Park, 25.05.1968, WA 31846; culture from rotten wood of *Betula* sp., 11.09.1969, WA 31847; on rotten wood of *Pinus sylvestris*, same locality, 10.10.1986, WA 31844 and on wood of *Carpinus betulus*, 10.10.1986, WA 31842; on rotten wood of *Alnus glutinosa*, reserve Krzywa Góra, Kampinos National Park, 20.06.1970, WA 31845; on dead cone of *Picea abies*, Białowieża National Park, 12.08.1972, WA 31943.

Helicoon richonis grows on decaying wood of *Quercus* sp., *Pinus* sp., *Populus* sp., *Salix* sp. and other trees, rarer on dead leaves of these plants and of its fruits. It has been so far recorded from Europe (France, The Netherlands, Great Britain) and North America (Canada) by: Linder (1929), Arnaud (1953), Michelides and Kendrick (1982), and Goos et al. (1986). In Poland the fungus common in alder-carrs in the Kampinos National Park, especially in the Sieraków reserve on the wood of *Alnus glutinosa*, *Betula* spp., *Carpinus betulus*, more rarly on rotten wood of *Pinus sylvestris* and dead *Quercus* sp., fruits, lying in water and damp sites. It was first recorded in this locality in 1968, and since then it has been present thoughout the growing season. In other communities, e.g. flood-plain forests, it seems rarer.

Helicoon sessile Morgan, Cincinn. Soc. Nat. Hist. Journ. 15: 50. 1892.

Colony on natural substrate effuse, powdery, white. Mycelium immersed, composed of septate, branched, hyaline, up to 4 μm thick hyphae.

Conidiophores mononematous, macronematous, mostly simple, up to 30 μm long, 3-5 μm wide. Conidiogenous cells integrated, terminal monoblastic or ?polyblastic. Conidia dolliform, ellipsoidal, sometimes slightly curved, hyaline, acrogenous, 30-40 × 24-30 μm, tightly coiled (4-)5-7 times in three planes; up to 11 septa per coil, (4-)5-6 μm thick. (Fig. 4).

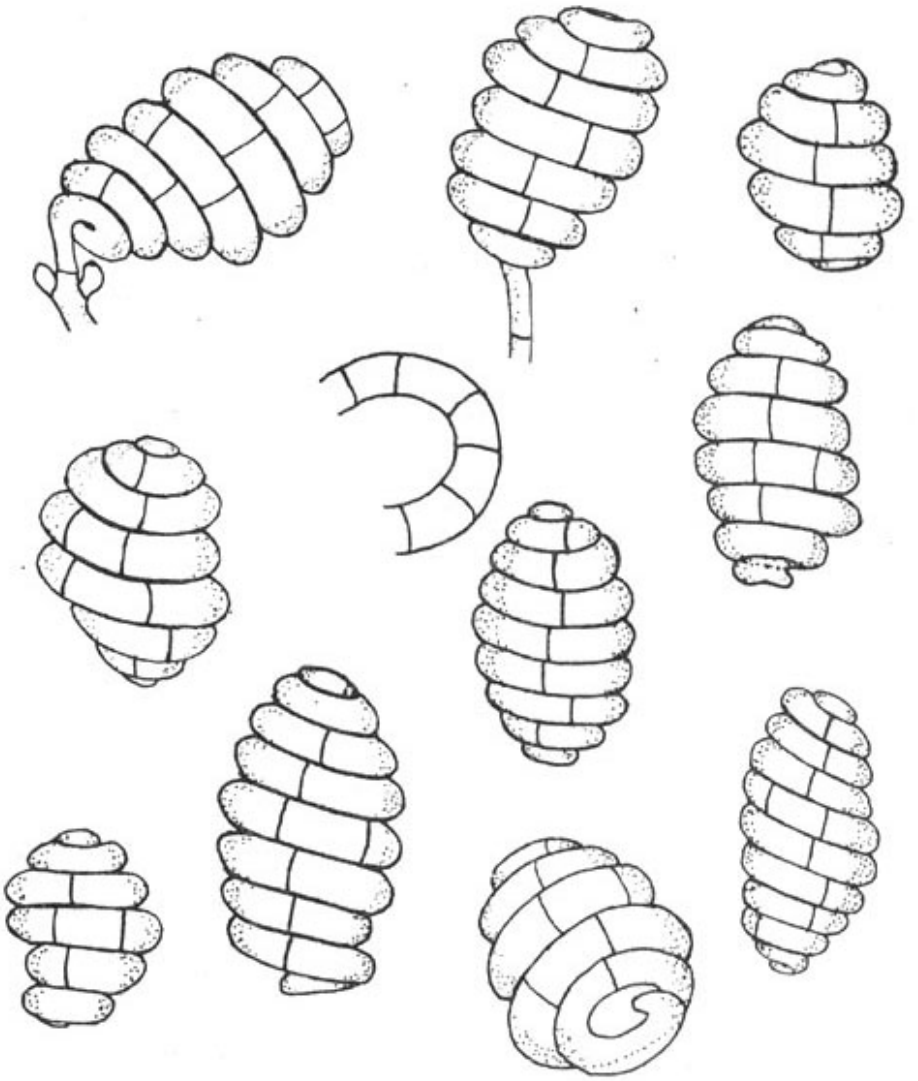

Fig. 4. *Helicoon sessile* Morgan
conidia; WA 31842 (1000 ×)

Specimen examined. On rotten wood of *Carpinus betulus*, reserve Sieraków, Kampinos National Park, 10.10.1986, WA 31842 (with *Helicoon richonis*).

Helicoon sessile seems to be rather rare. It has been recorded from Great Britain and the USA, where it grows on decaying leaves, twigs and wood of *Acer* sp., *Fagus* sp., *Quercus* sp., and on coniferous wood (Linder 1929, Goos et al. 1986, Ellis et Ellis 1986). The species is very similar to *H. farinosum* Linder; both species require further taxonomic studies.

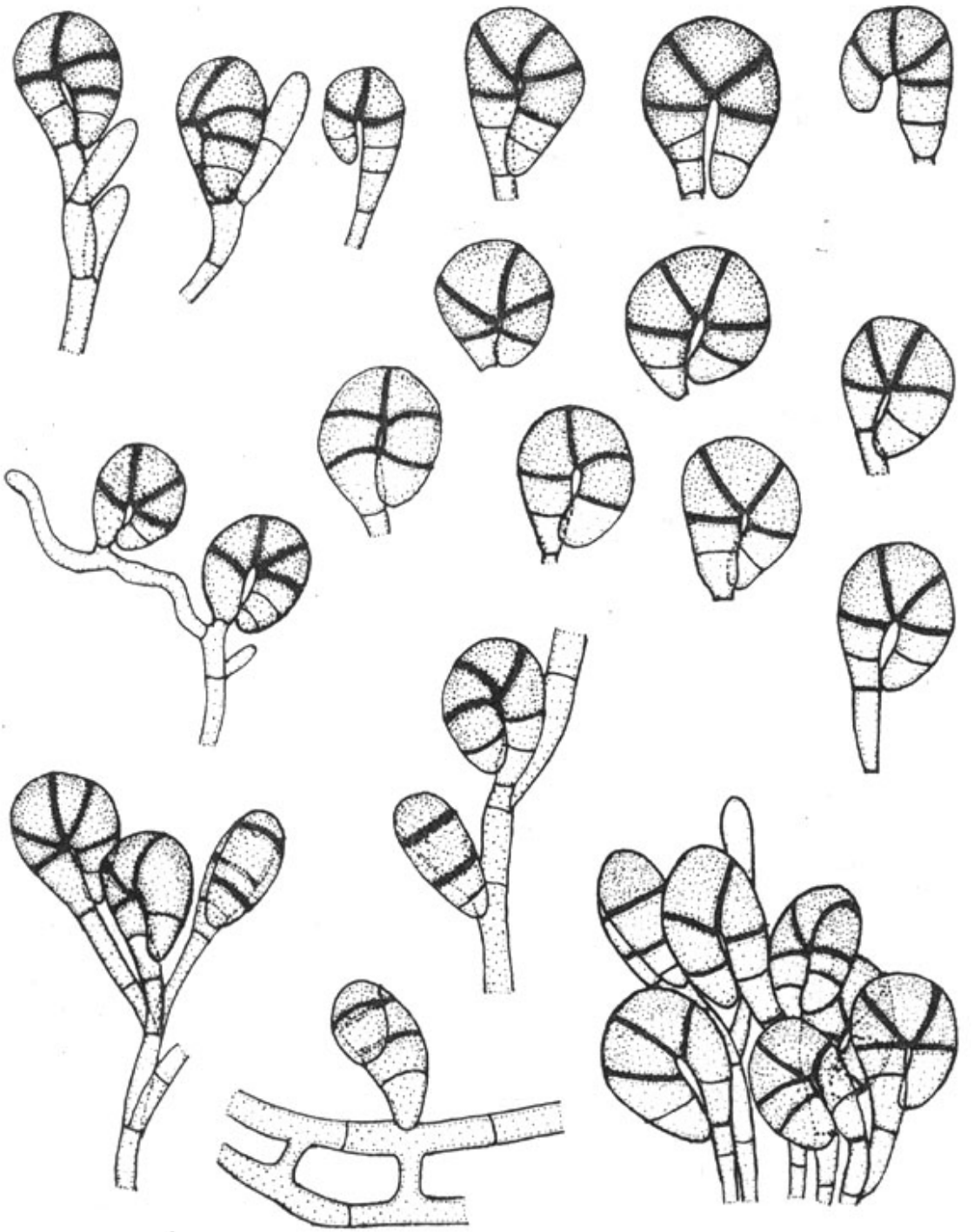

Fig. 5. *Slimacomyces monospora* (Kendrick) Minter
conidiophores and conidia; WA 31840 (1000 ×)

Slimacomyces monospora (Kendrick) Minter, Bull. Brit. Mycol. Soc. 20: 23. 1986.

(≡ *Helicoma monospora* Kendrick, Trans. Brit. Mycol. Soc. 41: 446. 1958. ≡ *Troposporella monospora* (Kendrick) M. B. Ellis, More Demat. Hyphom. p. 47. 1976. = *Helicoma isiola* Moore, Mycologia 49: 584. 1957).

Colonies punctiform and partly effuse, superficial, dark brown to blackish brown, shining. Mycelium partly immersed, partly superficial, sometimes anastomosing; hyphae 2-4,5 μm thick.

Conidiophores micronematous or macronematous, simple or branched, subhyaline to pale brown, 10-50 × (1,5-)2-3(-4) μm, aggregated in sporodochia up to 90 μm diam or solitary. Conidiogenous cells integrated, monoblastic, terminal, usually solitary. Conidia hemicircinate, $^3/_4$-1 times coiled, smooth-walled, (4-)5-7-septate, horseshoe-shaped, 12-16 × 10-14 μm, rounded at the apex, (5-)6-8 μm thick in the broadest part, middle cells brown and thick-walled, 2-2,7 μm wide at the base and tapering or with a small frill. (Fig. 5).

Specimens examined. On rotten cones of *Thuja orientalis*, Botanical Garden Warsaw University, 8.06.1987 (incubated 2 months), WA 31840.

Helicoma monospora was described by Kendrick (1958) on the basis of the data from Great Britain, where it grows on dead pine needles. The fungus both on this substrate and on media formed effuse colonies, unbranched conidiophores and 4-5-septate conidia, 8,5-13 μm in diameter. Ellis (1976) also on the grounds of English materials identified *H. monospora* on dead needles of *Juniperus communis* and *Pinus sylvestris*. This author, considering the formation of sporodochia by the fungus growing on *Juniperus* needles as essential, transferred the species to *Troposporella* genus. He also stressed that *T. monospora* may produce branched conidiophores, and 4-5-septate conidia, 15 μm in diametre (but in figure 31 even 6-septate conidium is presented).

Goos (1986) from the analysis of the type *Helicoma isiola* Moore (NRRL-QM 760) confirmed this taxon to be distinct from *Troposporella monospora* (Kendrick) M. B. Ellis and classified it into *Troposporella* genus.

Minter (1986) formed a new genus, *Slimacomyces* and transferred *Helicoma monospora* Kendrick there. This author indicates that a new genus differs from *Troposporella* in rhexolytic mode of the detachment of conidia in *H. monospora*. From the analysis of materials collected in Scotland from dead needles of *Pinus contorta* and type material of *H. monospora* he found that the fungus formed mainly mononematic conidiophores, whereas sporodochia were produced only occasionally on *Juniperus* needles. From his figure 3 it is clear that *Slimacomyces monospora* (Kendriek) Minter forms 6-7-celled conidia, with their diameter to 15 μm. Goos (1987) agreed with Minter's opinion and give wider diagnosis of the genus *Slimacomyces*, however he did not include Ellis's (1976) information on development of the species typical for *Juniperus* needles.

The studies on the development of *Slimacomyces monospora* on *Thuja orientalis* cones in Poland show that this fungus has high morphological and ecological plasticity. In single sample it forms conidia on a vegetative mycelium, branched and unbranched conidiophores, which grow loosely or aggregate into sporodochia. Its conidia may be detached rhexolytically or schizolytically and may contain from 4 to 7 septa. It resambles *Slimacomyces monospora* (Kendrick) Minter and *Helicoma isiola* Moore.

Moore (1957) described *H. isiola* from New Guinea, isolated from tent material. The diagnosis of this species is based on these characters which are common while it develops on PDA. The author presents (fig. 2) only 2 conidia and one conidiophore which are similar to those presented by Ellis (1975) in the diagnosis of *Troposporella monospora* (fig. 31).

On the grounds of Moor's (1957) and Goos s (1986) works one may suppose that *Helicoma isiola* Moore is the same taxon as *Helicoma monospora* Kendrick described later. However it may be confirmed only by new more thorough analysis of type material from Moor's collection and isolation of more strains of the analysed fungus.

Troposporella fumosa Karsten, Hedwigia 31: 299. 1892.
(= *Helicoma monilipes* Ellis et Johnson in Ellis et Everh., Proc. Acad. Nat. Sci. Phila. 1894: 376. 1894).

Colonies punctiform or subspherical, granular, fawn to yellowish brown, up to 250(-500) μm diam and up to 150 μm thick.

Conidiophores macronematous or semi-macronematous, mostly loosely branched, straight or flexuous, aggregated in groups, sometimes anstomosing, subhyaline, yellowish brown or olivaceous brown at the base, 40-120 μm long, cylindrical (2-)3 μm thick or moniliform and 4-6 μm wide, with septa 5-6 μm or 10 μm apart. Conidiogenous cells rather monoblastic, integrated, cylindrical, subhyaline, 5-10 × 2-4(-6) μm, terminal. Conidia acrogenous or pleurogenous, circinate to planate, simple, pale olivaceous to pale yellowish brown, smooth-walled, 9-15(-17)-septate, usually constricted at the septa, sometimes a few septa slightly darker, thicker and irregularly distributed; tightly coiled $1^1/_2$-$2^1/_4$ times, (11-)12-18(-20) μm diam., (3-)4-5(-6) μm thick, young with oil drops, apical cell rounded and at the periphery of the helix, basal cell tapering (up to 2-3 μm) slightly paler and in the centre of the conidium. (Fig. 6, 7).

Specimens examined. On rotten bark of *Populus tremula*, Smolniki near Suwałki, 28.09.1983, WA 29418; on rotten bark of *Populus tremula*, reserve Bagno Jacek, Wesoła near Warszawa, 8.10.1987, WA 31839.

Genus name, *Troposporella* was first applied by Karsten (1892) for *T. fumosa*. Linder (1929), on the grounds of type material, formulated the

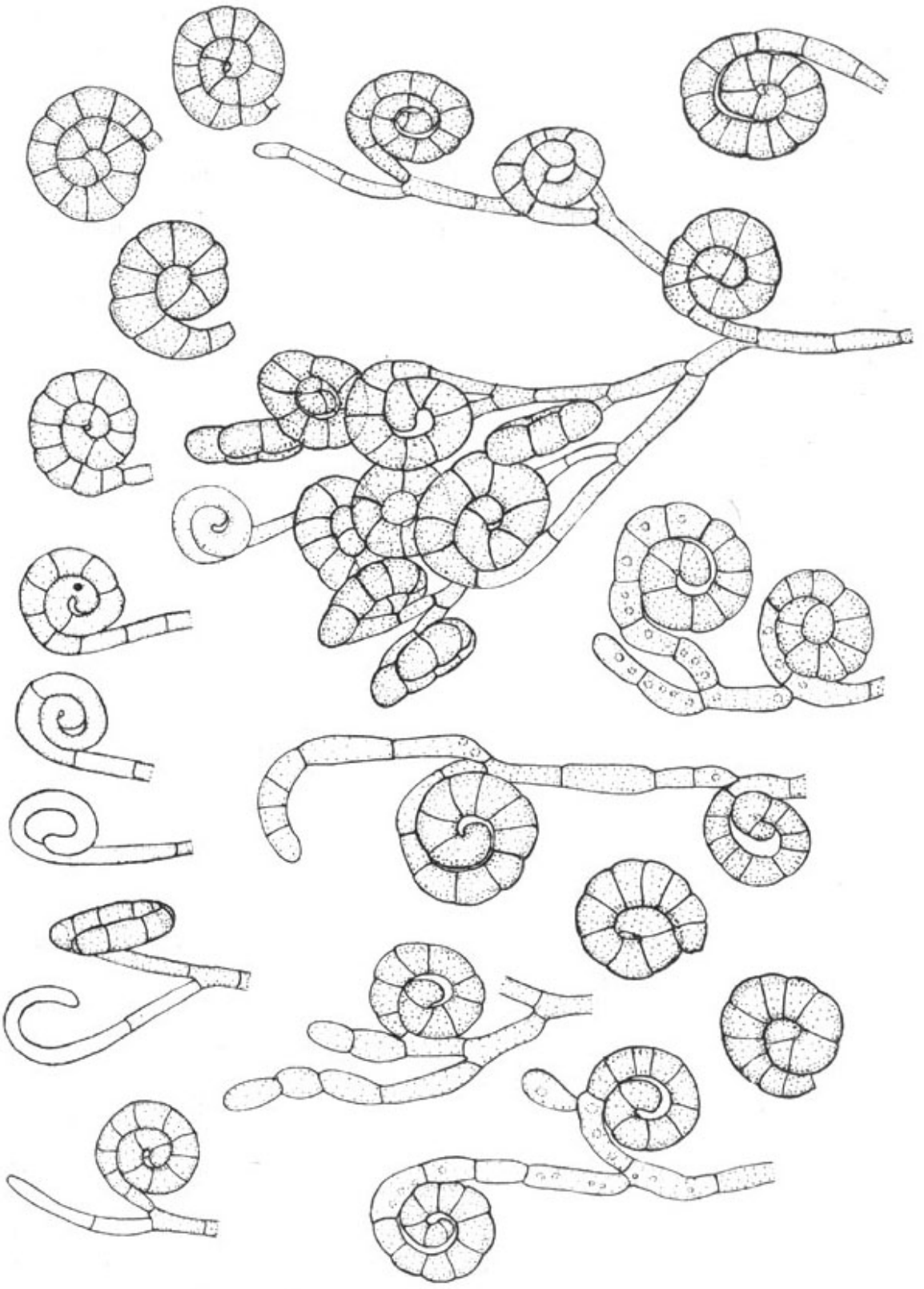

Fig. 6. *Troposporella fumosa* Karsten
conidiophores and conidia; WA 29418 (1000 ×)

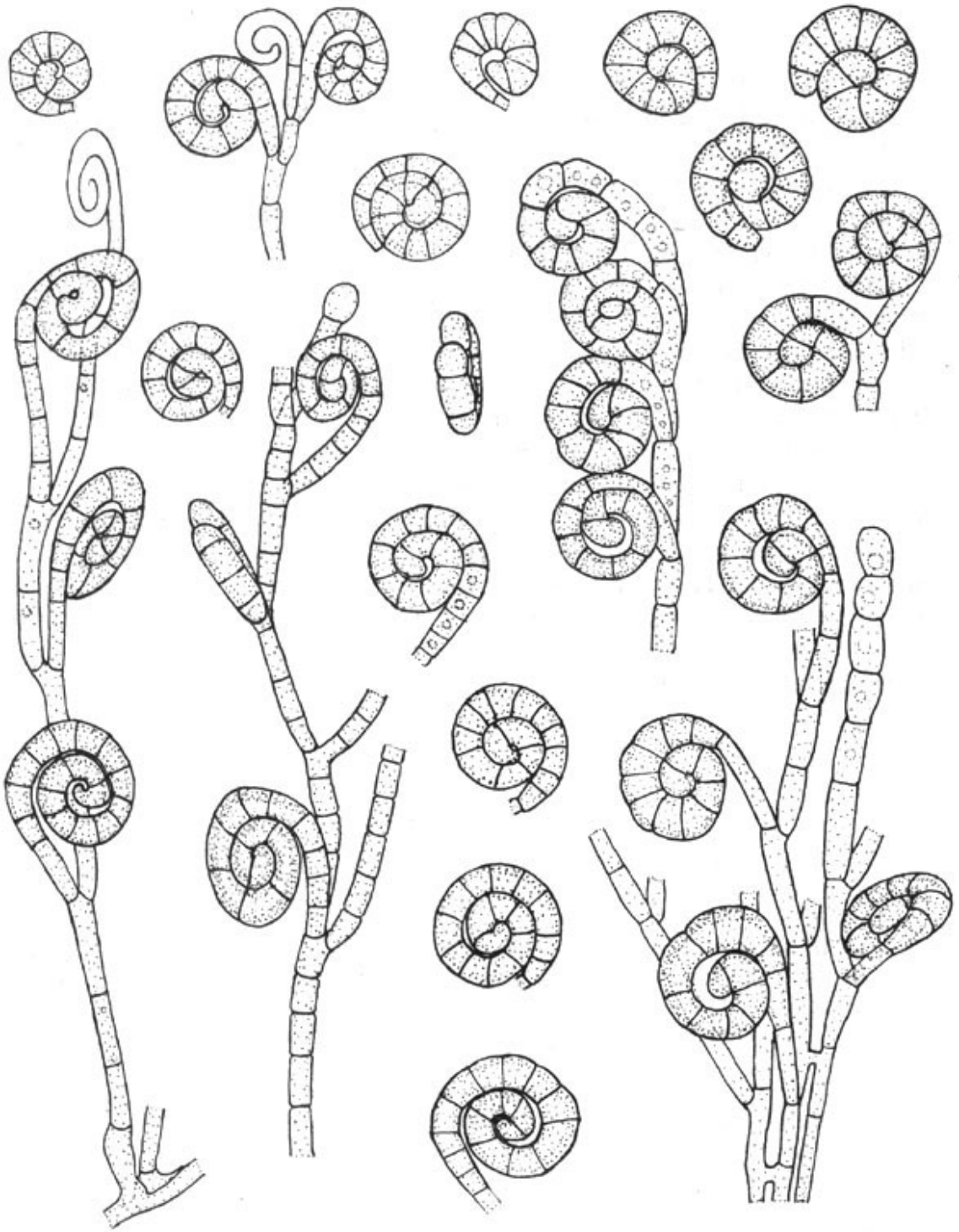

Fig. 7. *Troposporella fumosa* Karsten
conidiophores and conidia; WA 31839 (1000×)

diagnosis of the taxon with figures (pl. 26, fig. 10-14). He found it intermediate between *Helicoma monilipes* Ellis et Johnson and *H. olivaceum* (Karsten) Linder. Ellis (1971) recorded this species in Europe and North America, on *Populus* sp. bark; the fungi were producing conidia to 18 μm in diameter and contained 15 septa. Sutton (1973) had a very rich material from Canada. He encountered this species not only on the bark of *Populus tremuloides* and *P. balsamifera*, but also on that of *Abies balsamea* and *Prunus* sp. However, his specimens had not more than 15-celled conidia and up to 16 μm in diameter.

Holubová-Jechová (1980) after analysing *Helicoma monilipes* type thought this species to be conspecific with *Troposporella fumosa*. Unfortunately, the type of the latter was unavailable. This opinion is confirmed by Polish data. On the basis of numerous samples especially those from the Bagno Jacek reserve in Wesoła near Warsaw, it may be inferred that *Troposporella fumosa* has high morphological variation. Its conidia grew abundantly on the bark of felled *Populus tremula* tree in ditch in mixed pine forest near bog. Various types of conidiophores and conidia, presented in Fig. 7, were formed simultaneously in different colonies of *T. fumosa* on mentioned substrate. They represent all types of conidiophores and conidia described so far for *Troposporella fumosa* (Ellis et Ellis 1985; Linder 1929; Sutton 1973), and also those formed by *Helicoma monilipes* (Holubová-Jechová 1980; Linder 1929; Goos 1986; Matsushima 1980 sub. *Helicoma olivaceum*).

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Helikosporowe Hyphomycetes z Polski

Streszczenie

Praca zawiera opisy, analizę taksonomiczną a także stanowiska sześciu nowych dla Polski grzybów. Są to – *Cirrenalia lignicola* Kirk, *Helicoon fuscosporum* Linder, *H. richonis* (Boudier) Linder, *H. sessile* Morgan, *Slimacomyces monospora* (Kendrick) Minter oraz *Troposporella fumosa* Karsten.