

## Notes on Pyrenomycetes and Coelomycetes from Poland 3. *Diatrype subaffixa*, a new species for Europe

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Collections of *Diatrype subaffixa* from Poland are compared with the Schweinitz type collection and some related species such as *D. stigma*, *D. undulata* and *D. decorticata* from Poland, USA, Germany, Sweden and Lithuania. The Polish population is described as *Diatrype subaffixa* var. *rappazii* var. nov. Descriptions and illustrations of the morphological features of teleomorph and anamorph and a key are presented.

Keywords: taxonomy, variability, *Diatrype*, Poland.

Fungi referable to *Diatrype stigma* (Hoffm.: Fr.) Fr. in the traditional sense are difficult to separate. Nitschke (1867), Wehmeyer (1926) and Glawe & Rogers (1981, 1984) pointed out that there are several similar species with different ascospores and conidia. Rappaz (1987a) split *Diatrype stigma sensu lato* into *D. stigma*, *D. decorticata* (Pers.: Fr.) Rappaz and *D. undulata* (Pers.: Fr.) Fr. In a second paper (Rappaz, 1987b) he reported *Diatrype subaffixa* (Schwein.) Cooke as a related species (see also Cooke, 1883). The type of *D. subaffixa* has been collected in North America (Schweinitz, 1832; Rappaz, 1987b) and has not hitherto been found in Europe. The taxonomy of *D. subaffixa* is not clear. Ellis & Everhart (1892) considered *D. subaffixa* synonymous with *Diatrype platystoma* (Schwein.) Berk. Pirozynski (1974) erected the genus *Graphostroma* for *Diatrype platystoma sensu stricto* and placed it in the Xylariales. Rappaz (1987b) examined the original specimen of Schweinitz (PH-Schwein.) and retained *Diatrype subaffixa* in the Diatrypales. The original specimen of *S. subaffixa* is very old and it is not possible to obtain an anamorph in culture and to classify the fungus discussed here with absolute certainty. Glawe & Rogers (1984) used the “collection group” concept of *Diatrype stigma*

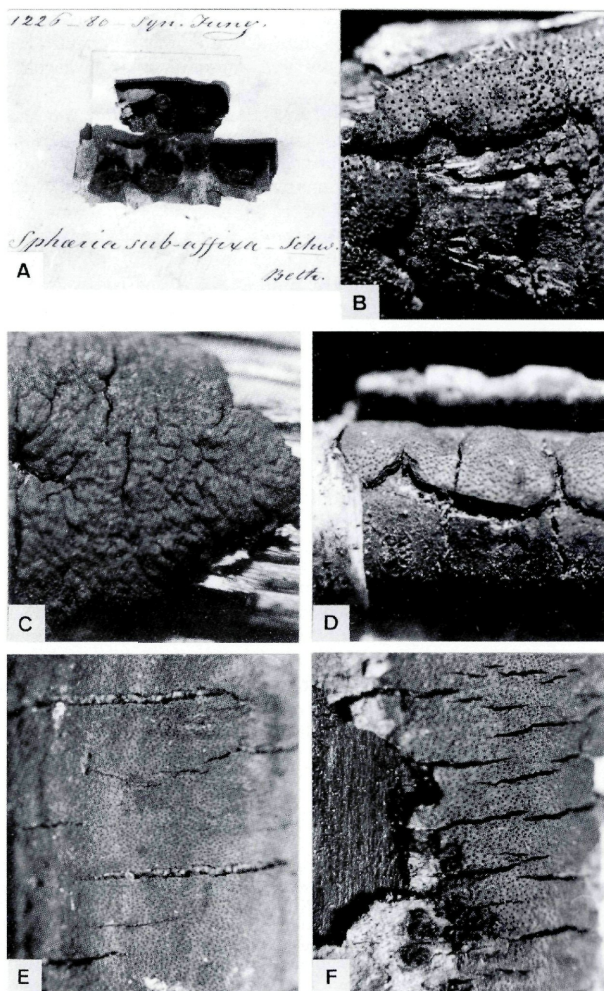


Fig. 1. – Stromata of *Diatrype subaffixa* and related taxa. – A, B. *Diatrype subaffixa*, type collection, PH-Schwein. – C. *Diatrype subaffixa* var. *rappazii*, KRAM-Chlebicki 41 521. – D. *Diatrype undulata* KRAM-Chlebicki 41 007. – E. *Diatrype stigma*, KRAM-Chlebicki 40 431. – F. *Diatrype decorticata*, KRAM-Chlebicki 41 740.

and tentatively divided it into several groups. The ascospore length of "collection group 1" is similar to that of *D. subaffixa*. Rappaz (1987b) mentions similar specimens of *Diatrype stigma* with larger ascospores from Europe.

Material from Białowieża National Park (Bujakiewicz & al., 1992; Chlebicki, 1993) is referable mainly to *Diatrype stigma*, *Diatrype undulata* and *Diatrype decorticata*. Some samples belong to *Diatrype spilomea* H. Sydow, *Diatrype flavovirens* (Pers. : Fr.) Fr. and *Diatrype bullata* (Hoffm. : Fr.) Fr. Problematic collections of *Diatrype* can be distinguished from the others by the strongly undulating stromata and larger ascospores. F. Rappaz examined nine of them and suggested that they are conspecific with *D. subaffixa* (Rappaz, *in litt.*). Recently very similar fungi were found in other primeval forests of North-East Poland.

### Materials and methods

Forty-three specimens from the herbarium of the author (KRAM-Chlebicki), GOET, DAOM (*Graphostroma platystoma* only), PH-Schwein. and WSP were examined.

Length of 20 ascospores, diameter and height of ostioles, length of asci, height of perithecia and length of conidia were measured for each specimen. Minimum, maximum, mean, standard deviation and standard error of the mean were computed. Scanning electron microscopy of teleomorph ostioles was done with a Tesla 301 scanning electron microscope. Cultures of *D. decorticata*, *D. undulata* and *D. subaffixa* were started by soaking stromata in sterile water and placing masses of ascospores in Petri plates 9 cm diam. containing malt-agar (MA; Rappaz, 1987b). Growing colonies were incubated at 20–22 C in the dark.

### Material examined

***Diatrype subaffixa***: USA: Bethlehem, New Jersey, on twig of a member of Rosaceae, as *Sphaeria subaffixa* L. v. Schw., PH-Schwein., upper twig (NEOTYPE).

***Diatrype subaffixa* var. *rappazii***: POLAND, Białowieża N.P., section 256: on twigs of *Acer platanoides*, Tilio-Carpinetum, 8 June 1988, KRAM-Chlebicki 41 016; on twigs of *Carpinus betulus*, Quercu-Piceetum, 28 October 1988, KRAM-Chlebicki 41 112; on branches of *Carpinus betulus*, Tilio-Carpinetum, 28 October 1988, KRAM-Chlebicki 41 129; on branches of *Carpinus betulus*, Tilio-Carpinetum, 21 June 1989, KRAM-Chlebicki 41 181; on branches of *Carpinus betulus*, Pino-Quercetum, 1 March 1990, KRAM-Chlebicki 41 237; on branches of *Carpinus betulus*, Fraxino-Alnetum, 16 May 1990, KRAM-Chlebicki 41 297; on twigs of *Sorbus aucuparia*, Carici elongatae Alnetum, 16 May 1990, KRAM-Chlebicki 41 347; on branches of *Carpinus betulus*, Tilio-Carpinetum, 15 May 1990, KRAM-Chlebicki

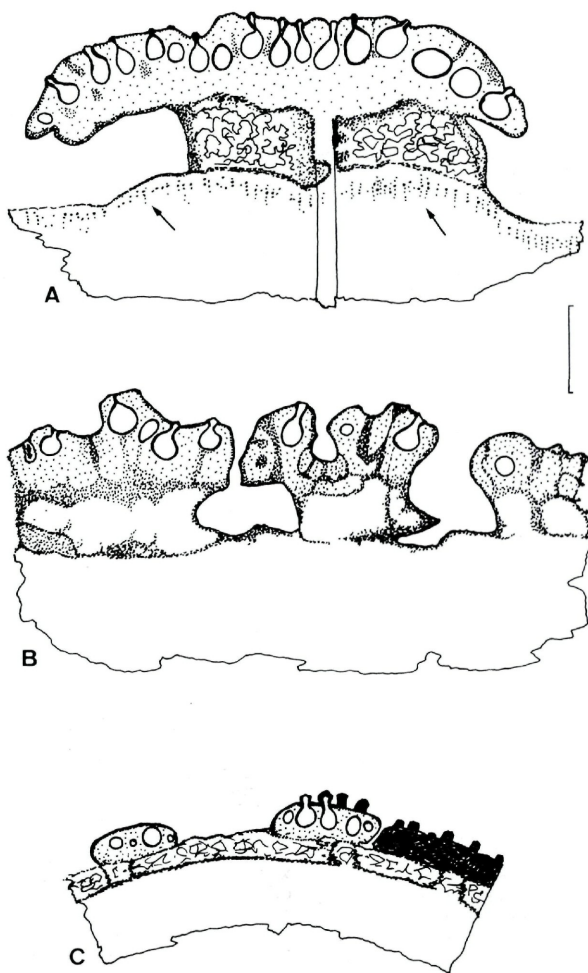


Fig. 2. - Different shapes of stromata of *Diatrype subaffixa* (Schwein.) Cooke developed within cortical tissues. - A. Pulvinate stroma on *Carpinus betulus*, black mycelial hyphae are visible inside vascular system of wood (arrowed) KRAM-Chlebicki 41 521. - B. Undulate stroma on *Carpinus betulus*, KRAM-Chlebicki 41 577. - C. Type collection, PH-Schwein. - Scale bar = 1000  $\mu$ m.

41 367; on branches of *Carpinus betulus*, Carici elongatae Alnetum, 16 May 1990, KRAM-Chlebicki 41 369; on branches of *Carpinus betulus*, Tilio-Carpinetum, 23 November 1990, KRAM-Chlebicki 41 375; on twigs of *Sambucus racemosa*, Querco-Piceetum, 23 November 1990, KRAM-Chlebicki 41 405; on twig of *Sambucus racemosa*, Querco-Piceetum, 23 November 1990, KRAM-Chlebicki 41 428; on branches of *Carpinus betulus*, Tilio-Carpinetum, 23 November 1990, KRAM-Chlebicki 41 433; on branches of *Carpinus betulus*, Tilio-Carpinetum, 20 November 1990, KRAM-Chlebicki 41 437; on twigs of *Acer platanoides*, Fraxino-Alnetum, 2 March 1990, KRAM-Chlebicki 41 451; on twigs of *Carpinus betulus*, Tilio-Carpinetum, 9 September 1990, KRAM-Chlebicki 41 521(TYPE); on twigs of *Acer platanoides*, Tilio-Carpinetum, 21 November 1990, KRAM-Chlebicki 41 536; on branches of *Carpinus betulus*, Tilio-Carpinetum, 23 November 1990, KRAM-Chlebicki 41 548; on branches of *Acer platanoides*, Fraxino-Alnetum, 20 November 1990, KRAM-Chlebicki 41 556; on branches of *Carpinus betulus*, Tilio-Carpinetum, 9 July 1991, KRAM-Chlebicki 41 577. — Puszcza Romincka Forest: on twig of *Carpinus betulus*, Boczki Reserve, Tilio-Carpinetum, 9 August 1991, KRAM-Chlebicki 41 727 and 24 April 1993, KRAM-Chlebicki 42 048; Puszcza Borecka Forest: on twigs of *Carpinus betulus*, 5 km of Nord of Czerwony Dwór near the bank of Elk River, Tilio-Carpinetum, 23 April 1993, KRAM-Chlebicki 41 900, 42049.

***Diatrype stigma***: POLAND: on twig of *Quercus robur*, Strzelińskie Hills, Tilio-Carpinetum, 1 April 1984, KRAM-Chlebicki 40 263; on twig of *Quercus* sp., Wolin N. P., on the west of Czubiński Reserve, Luzulo pilosae-Fagetum, 24 September 1984, KRAM-Chlebicki 40 431; on twigs of *Betula pendula*, Białowieża N. P., section 256, Tilio-Carpinetum, 18 November 1987, KRAM-Chlebicki 41 034; on twig of *Quercus robur*, Białowieża N. P., section 256, Tilio-Carpinetum, 23 November 1990, KRAM-Chlebicki 41 431; on twig of *Quercus robur*, Silesia Lower, Trzebnickie Hills, near Złotnik Stream, forest with *Betula pendula*, *Quercus robur*, *Fagus sylvatica* and *Picea abies*, 1 August 1991, KRAM-Chlebicki 42 046; on twig of *Carpinus betulus*, Puszcza Romincka Forest, Boczki Reserve, Tilio-Carpinetum, 24 April 1993, KRAM-Chlebicki 42 047. — USA: on *Alnus* sp., near Genesee, Itah County Idaho, 23 November 1963, leg. J. Rogers, WSP 51 926; on twig of *Acer glabrum*, Washington, Columbia County: Burnt Creek, ca 15 miles south of Dayton, leg. C.G. Shaw, WSP 58 109. — GERMANY: *Sphaeria stigma* Ehrhart Plant. Crypt. no 170 GOET.

***Diatrype undulata***: USA: on twig of *Betula* sp., as *Sphaeria subaffixa* L. v. S., Bethlehem, New Jersey, PH-Schweinitz, Collins 47. — POLAND: on twigs of *Betula pendula*, Białowieża N. P., section 256, Pino-Querquetum, 9 June 1988, KRAM-Chlebicki 40 982; on twig of *Betula pendula*, Białowieża N. P., section 256, Peucedano Pinetum, 7 June 1988, KRAM-Chlebicki 41 007; on twig of *Betula pendula* Puszcza Augustowska primeval Forest, Mały Borek Reserve, 10 August 1991, KRAM-Chlebicki 41 731; on twig of *Betula pubescens*, Puszcza Borecka Forest, 5 km of north of Czerwony Dwór near Elk River, Tilio-Carpinetum, 23 April 1993, KRAM-Chlebicki 42 051. — LITHUANIA: on twig of *Betula pendula*, Joniškėlis, forest with *Picea abies* and *Betula pendula*, 19 September 1991, KRAM-Chlebicki 41 724. — SWEDEN: on twigs of *Betula pubescens* ssp. *tortuosa*, Abisko Östra, *Betula tortuosa* forest, 9 September 1992, KRAM-Chlebicki 41 725; on twigs of *Betula pubescens* ssp. *tortuosa*, Abisko Tourist Station, in a peat bog with *Betula nana*, 10 September 1992, KRAM-Chlebicki 41 726.

***Diatrype decorticata***: POLAND: on twig of *Corylus avellana*, Puszcza Romincka Forest, Boczki Reserve, Tilio-Carpinetum, 24 April 1993, KRAM-Chlebicki 41 901.

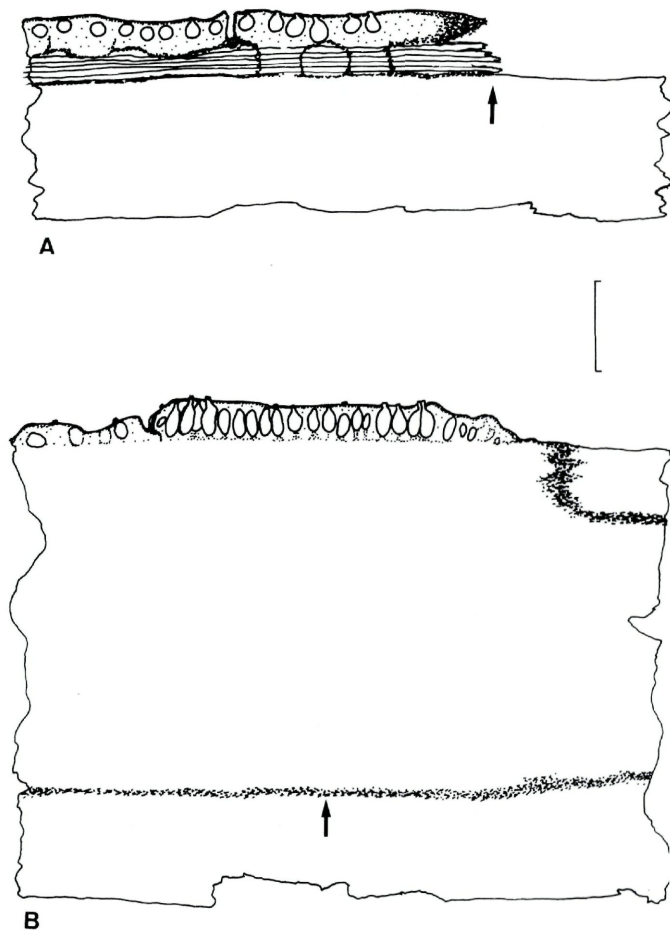


Fig. 3. - Shape of stomata of *Diatrype*. - A. American taxon, WSP 58 109, dorsal zone surrounding the stroma is restricted to nearest cortical tissue (arrowed). - B. *Diatrype subaffixa* developed on decorticated wood: visible black ventral zone in wood (arrowed). KRAM-Chlebicki 41 375. - Scale bar = 1000  $\mu\text{m}$ .

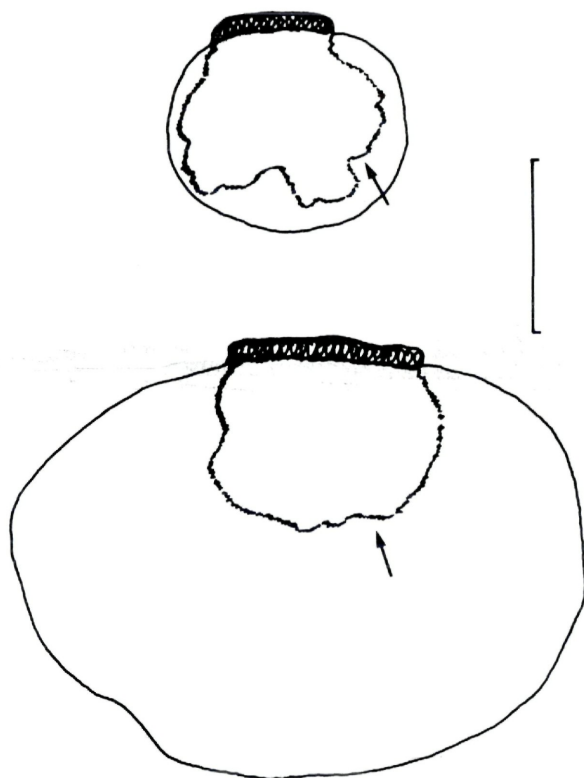


Fig. 4. - Ventral zone in samples from decorticated wood of *Carpinus betulus* (arrowed). - Scale bar = 1000  $\mu\text{m}$ .

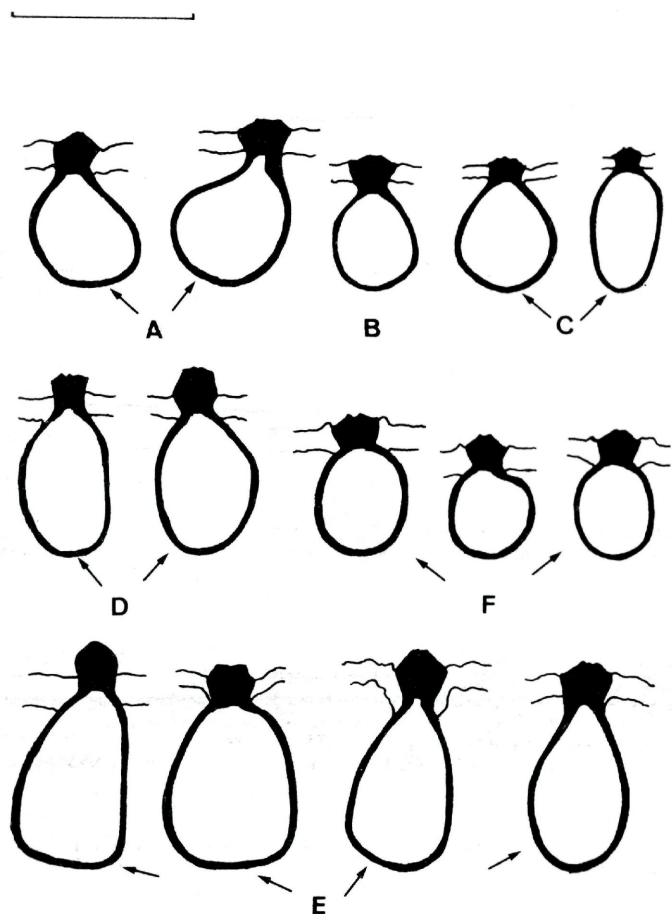


Fig. 5. - Perithecia of *Diatrype subaffixa* from different hosts. - A. *Sorbus aucuparia*. - B. *Sambucus racemosa*. - C. *Acer platanoides*. - D. Type collection (PH-Schwein.). - E. *Carpinus betulus*. Perithecia of *Diatrype stigma*. - F. *Acer glabrum* from USA (WSP-58 109). - Scale bar = 500  $\mu$ m.



**Graphostroma platystoma:** USA: on *Quercus* sp., Scioto Park Forest, Ohio, 31 Aug. 1968, leg. K. A. Pirozynski DAOM 127 673. — CANADA: on *Populus* sp., Pine Lake, Dorset, Ontario, leg. D. A. Quirke, det. K. A. Pirozynski DAOM 43729.

## Results

***Diatrype subaffixa*** (Schwein.) Cooke, Grevillea 12(61): 5. 1883.

= *Sphaeria subaffixa* Schwein., Trans. Amer. Philos. Soc. ser. 24(2): 194. 1832.

= *Nummularia subaffixa* (Schwein.) Sacc., Syll. fung. 1: 401. 1882.

### Characters of the teleomorph

Stromata erumpent through bark or rarely occurring in decorticated wood, ca (400–) 600–1400  $\mu\text{m}$  thick, widely effused, irregular in outline, sometimes pulvinate in the middle (Fig. 2A), strongly undulate and raised especially on *Carpinus betulus* (Fig. 2B) to somewhat undulate on *Acer platanoïdes*, *Sorbus aucuparia* and flat on *Sambucus racemosa*, cracked across and divided into irregular lobes in the peripheral part, with a distinctly marked margin. The surface of entostroma (outer stromal crust) brown, brown-black to black. Surface examined in SEM is distinctly perforate or with various depressions and irregular spines. In *D. stigma* the surface is covered by irregular white remains of ectostroma (Fig. 6F). Entostroma is creamy-white to yellowish-white with embedded perithecia in one, or rarely two, layers. The stroma is delimited beneath by a black stromatic zone visible as blackened areas and a line extending down to the wood. Sometimes black mycelial hyphae have been observed inside the vascular system of wood (Fig. 2 A). Stromata occurring on decorticated wood are frequently delimited by a black ventral zone resembling that of *Diaporthe* (Fig. 3B, Fig. 4). This zone penetrates the wood of twigs and branches to a depth of 10–15 mm. – Ostioles are 100(108.8)[120,4]–(132)147  $\mu\text{m}$  in diameter (Fig. 11), 40.8 [67.4] 91.5  $\mu\text{m}$  high, cone-shaped, three- to four-sulcate, black, darker in color than the stromal crust and separately erumpent. Ostioles of the type collection are very similar to those of Polish collections (Fig. 6A–6D) whereas ostioles of *D. stigma* are disk-shaped and slightly depressed with 5–6 ill-defined sulcations (Fig. 6 E, F). Ostioles of *D. undulata* are similar to those of *D. subaffixa* (Fig. 8E, F). – Perithecia in one layer, globose to pyriform, 382–472 x 284–371  $\mu\text{m}$ . The height of perithecia correlates with the host (Fig. 5). The highest perithecia were observed in populations on *Carpinus betulus* (Fig. 5E) and the type collection (Fig. 5D). – Asci spindle-shaped, long stipitate, eight-spored, spore-bearing part (30) 36–50 x 5.7–7  $\mu\text{m}$ . – Ascospores allantoid, rarely slightly bent, subolivaceous, sometimes with budding apex (Fig. 9A) , varying in size (8.5)9–12(13) x 1.8–2.5(3)  $\mu\text{m}$  (Fig. 9 A, B ).

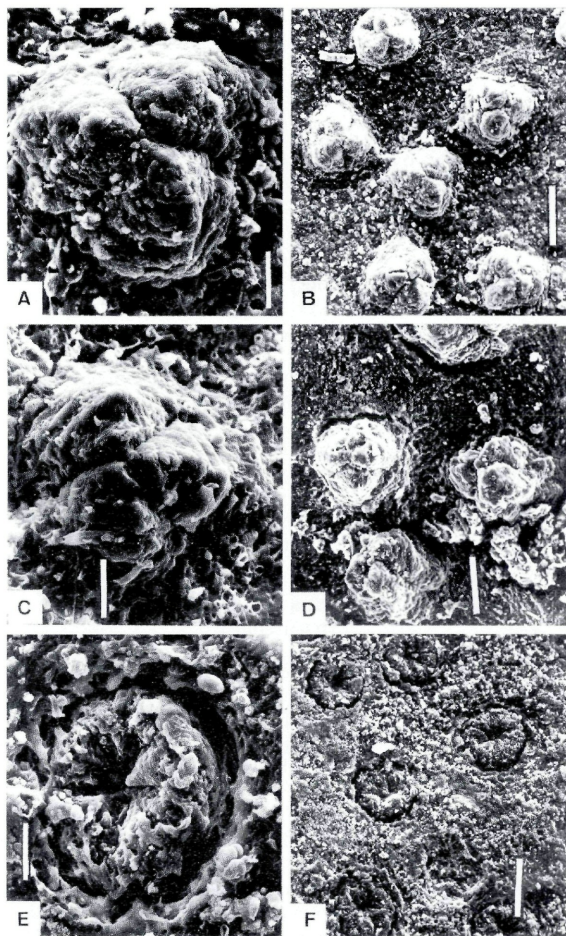


Fig. 6. – SEM photographs of ostioles and stromata. – A, B. *Diatrype subaffixa*, type collection (PH – Schw. 1226). A. Ostiole, scale bar = 20  $\mu$ m. B. Stromatal surface with ostioles, scale bar = 100  $\mu$ m. – C, D. *Diatrype subaffixa* var. *rappazii* from Poland. C. Ostiole, KRAM–Chlebicki 41 521, scale bar = 20  $\mu$ m. D. Stromatal surface with ostioles, KRAM 41 369, scale bar = 100  $\mu$ m. – E, F. *Diatrype stigma* from Poland KRAM–Chlebicki 40 263. E. Ostiole, scale bar = 20  $\mu$ m. F. Stromatal surface with ostioles, scale bar = 100  $\mu$ m.

Habitat. – On dead twigs and branches of *Carpinus betulus*, *Acer platanoides*, *Sorbus aucuparia* and *Sambucus racemosa*.

#### Characters of the anamorph in nature

Conidiomata pycnidium-like, immersed in perithecial stroma, with short neck and umbilicate ostiole (Fig. 7). – Conidia hyaline, slightly curved, tapered at both ends, 9–13.6 x 0.9–1.2  $\mu\text{m}$  (on *Carpinus betulus*, KRAM-Chlebicki 1181, 1237); 10.8–18.5 x 0.9–1.2  $\mu\text{m}$  (on *Acer platanoides*, KRAM-Chlebicki 1437, 1536). The length of conidia in culture is slightly longer (Fig. 13).

#### Characters of the anamorph in culture

Two month-old colonies white with dense cottony aerial hyphae and without radially orientated cordons, covering 9 cm Petri plate in 14 days, margin jagged, sporulating areas 1–4 (10) mm in diameter, honey yellow to brown, conical to globoid, sometimes irregular and confluent, especially when large, with honey yellow conidial masses; reverse coloration pale yellow to creamy white (Fig. 8 A, B). – Conidia single celled, hyaline, cylindrical to very slightly swollen at the end, nearly straight to slightly curved 9.9–17.7 x 1.0–1.3 (1.5)  $\mu\text{m}$  (Fig. 9 D).

### Discussion

Vasilyeva (1984, 1985, 1986) considered the genus *Diatrype* to be heterogenous, consisting of two 'sections': *Discosphaeria* and *Stictosphaeria* (*sensu* Cooke, 1885). Section *Stictosphaeria* according to Vasilyeva (l.c.) and Cooke (1885) consists of species with effuse and bipartite stromata, whereas members of section *Discosphaeria* are similar to *Diatrypella*, e.g. *Diatrype disciformis* (Hoffm.: Fr.) Fr. Cooke (1885) included *D. subaffixa* in section *Stictosphaeria*. We observed both effuse and separate stromata in *D. bullata* from section *Discosphaeria* and in *D. spilomea* from section *Stictosphaeria*. Thus, we retain species with effuse stromata in the genus *Diatrype*.

The conidiomata of diatrypaceous fungi may be pycnidium-like (Kliejunas & Kuntz, 1972; Chlebicki, 1986), acervulus-like (Messner & Sutton, 1982; Chlebicki, 1986) or sporodochium-like (Glawe & Rogers, 1984; Glawe & Jacobs, 1987). Pycnidium-like conidiomata belong to the form-genus *Cytosporina* (Sacc.) Sacc. with filiform conidia (Rappaz, 1987b). Both Wehmeyer (1923) and Glawe (1983) noted that *Diatrypella frostii* produces pycnidia and Glawe (1983) suggested that this anamorph should be placed in *Cytosporina*. Chlebicki (1986)

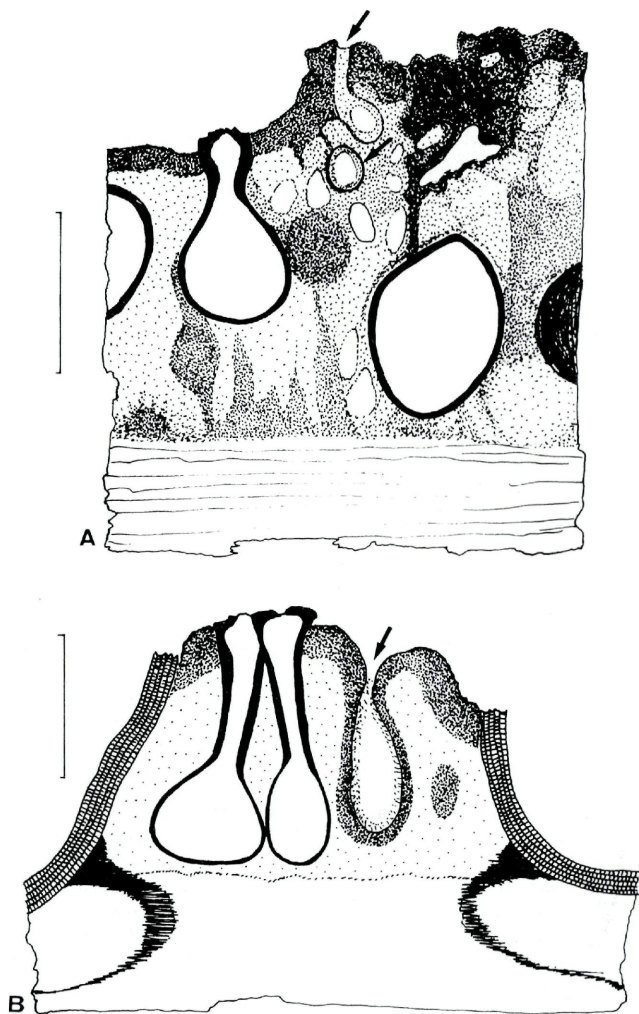


Fig. 7. - Conidiomata in natural conditions. - A. *Diatrype subaffixa* var. *razzai*, ostioles arrowed, KRAM-Chlebicki 41 536, scale bar = 500  $\mu$ m. - B. *Diatrypella moravica*, ostiole arrowed, KRAM-Chlebicki 40 007, scale bar = 500  $\mu$ m.

reported a pycnidium-like structure associated with the young stroma (Fig. 7B) of *Diatrypella moravica* Petr. (as *D. favacea* ssp. *nespiakii*) which is similar to those of *Diatrype subaffixa* (Fig. 7A). However Rogers (*in litt.*) stated that *Cytosporina* is an ill-defined genus and proposed the genus *Libertella* Desm. as more adequate for many diatrypaceous anamorphs.

A comparison of the ascospore length of the Polish population of *D. subaffixa* with that of the type collection and with those of some related species like *D. undulata* and *D. stigma* indicates that the Polish population is very similar to the Schweinitz type of *D. subaffixa*. In addition, that population is similar in ostiole morphology, diameter of ostioles, ascus length, steep margin of stroma and height of perithecia (Fig. 5). The surface and shape of stroma of the type collection of *D. subaffixa* is similar to *Diatrype undulata*, but it differs in ascospore length. Also, the Polish specimens on *Sambucus racemosa* and *Sorbus aucuparia* resemble *D. undulata*. The differences in thickness of stroma among specimens on *Carpinus*, *Sorbus*, *Acer* and *Sambucus* are correlated with the substratum, especially with the thickness of cortex. The specimen occurring on decorticated wood of *Carpinus betulus* has thin stromata which reach 700  $\mu\text{m}$  (Fig. 3B), whereas residual specimens developed within cortical tissues have larger stromata reaching 1000–1400  $\mu\text{m}$  (Fig. 2A, B). In all Polish specimens of *D. subaffixa* and the type collection the margin of the stroma is steep. On the basis of this character we separate the two American collections WSP 51926 and WSP 58109 from *D. subaffixa* (Fig. 12) in spite of the fact that the ascospores of the former collections are as long as in the type collection of *D. subaffixa* (Fig. 10). The stomatal margin of the American collections is very low and the dorsal zone surrounding the stroma is restricted to the nearest cortical tissue (Fig. 3A). Moreover, the ostioles are flattened and indistinctly furrowed as in *Diatrype stigma*. These two collections probably belong to *Diatrype stigma*. Rappaz (1987b) mentions similar fungi with long ascospores from Europe, but their anamorphs have smaller conidia and a different cultural appearance (Rappaz, 1987b; Plate 2B). Ehrhart's specimen (GOET) also has long ascospores (Fig. 10 No 43).

The thick and undulate stroma of *D. subaffixa* with ventral zone resembles that of the American taxon *Diatrype stigmaoides* Kauffman but the latter species has small ascospores and occurs only on *Quercus* branches (Glawe & Rogers, 1984 – Collection Group 2). The equivalent species to *D. stigmaoides* in Europe is *D. spilomea* with strongly undulate stroma and small ascospores. *D. subaffixa* occurs in Białowieża N. P. together with *D. stigma*, *D. undulata*, *D. decorticata* and *D. spilomea*. The population of *D. subaffixa* on *Carpinus betulus* from Białowieża produces strongly undulate stromata as *D. spilomea*,

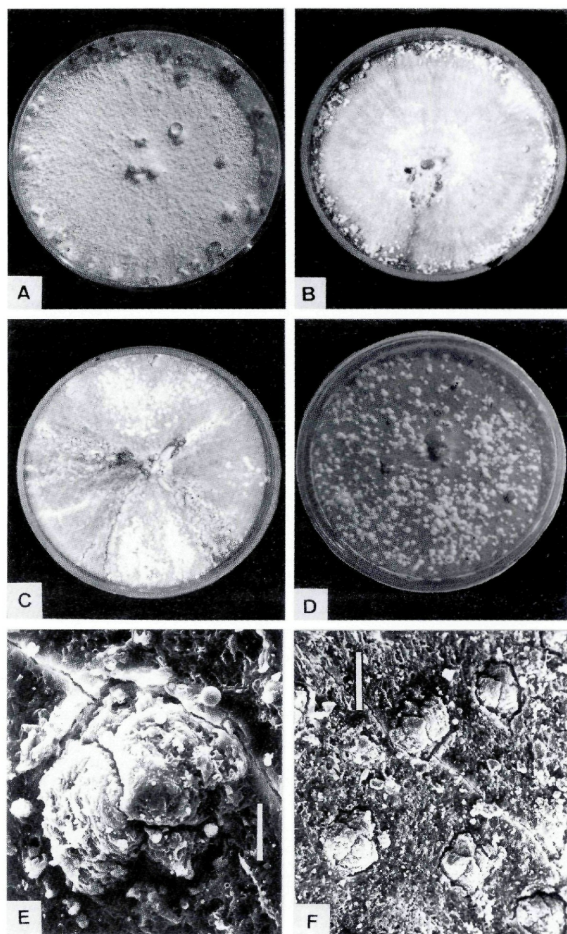


Fig. 8. – Cultures and SEM photographs of ostioles. – A. Culture of *Diatrype subaffixa* var. *rappazii*, KRAM-Chlebicki 41 900. – B. Culture of *Diatrype subaffixa* var. *rappazii*, KRAM-Chlebicki 41 577. – C. Culture of *Diatrype decorticata*, KRAM-Chlebicki 41 901. – D. Culture of *Diatrype undulata*, KRAM-Chlebicki 41 007. – E. Ostiole of *Diatrype undulata*, KRAM-Chlebicki 40 982, scale bar = 20  $\mu\text{m}$ . – F. Stromatal surface with ostioles of *D. undulata*, KRAM-Chlebicki 40 982, scale bar = 100  $\mu\text{m}$ .

whereas the same population on *Carpinus betulus* from Poland where *D. spilomea* is absent has rather moderately undulating stromata. The stroma of *D. subaffixa* is also similar to that of *D. undulata*. Both species have a similar steep margin of stromata and subconical ostioles (Fig. 6A, C; Fig. 8E) but differ in ascospore length (Fig. 9A–C) and anamorphic characters.

The Polish population of *D. subaffixa* is clearly distinct (Fig. 12A). It forms a group of specimens different from *D. undulata* (12C) in ascospore length and from *D. stigma* in shape of stroma and ostiole characters. Cultures of *D. subaffixa* are white without the radially oriented cordons characteristic to *D. decorticata* (Fig. 8C) and without numerous small white spots characteristic of *D. undulata* (Fig. 8D). Moreover, this anamorph differs in colour of conidial masses and reverse coloration. It grows more slowly than *D. undulata*. Conidia are distinctly shorter than in *D. decorticata* and slightly smaller than those of *D. undulata* (Fig. 9E). Study of additional collections of *D. subaffixa* from North America are needed to determine variability of American population of this species. The Polish population can be compared with the type described by Schweinitz (1832). However, thick, undulate stromata and very characteristic dorsal zone are noteworthy. This morphological variant should be regarded as a different subtaxon at varietal rank:

***Diatrype subaffixa*** (Schweinitz) Cooke var. ***rappazii*** Chlebicki var. nov.

Stromata erumpentia, crassa (ca 600–1400 µm), nigrescentia, undulata, zona ventralis nigra limitata; ostiolis subconicis, radiatim sulcatis, nigris; ascosporis allantoideis, dilute fusciscentibus (8.5)9–12(13) x 1.8–2.5(3) µm; stroma conidiiferum pustuliforme.

Habitus *Diatrypis subaffixae* (Schweinitz) Cooke sed stromata undulata et crassa.

Type collection: Poland, Białowieża National Park, on *Carpinus betulus*, KRAM-Chlebicki 41 521, Fig. 1 C, 2 A, 6 C, 9 B.

The taxonomic approach in this study is similar to that of Rappaz's treatment (1987b). The following key to *Diatrype* has been elaborated on the basis of stromatal morphology, microscopic features and anamorphic characters.

**Key to the *Diatrype* species discussed**

- |                                      |   |
|--------------------------------------|---|
| 1. Ascospores 8–12(14) µm long ..... | 2 |
| 1. Ascospores smaller .....          | 4 |

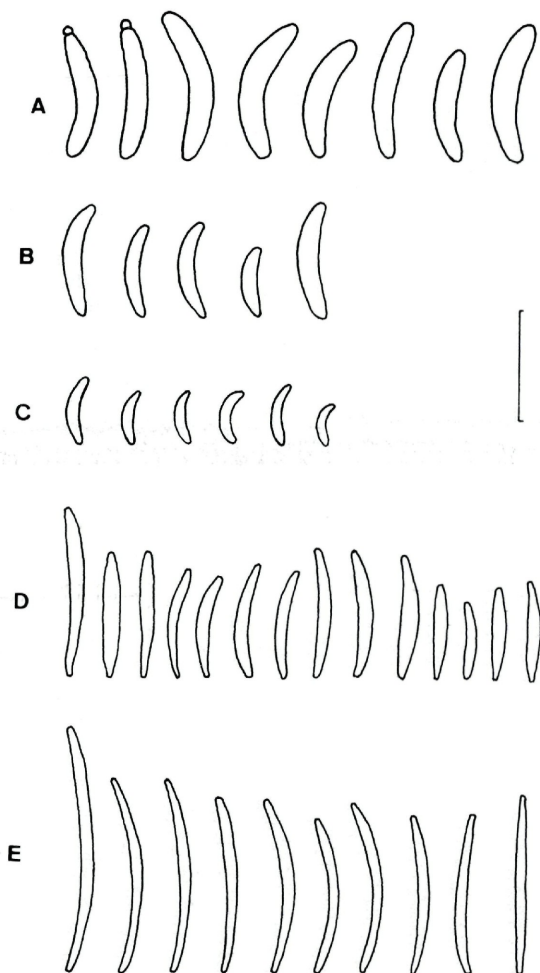


Fig. 9. - Ascospores and conidia of *Diatrype subaffixa* and *Diatrype undulata*. - A-C, Ascospores. - A. *D. subaffixa* var. *rappazii*, KRAM-Chlebicki 41 521. - B. *D. subaffixa*, type coll. PH Schweinitz 1226. - C. *D. undulata*, KRAM-Chlebicki 41 007. D, E, Conidia. - D. *D. subaffixa*, KRAM-Chlebicki 41 521. - E. *D. undulata*, KRAM-Chlebicki 41 726. Scale bar = 10  $\mu$ m.



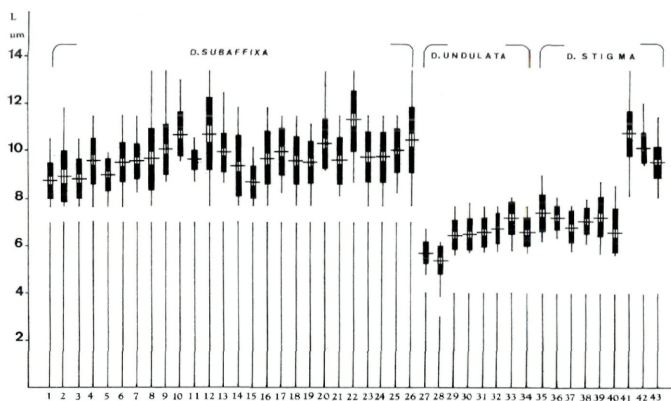


Fig. 10. – Variability in ascospore length of *Diatrype subaffixa*, *D. undulata* and *D. stigma*. – 1. PH-Schweinitz (type of *D. subaffixa*). – 2–26, KRAM-Chlebicki collections: 2, 41 132; 3, 41 112; 4, 41 129; 5, 41 118; 6, 41 237; 7, 41 297; 8, 41 367; 9, 41 369; 10, 41 375; 11, 41 433; 12, 41 521; 13, 41 548; 14, 41 577; 15, 41 727; 16, 41 900; 17, 42 049; 18, 42 048; 19, 41 016; 20, 41 437; 21, 41 451; 22, 41 536; 23, 41 556; 24, 41 347; 25, 41 428; 26, 41 405. – 27. PH-Collins 47. – 28–40, KRAM-Chlebicki collections: 28, 40 982; 29, 41 007; 30, 41 724; 31, 41 725; 32, 41 726; 33, 41 731; 34, 42 051; 35, 41 431; 36, 40 431; 37, 40 263; 38, 42 046; 39, 41 034; 40, 42 047. – 41, WSP-51926. – 42, WSP-58109. – 43 – GOET-Ehrhart 170.

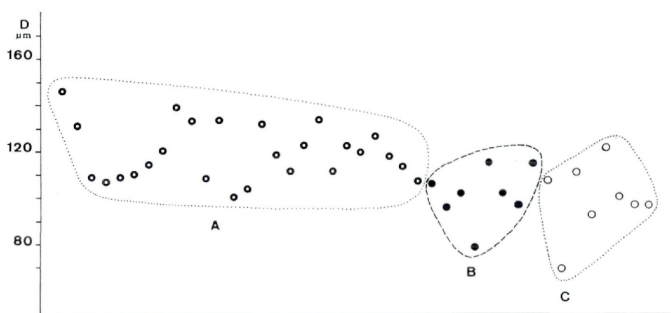


Fig. 11. – Variability in ostioles diameter. – A. *Diatrype subaffixa*. – B. *Diatrype undulata*. – C. *Diatrype stigma*. – D: diameter of ostiole.

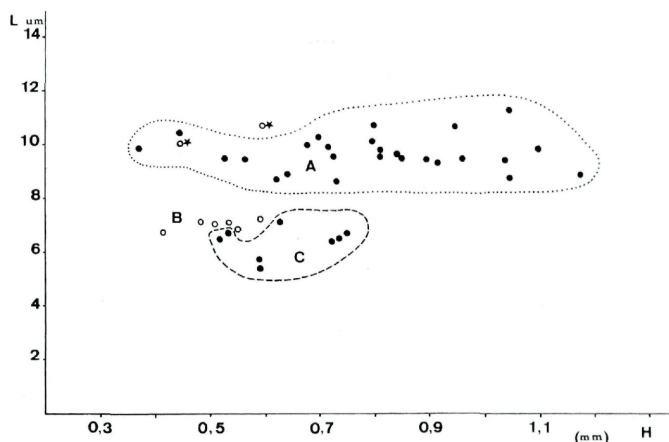


Fig. 12. - Scatter diagram of height of stroma (H) vs. ascospore length (L) and of *Diatrype subaffixa* and related species. - A. *D. subaffixa*. - B. *D. stigma* (open symbols). - C. *D. undulata*. - Stars designate American specimens of *D. stigma*.

2. Stromata nearly flat with low margin, ostioles disk-shaped, indistinctly furrowed, ascospores 6-10 (12)  $\mu\text{m}$  long, conidia usually 4-8  $\mu\text{m}$  long; on a wide host range, Europe, North America.....*D. stigma*
2. Stromata usually strongly undulating, rarely flat, with distinctly marked steep margin, ostioles cone-shaped, erumpent, three- to four-sulcate ..... 3
3. Stromata nearly flat, 500-700  $\mu\text{m}$  thick, ascospores 8-10  $\mu\text{m}$  long; on *Pyrus*, New Jersey, USA (type collection)..... *D. subaffixa*
3. Stromata strongly undulating, rarely flat (on *Sambucus*), 700-1200  $\mu\text{m}$  thick, ascospores (8) 9-12  $\mu\text{m}$  long, conidia 9-17  $\mu\text{m}$  long; on *Carpinus betulus*, *Sorbus aucuparia*, *Acer platanoides* and *Sambucus racemosa*, Poland, Europe. ....*D. subaffixa* var. *rappazii*
4. Stromata strongly undulating, ascospores 4.5-6  $\mu\text{m}$  long; on *Acer*, Europe.....*D. spilomea*
4. Stromata usually flat or rarely slightly undulate .....5
5. Margin of stroma deep, sinuate in contour, ostioles cone-shaped, erumpent, ascospores 6.5-8  $\mu\text{m}$  long, conidia 13-17  $\mu\text{m}$  long; on Betulaceae, Europe, North America .....*D. undulata*

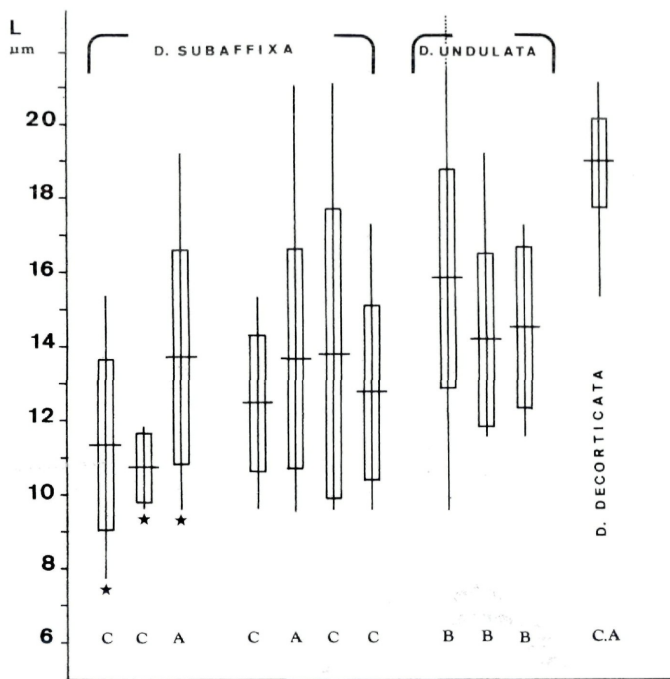


Fig. 13. - Variability in conidium length of *Diatrype subaffixa*, *D. undulata* and *D. decorticata*. - Stars designate collections with anamorph found in nature, all other conidia have been obtained in cultures. - A. *Acer platanoides*. - B. *Betula* spp. - C. *Carpinus betulus*. - C.A. *Corylus avellana*.

5. Margin of stroma low, slightly sinuate, stromata widespreading with deep transverse fissures, ascospores 6-9 μm long, conidia 17-21 μm long; on *Fagus* and *Betulaceae*, Europe, North America ..  
 ..... *D. decorticata*

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