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CATALOGUE OF POLISH SMUT FUNGI, WITH NOTES ON FOUR SPECIES OF *ANTHRACOIDEA*

MARCIN PIĄTEK, MAŁGORZATA RUSZKIEWICZ-MICHALSKA & WIESŁAW MUŁENKO

Abstract. A catalogue of smut fungi known in Poland is presented, incorporating the current nomenclature and classificatory system for the species. The species now known from Poland number 174, classified in 30 genera and 14 families. The Polish collections of *Anthracoidea* Bref. on *Carex fuliginosa* (= misnamed *C. sempervirens*), *C. hartmanii*, *C. humilis*, *C. michelii* and *C. sempervirens* are revised. *Anthracoidea buxbaumii* Kukkonen, *A. humilis* Vánky and *A. michelii* Vánky are records new for Poland. *Anthracoidea sempervirentis* Vánky, previously poorly known, is considered to be fairly common in the Tatra Mts. All species of *Anthracoidea* are fully documented with voucher specimens, original descriptions and SEM micrographs, and their distribution in Poland is mapped.

Key words: Ustilaginomycetes *p.p.*, Urediniomycetes *p.p.*, census catalogue, *Anthracoidea*, taxonomy, Poland

Marcin Piątek, Department of Mycology, W. Szafer Institute of Botany, Polish Academy of Sciences, Lubicz 46, PL-31-512 Kraków, Poland; e-mail: mpiatek@ib-pan.krakow.pl
Małgorzata Ruszkiewicz-Michalska, Department of Algology and Mycology, University of Łódź, Banacha 12/16, PL-90-237 Łódź, Poland; e-mail: mrusz@biol.uni.lodz.pl
Wiesław Mułenko, Department of General Botany, Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland; e-mail: botog@biotop.umcs.lublin.pl

INTRODUCTION

The long-standing tradition of research on smut fungi in Poland goes back to the works of Schröter (1869, 1887), the later taxonomic monographs of Kawecka-Starmachowa (1936, 1939) and Kochman (1936), and the postwar monograph by Kochman and Majewski (1973). These studies are supplemented by a number of reports published mostly in Polish and German literature.

Since the publication of the monograph by Kochman and Majewski (1973) there has been remarkable progress in studies on smut fungi, contributing descriptions and re-evaluations of many species. Some species have been synonimized or reallocated to other genera. This has brought significant changes in the taxonomy and nomenclature of smut fungi. Reports on several newly discovered species in Poland have been published since the 1970s. Thus, it is appropriate to provide a catalogue of smut fungi known in Poland, incorporating the current nomenclature and modern classificatory system. The catalogue is a shortened form of a forthcoming checklist of Polish smut fungi (Majewski, Ruszkiewicz-Michalska & Piątek, submitted). The checklist will be greatly expanded, and will comprise data on synonyms, host species and records published after Kochman and Majewski's work.

We also provide the results of studies on four species of *Anthracoidea* Bref., which is the most taxonomically complicated genus of smut fungi in Poland. Three species of this genus, *A. buxbaumii* Kukkonen, *A. humilis* Vánky and *A. michelii* Vánky, are reported for the first time in Poland; the fourth, *A. sempervirentis* Vánky, is briefly reviewed, and the species discussed are fully documented with voucher specimens, original descriptions and SEM micrographs.

MATERIAL AND METHODS

The catalogue is based on critical analysis of the information given by Kochman and Majewski (1973)

and subsequent papers (below). The majority of recent taxonomic additions and changes have been incorporated. Species nomenclature is based largely on Vánky (1994), with innovations and changes published since that study came out (Vánky 1998a, b, 1999, 2001a, 2004; Piepenbring *et al.* 1999; Ershad 2000; Piepenbring 2000; Bauer *et al.* 2001a; Vánky & McKenzie 2002; Piątek 2005a).

Smut fungi have long been included in one order, Ustilaginales, with the two families Tilletiaceae and Ustilaginaceae. Major changes resulting from extensive ultrastructural and molecular studies have been introduced in the last two decades (Bauer *et al.* 1997, 2001b; Begerow *et al.* 1998; Vánky 1999, 2001b, c; Weiss *et al.* 2004). Smut fungi are currently included in two classes, Ustilaginomycetes and Urediniomycetes, and numerous orders and families. In this paper, the classificatory system has been adopted after Vánky (2001b) with the modifications introduced by Vánky (2001c) and Weiss *et al.* (2004).

The collections of *Anthracoidea* species analyzed in this paper come from KRAM and LBLM. Except for a few records of *A. michelii* and *A. sempervirentis*, only materials collected within the borders of present-day Poland have been included. Observations and measurements of spores were made from samples mounted in 5% KOH under a NIKON Eclipse E600 light microscope with Nomarski phase contrast. For SEM studies, dry spores were dusted on a clean slide, mounted on one side of double-sided tape and affixed to an aluminum stub. The stubs were sputter-coated with carbon using a CRESSINGTON sputter-coater and viewed with a Hitachi S-4700 scanning electron microscope at a working distance of 12–13 mm. SEM micrographs were taken in the Laboratory of Field Emission Scanning Electron Microscopy and Microanalysis at the Institute of Geological Sciences of the Jagiellonian University, Kraków.

Results and discussion

Catalogue of Polish smut fungi

The monograph by Kochman and Majewski (1973) comprised 149 species known to occur in Poland, classified in 19 genera and two families. In the past three decades there has been significant progress in taxonomic, nomenclatural and phytogeographical studies, and many findings on changes related to European smut fungi have been published. On the one hand, the results of these studies have brought about a reduction in the number of Polish smut fungi; for example, two known species of *Schroeteria* G. Winter, viz. *S. decaisneana* (Boud.) de Toni and *S. delastrina* (Tul. & C. Tul.) G. Winter, were excluded from the smut fungi because ultrastructural study showed them to be ascomycetes (Nagler *et al.* 1989). Other species have been synonimized with others: *Entyloma aschersonii* (Ule) Woronin with *E. magnusii* (Ule) Woronin, *Ustilago corcontica* (Bubák) Liro with *U. striiformis* (Westend.) Niessl, *Ustilago levis* (Kellerm. & Swingle) Magnus with *U. hordei* (Pers.) Lagerh., *Ustilago perennans* Rostr. with *U. avenae* (Pers.) Rostr., and *Ustilago raciborskiana* Siemaszko & Wróbl. with *Microbotryum anomalum* (J. G. Kunze *ex* G. Winter) Vánky (Vánky 1994).

On the other hand, descriptions of new species and revisions of some others have added smut fungi species known from Poland. *Microbotryum violaceum* (Pers.: Pers.) G. Deml & Oberw. *s.l.*, for instance, was treated in its broad sense in Kochman and Majewski (1973). Now this collective species is represented in Poland by six species: *M. dianthorum* (Liro) H. Scholz & I. Scholz, *M. lychnidis-dioicae* (DC. *ex* Liro) G. Deml & Oberw., *M. silenes-inflatae* (DC. *ex* Liro) G. Deml & Oberw., *M. stellariae* (Sowerby) G. Deml & Oberw., *M. violaceo-verrucosum* (Brandenb. & Schwinn) Vánky, and *M. violaceum* (Pers.: Pers.) G. Deml & Oberw. *s. str.* Similarly, *Entyloma picridis* Rostr. *s.l.* is currently divided into smaller species, three of which are known in Poland: *E. arnoseridis* Syd. & P. Syd. *ex* Cif., *E. hieracii* Syd. & P. Syd. *ex* Cif., and *E. leontodontis* Syd. & P. Syd. *ex* Cif. Another example, *Urocystis primulicola* Magnus *s.l.*, is now represented in Poland by two species, *U. primulae* (Rostr.) Vánky and *U. primulicola* Magnus *s.str*. Finally, while *Microbotryum aviculare* (Liro) Vánky was treated by Kochman and Majewski (1973) as a variety, '*Ustilago anomala* var. *avicularis* (Liro) B. Lindeb.,' it is now considered to be a good species (Vánky 1994). Similarly, '*Ustilago montagnei* var. *major* Desm.' is now treated as a species, *Ustanciosporium majus* (Desm.) M. Piepenbr. (Piepenbring 2000).

Apart from those additions, the number of Polish smut fungi has also increased simply

because new species have been discovered in Poland, such as *Tilletia holci* (Westend.) J. Schröt. (Michalski 1982), *Tilletia sesleriae* Juel (Romaszewska-Sałata 1982), *Entyloma helosciadii* Magnus (Skirgiełło *et al.* 1992; Mułenko 1994), *Microbotryum cichorii* (Syd.) Vánky (Adamska & Błaszkowski 2000; Adamska 2001), *Urocystis dactylidina* (Lavrov) Zundel (Adamska 2001), *Ustilago trichophora* (Link) Körn. (Pusz & Kita 2001; Madej *et al.* 2001), *Microbotryum pinguiculae* (Rostrup) Vánky (Piątek *et al.* 2005), *Schizonella intercedens* Vánky & A. Nagler (Piątek 2005a), *Tothiella thlaspeos* (Beck) Vánky, *Tracya lemnae* (Setch.) Syd. & P. Syd. (Płachecka 2005) and *Urocystis muscaridis* (Niessl) Moesz (Wołczańska & Rozwałka 2005).

Several groups of smut fungi still require further re-examination to clarify their status in Poland. The most problematic species belong to the genus *Anthracoidea* Bref. In their monograph, Kochman and Majewski (1973) listed 11 species of *Anthracoidea* from Poland. The concept of this genus, although correct at the time, has changed greatly. Vánky (1979) added to this list *A. tomentosae* Vánky and *A. sempervirentis* Vánky, which he newly described. On the basis of the host plants mentioned in Kochman and Majewski (1973), Nannfeldt (1977, 1979) concluded that several species of *Anthracoidea* newly described or resurrected from oblivion are known from Poland, but he did not examine voucher specimens. Nannfeldt lists the following species: *A. angulata* (Syd.) Boidol & Poelt, *A. bigelowii* Nannf., *A. intercedens* Nannf., *A. irregularis* (Liro) Boidol & Poelt, *A. karii* (Liro) Nannf., *A. vankyi* Nannf., and (with some doubts) also *A. fischeri* (P. Karst.) Kukkonen. One of them has already been confirmed in Poland: *A. vankyi* (Piątek 2005b). The others need to be confirmed with a re-examination of herbarium materials, but except for *A. fischeri* we included them in our checklist (marked with an asterisk). The first author (M.P.) is currently making a critical analysis of all materials of *Anthracoidea* deposited in Polish herbaria, including verification of host identifications. Preliminary results are reported in the present paper.

Synonimizations and deletions with resurrections and additions of species have been expanded; thus the total number of smut fungi reported from Poland is now 174, classified in 30 genera belonging to 14 families.

Class USTILAGINOMYCETES R. Bauer, Oberw. & Vánky

Canad. J. Bot. **75**: 1311. 1997.

Subclass ENTORRHIZOMYCETIDAE R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Order *ENTORRHIZALES* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Family *ENTORRHIZACEAE* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Entorrhiza C. A. Weber

Bot. Zeitung **42**: 378. 1884.

1. ***Entorrhiza aschersoniana*** (Magnus) Lagerh.

Hedwigia **27**: 262. 1888.

2. ***Entorrhiza casparyana*** (Magnus) Lagerh.

Hedwigia **27**: 262. 1888.

3. ***Entorrhiza cypericola*** (Magnus) C. A. Weber

Bot. Zeitung **42**: 378. 1884.

Subclass USTILAGINOMYCETIDAE Jülich

Biblioth. Mycol. **85**: 54. 1981, *emend.* R. Bauer & Oberw., Canad. J. Bot. **75**: 1311. 1997.

Order *UROCYSTALES* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Family *MELANOTAENIACEAE* Begerow, R. Bauer & Oberw.

Canad. J. Bot. **75**(1997): 2053. 1998.

Melanotaenium de Bary

Bot. Zeitung **32**: 105. 1874.

1. ***Melanotaenium cingens*** (Beck) Magnus

Oesterr. Bot. Z. **42**: 40. 1892.

2. ***Melanotaenium endogenum*** (Unger) de Bary

Bot. Zeitung **32**: 106. 1874.

Family *DOASSANSIOPSACEAE* Begerow, R. Bauer & Oberw.

Canad. J. Bot. **75**(1997): 2052. 1998.

Doassansiopsis (Setch.) Dietel

in Engler & Prantl, Näturl. Pflanzenfam. **I**(1): 21. 1897.

1. ***Doassansiopsis hydrophila*** (A. Dietr.) Lavrov

Sist. Zametki Mater. Gerb. Krylova Tomsk. Gousud. Univ. Kujbyševa **11**: 4. 1937.

Family *UROCYSTACEAE* Begerow, R. Bauer & Oberw.

Canad. J. Bot. **75**(1997): 2052. 1998.

Urocystis Rabenh. *ex* Fuckel

Jahrb. Nassauischen Vereins Naturk. **23–24**: 41. 1870.

1. ***Urocystis agropyri*** (Preuss) A. A. Fisch. Waldh.

Bull. Soc. Imp. Naturalistes Moscou **40**: 258. 1867.

2. ***Urocystis anemones*** (Pers.) G. Winter

Hedwigia **19**: 160. 1880.

3. ***Urocystis avenae-elatioris*** (Kochman) Zundel

Ustilaginales of the World: 311. 1953.

4. ***Urocystis bolivarii*** Bubák & Gonz. Frag.

in Bubák, Bol. Soc. Esp. Hist. Nat. **22**: 205. 1922.

5. ***Urocystis bromi*** (Lavrov) Zundel

Ustilaginales of the World: 312. 1953.

6. ***Urocystis colchici*** (Schltdl.) Rabenh.

Fungi europ. 396. 1861.

7. ***Urocystis dactylidina*** (Lavrov) Zundel

Ustilaginales of the World: 314. 1953.

8. ***Urocystis ficariae*** (Liro) Moesz

Budapest és környékének gombái: 137. 1942.

9. ***Urocystis filipendulae*** (Tul.) J. Schröt.

Abh. Schles. Ges. Vaterl. Cult., Abth. Naturwiss. **1869/1872**: 7. 1869.

10. ***Urocystis fischeri*** Körn. *ex* G. Winter

in Rabenhorst, Krypt.-fl. Deutsch., Oester. Schweiz **2**(1): 120. 1881.

11. ***Urocystis floccosa*** (Wallr.) D. M. Hend.

Notes Roy. Bot. Gard. Edinburgh **21**: 241. 1955.

12. ***Urocystis johansonii*** (Lagerh.) Magnus

Verh. Bot. Vereins Prov. Brandenburg **37**(1895): 94. 1896.

13. ***Urocystis junci*** Lagerh.

Bot. Not. **1888**: 201. 1888.

14. ***Urocystis kmetiana*** Magnus

Verh. Bot. Vereins Prov. Brandenburg **31**: xix. 1890.

15. ***Urocystis leimbachii*** Örtel

Irmischia **1**(1881): 4. 1882.

16. ***Urocystis luzulae*** (J. Schröt.) G. Winter

in Rabenhorst, Krypt.-fl. Deutsch., Oester. Schweiz **2**(1): 120. 1881.

17. ***Urocystis magica*** Pass.

in Thümen, Mycoth. univ. 223. 1875.

18. ***Urocystis muscaridis*** (Niessl) Moesz

A Kárpát-medence üszöggombái: 199. 1950.

19. ***Urocystis occulta*** (Wallr.) Rabenh. *ex* Fuckel

Jahrb. Nassauischen Vereins Naturk. **23–24**: 41. 1870.

20. ***Urocystis ornithogali*** Körn.

in Fischer von Waldheim, Ann. Sci. Nat. Bot., Sér. 6, **4**(1876): 240. 1877.

21. ***Urocystis poae*** (Liro) Padwick & A. Khan

Mycol. Pap. **10**: 2. 1944.

22. ***Urocystis primulae*** (Rostr.) Vánky

Symb. Bot. Upsal. **24**(2): 176. 1985.

23. ***Urocystis primulicola*** Magnus

Verh. Bot. Vereins Prov. Brandenburg **20**: 53. 1878.

24. ***Urocystis pulsatillae*** (Bubák) Moesz

A Kárpát-medence üszöggombái: 211. 1950.

25. ***Urocystis ranunculi*** (Lib.) Moesz

A Kárpát-medence üszöggombái: 199. 213. 1950.

26. ***Urocystis ranunculi-auricomi*** (Liro) Zundel

Ustilaginales of the World: 331. 1953.

27. ***Urocystis syncocca*** (L. A. Kirchn.) B. Lindeb.

Symb. Bot. Upsal. **16**(2): 99. 1959.

28. ***Urocystis trientalis*** (Berk. & Broome) B. Lindeb.

Symb. Bot. Upsal. **16**(2): 100. 1959.

29. ***Urocystis trollii*** Nannf.

in Lindeberg, Symb. Bot. Upsal. **16**(2): 100. 1959.

30. ***Urocystis ulei*** Magnus

in Rabenhorst, Fungi europ. 2390. 1877.

31. ***Urocystis violae*** (Sowerby) A. A. Fisch. Waldh.

Bull. Soc. Imp. Naturalistes Moscou **40**: 258. 1867.

Vankya Ershad

Rostaniha **1**: 66. 2000.

1. ***Vankya ornithogali*** (J. C. Schmidt & Kunze) Ershad

Rostaniha **1**: 66. 2000.

2. ***Vankya vaillantii*** (Tul. & C. Tul.) Ershad

Rostaniha **1**: 69. 2000.

Order *USTILAGINALES* G. P. Clinton

North Amer. Flora **7**: 1. 1906, *emend.* R. Bauer & Oberw., Canad. J. Bot. **75**: 1311. 1997.

Family *CINTRACTIACEAE* Vánky

Mycotaxon **74**(2): 344. 2000.

Tolyposporium Woronin *ex* J. Schröt.

in Cohn, Krypt.-fl. Schles. **3**(1): 276. 1887.

1. ***Tolyposporium junci*** (J. Schröt.) Woronin *ex* J. Schröt.

in Cohn, Krypt.-fl. Schles. **3**(1): 276. 1887.

Ustanciosporium Vánky

Mycotaxon **70**: 31. 1999, *emend.* M. Piepenbr., Nova Hedwigia **70**(3–4): 330. 2000.

1. ***Ustanciosporium gigantosporum*** (Liro) M. Piepenbr. & Begerow

Nova Hedwigia **70**(3–4): 339. 2000.

2. ***Ustanciosporium majus*** (Desm.) M. Piepenbr.

Nova Hedwigia **70**(3–4): 341. 2000.

3. ***Ustanciosporium montagnei*** (Tul. & C. Tul.) M. Piepenbr., Begerow & Oberw.

Nova Hedwigia **70**(3–4): 344. 2000.

Family *FARYSIACEAE* Vánky

Fungal Diversity **6**: 143. 2001.

Farysia Racib.

Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math. Nat. **1909**: 354. 1909.

1. ***Farysia thuemenii*** (A. A. Fisch. Waldh.) Nannf.

in Lindeberg, Symb. Bot. Upsal. **16**(2): 51. 1959.

Family *GLOMOSPORIACEAE* Cif.

Riv. Patol. Veg. **3**: 141. 1963, *emend*. Begerow, R. Bauer & Oberw., Canad. J. Bot. **75**(1997): 2053. 1998.

Glomosporium Kochman

Acta Soc. Bot. Polon. **16**: 58. 1939.

1. ***Glomosporium leptideum*** (Syd.) Kochman

Acta Soc. Bot. Polon. **16**: 58. 1939.

Kochmania M. Piątek

Mycotaxon **92**: 34. 2005.

1. ***Kochmania oxalidis*** (Ellis & Tracy) M. Piątek

Mycotaxon **92**: 34. 2005.

Thecaphora Fingerh.

Linnaea **10**: 230. 1836, *emend*. Vánky, Mycotaxon **69**: 94. 1998.

1. ***Thecaphora affinis*** W. G. Schneid. *ex* A. A. Fisch. Waldh.

Aperçu systématique des Ustilagineés: 36. 1877.

2. ***Thecaphora saponariae*** (F. Rudolphi) Vánky

Mycotaxon **69**: 94. 1998.

3. ***Thecaphora seminis-convolvuli*** (Desm.) S. Ito

Trans. Sapporo Nat. Hist. Soc. **14**: 94. 1935.

Tothiella Vánky

Mycotaxon **70**: 39. 1999.

1. ***Tothiella thlaspeos*** (Beck) Vánky

Mycotaxon **70**: 39. 1999.

Family *USTILAGINACEAE* Tul. & C. Tul.

Ann. Sci. Nat. Bot., Sér. 3, **7**: 14. 1847, *emend*. R. Bauer & Oberw., Canad. J. Bot. **75**: 1312. 1997.

Macalpinomyces Langdon & Full.

Trans. Brit. Mycol. Soc. **68**: 30. 1977, *emend*. Vánky, Mycotaxon **59**: 119. 1996.

1. ***Macalpinomyces neglectus*** (Niessl) Vánky

Mycotaxon **89**(1): 106. 2004.

Melanopsichium Beck

Ann. K. K. Naturhist. Hofmus. **9**: 122. 1894.

1. ***Melanopsichium pennsylvanicum*** Hirschh.

Notas Mus. La Plata, Bot. **6**: 149. 1941.

Moesziomyces Vánky

Bot. Not. **130**: 133. 1977.

1. ***Moesziomyces bullatus*** (J. Schröt.) Vánky

Bot. Not. **130**: 133. 1977.

Schizonella J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 362. 1877.

1. ***Schizonella cocconii*** (Morini) Liro

Ann. Acad. Sci. Fenn., Ser. A, **42**(1): 52. 1938.

2. ***Schizonella intercedens*** Vánky & A. Nagler

Mycotaxon **69**: 105. 1998.

3. ***Schizonella melanogramma*** (DC.) J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 385. 1877.

Sporisorium Ehrenb. *ex* Link

in Linne, Spec. Plant. Ed. 4, **6**(2): 86. 1825.

1. ***Sporisorium andropogonis*** (Opiz) Vánky

Symb. Bot. Upsal. **24**(2): 113. 1985.

2. ***Sporisorium cruentum*** (J. G. Kühn) Vánky

Symb. Bot. Upsal. **24**(2): 115. 1985.

3. ***Sporisorium destruens*** (Schltdl.) Vánky

Symb. Bot. Upsal. **24**(2): 115. 1985.

4. ***Sporisorium sorghi*** Ehrenb. *ex* Link

in Linne, Spec. Plant. Ed. 4, **6**(2): 86. 1825.

Stegocintractia M. Piepenbr., Begerow & Oberw.

Mycologia **91**: 497. 1999.

1. ***Stegocintractia luzulae*** (Sacc.) M. Piepenbr., Begerow & Oberw.

Mycologia **91**: 497. 1999.

Tranzscheliella Lavrov

Trudy Biol. Naucno-Issl. Inst. Tomsk. Gosud. Univ. **2**: 29. 1936, *emend*. Vánky, Mycotaxon **85**: 2. 2003.

1. ***Tranzscheliella hypodytes*** (Schltdl.) Vánky & E. H. C. McKenzie

Fungal Diversity Research Series **8**: 156. 2002.

Ustilago (Pers.) Roussel

Flore Calvados, ed 2: 47. 1806.

1. ***Ustilago avenae*** (Pers.) Rostr.

Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider **1890**: 13. 1890.

2. ***Ustilago bromivora*** (Tul. & C. Tul.) A. A. Fisch. Waldh.

Bull. Soc. Imp. Naturalistes Moscou **40**: 252. 1867.

3. ***Ustilago calamagrostidis*** (Fuckel) G. P. Clinton

J. Mycol. **8**: 138. 1902.

4. ***Ustilago crameri*** Körn.

Verh. Naturhist. Vereines Preuss. Rheinl. Westphalens **29**: 192. 1872.

5. ***Ustilago davisii*** Liro

Ann. Acad. Sci. Fenn., Ser. A, **17**(1): 80. 1924.

6. ***Ustilago echinata*** J. Schröt.

Abh. Schles. Ges. Vaterl. Cult., Abth. Naturwiss. **1869/1872**: 4. 1869.

7. ***Ustilago filiformis*** (Schrank) Rostr.

Festskr. Bot. Foren. Kjøbenhavn. 1890: 136. 1890.

8. ***Ustilago grandis*** Fr.

Syst. mycol. **3**(2): 518. 1832.

9. ***Ustilago hordei*** (Pers.) Lagerh.

Mitt. Bad. Bot. Vereins **1889**: 70. 1889.

10. ***Ustilago lolii*** Magnus

Hedwigia **49**: 93. 1909.

11. ***Ustilago maydis*** (DC.) Corda

Icones Fung. Huc. Cognit. **5**: 3. 1842.

12. ***Ustilago nuda*** (J. L. Jensen) Kellerm. & Swingle

Kansas Agric. Exp. Sta. Annual Rep. **2**: 277. 1890.

13. ***Ustilago serpens*** (P. Karst.) B. Lindeb.

Symb. Bot. Upsal. **16**(2): 133. 1959.

14. ***Ustilago striiformis*** (Westend.) Niessl

Hedwigia **15**: 1. 1876.

15. ***Ustilago syntherismae*** (Schwein.) Peck

Annual Rep. New York State Mus. Nat. Hist. **27**: 103. 1875.

16. ***Ustilago trichophora*** (Link) Körn.

Hedwigia **16**: 36. 1877.

17. ***Ustilago tritici*** (Pers.) Rostr.

Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider **1890**: 15. 1890.

Family *ANTHRACOIDEACEAE* C. Denchev

Mycotaxon **65**: 413. 1997.

Anthracoidea Bref.

Untersuch. Gesammtgeb. Mykol. xii: Hemibasidii, Brandpilze iii: 144. 1895.

*1. ***Anthracoidea angulata*** (Syd.) Boidol & Poelt

Ber. Bayer. Bot. Ges. **36**: 23. 1963.

2. ***Anthracoidea arenaria*** (Syd.) Nannf.

Bot. Not. **130**: 365. 1977.

*3. ***Anthracoidea bigelowii*** Nannf.

in Nannfeldt & Lindeberg, Svensk Bot. Tidskr. **59**: 203. 1965.

4. ***Anthracoidea buxbaumii*** Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 88. 1963.

5. ***Anthracoidea caricis*** (Pers.) Bref.

Untersuch. Gesammtgeb. Mykol. xii: Hemibasidii, Brandpilze iii: 144. 1895, *emend.* Nannf., Symb. Bot. Upsal. **22**(3): 17. 1979.

6. ***Anthracoidea caricis-albae*** (Syd.) Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 62. 1963.

7. ***Anthracoidea caryophylleae*** Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 53. 1963.

8. ***Anthracoidea echinospora*** (Lehtola) Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 72. 1963.

9. ***Anthracoidea heterospora*** (B. Lindeb.) Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 63. 1963.

10. ***Anthracoidea humilis*** Vánky

Mycotaxon **18**: 321. 1983.

11. ***Anthracoidea inclusa*** Bref.

Untersuch. Gesammtgeb. Mykol. xv: Brandpilze Brandkrank. v: 35. 1912.

*12. ***Anthracoidea intercedens*** Nannf.

Symb. Bot. Upsal. **22**(3): 22. 1979.

*13. ***Anthracoidea irregularis*** (Liro) Boidol & Poelt

Ber. Bayer. Bot. Ges. **36**: 23. 1963.

*14. ***Anthracoidea karii*** (Liro) Nannf.

Bot. Not. **130**: 368. 1977.

15. ***Anthracoidea limosa*** (Syd.) Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 91. 1963.

16. ***Anthracoidea michelii*** Vánky

Bot. Not. **132**: 223. 1979.

17. ***Anthracoidea paniceae*** Kukkonen

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 76. 1963.

18. ***Anthracoidea pratensis*** (Syd.) Boidol & Poelt

Ber. Bayer. Bot. Ges. **36**: 23. 1963.

19. ***Anthracoidea sempervirentis*** Vánky

Bot. Not. **132**: 225. 1979.

20. ***Anthracoidea subinclusa*** (Körn.) Bref.

Untersuch. Gesammtgeb. Mykol. xii: Hemibasidii, Brandpilze iii: 146. 1895.

21. ***Anthracoidea tomentosae*** Vánky

Bot. Not. **132**: 227. 1979.

22. ***Anthracoidea vankyi*** Nannf.

Bot. Not. **130**: 372. 1977.

Subclass EXOBASIDIOMYCETIDAE Jülich

Biblioth. Mycol. **85**: 55. 1981, *emend.* R. Bauer & Oberw., Canad. J. Bot. **75**: 1311. 1997.

Order *GEORGEFISCHERIALES* R. Bauer, Begerow & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Family *GEORGEFISCHERIACEAE* R. Bauer, Begerow & Oberw.

Canad. J. Bot. **75**: 1312. 1997.

Jamesdicksonia Thirum., Pavgi & Payak

Mycologia **52**: 478. 1960, *emend.* R. Bauer, Begerow, A. Nagler & Oberw., Mycol. Res. **105**(4): 422. 2001.

1. ***Jamesdicksonia dactylidis*** (Pass.) R. Bauer, Begerow, A. Nagler & Oberw.

Mycol. Res. **105**(4): 422. 2001.

Order *TILLETIALES* Kreisel *ex* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Family *TILLETIACEAE* Tul. & C. Tul.

Ann. Sci. Nat. Bot., Sér. 3, **7**: 14. 1847, *emend.* R. Bauer & Oberw., Canad. J. Bot. **75**: 1311. 1997.

Tilletia Tul. & C. Tul.

Ann. Sci. Nat. Bot., Sér. 3, **7**: 112. 1847.

1. ***Tilletia anthoxanthi*** A. Blytt

Forh. Vidensk.-Selsk. Christiania **1896**(6): 31. 1896.

2. ***Tilletia caries*** (DC.) Tul. & C. Tul.

Ann. Sci. Nat. Bot., Sér. 3, **7**: 113. 1847.

3. ***Tilletia contraversa*** J. G. Kühn

in Rabenhorst, Fungi europ. 1896. 1874.

4. ***Tilletia holci*** (Westend.) J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 365. 1877.

5. ***Tilletia laevis*** J. G. Kühn

in Rabenhorst, Fungi europ. 1697. 1873.

6. ***Tilletia lolii*** Auersw. *ex* G. Winter

in Rabenhorst, Krypt.-fl. Deutsch., Oester. Schweiz **2**(1): 109. 1881.

7. ***Tilletia olida*** (Riess) J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 366. 1877.

8. ***Tilletia secalis*** (Corda) Körn.

Verh. Naturhist. Vereines Preuss. Rheinl. Westphalens **29**: 98. 1872.

9. ***Tilletia separata*** J. Kunze *ex* G. Winter

in Rabenhorst, Krypt.-fl. Deutsch., Oester. Schweiz **2**(1): 111. 1881.

10. ***Tilletia sesleriae*** Juel

Öfvers. Förh. Kongl. Svenska Vetensk.-Akad. **51**: 494. 1894.

11. ***Tilletia sphaerococca*** (Wallr.) A. A. Fisch. Waldh.

Bull. Soc. Imp. Naturalistes Moscou **40**: 255. 1867.

Order *ENTYLOMATALES* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

Family *ENTYLOMATACEAE* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1312. 1997.

Entyloma de Bary

Bot. Zeitung **32**: 101. 1874.

1. ***Entyloma achilleae*** Magnus

Abh. Naturhist. Ges. Nürnberg **13**: 8. 1900.

2. ***Entyloma arnoseridis*** Syd. & P. Syd. *ex* Cif.

Atti Ist. Bot. Univ. Pavia, Ser. 3, **1**: 93. 1924.

3. ***Entyloma bellidiastri*** Maire

in Brockmann-Jerosch & Maire, Oesterr. Bot. Z. **57**: 274. 1907.

4. ***Entyloma bellidis*** Willi Krieg.

Hedwigia, Beibl. **35**: 145. 1896.

5. ***Entyloma calendulae*** (Oudem.) de Bary

Bot. Zeitung **32**: 102. 1874.

6. ***Entyloma chrysosplenii*** J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 372. 1877.

7. ***Entyloma cichorii*** Wróbl.

Spraw. Komis. Fizjogr. **47**: 153. 1913.

8. ***Entyloma corydalis*** de Bary

Bot. Zeitung **32**: 104. 1874.

9. ***Entyloma dahliae*** Syd. & P. Syd.

Ann. Mycol. **10**: 36. 1912.

10. ***Entyloma erigerontis*** Syd. & P. Syd. *ex* Cif.

Ann. Mycol. **26**: 39. 1928.

11. ***Entyloma eryngii-plani*** Cif.

Bull. Soc. Bot. Ital. **1924**: 54. 1924.

12. ***Entyloma fergussonii*** (Berk. & Broome) Plowr.

Monogr. Brit. Ured. Ustilag.: 289. 1889.

13. ***Entyloma ficariae*** Thüm. *ex* A. A. Fisch. Waldh.

Bull. Soc. Imp. Naturalistes Moscou 52: 309. 1877.

14. ***Entyloma fuscum*** J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 373. 1877.

15. ***Entyloma gaillardianum*** Vánky

Mycotaxon **16**: 104. 1982.

16. ***Entyloma helosciadii*** Magnus

Hedwigia **21**: 130. 1882.

17. ***Entyloma hieracii*** Syd. & P. Syd. *ex* Cif.

Bull. Soc. Bot. Ital. **1924**: 50. 1924.

18. ***Entyloma leontodontis*** Syd. & P. Syd. *ex* Cif.

Atti Ist. Bot. Univ. Pavia, Ser. 3, **1**: 93. 1924.

19. ***Entyloma linariae*** J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 371. 1877.

20. ***Entyloma magnusii*** (Ule) Woronin

Abh. Senckenberg. Naturf. Ges. **12**(1881): 580. 1882.

21. ***Entyloma matricariae*** Rostr.

in Thümen, Mycoth. univ. 2223. 1884.

22. ***Entyloma microsporum*** (Unger) J. Schröt.

in Rabenhorst, Fungi europ. 1872. 1874.

23. ***Entyloma ranunculi-repentis*** Sternon

L'hétérogenité du genre *Ramularia*: 34 & 45. 1925.

24. ***Entyloma serotinum*** J. Schröt.

in Cohn, Beitr. Biol. Pflanz. **2**: 437. 1877.

25. ***Entyloma thalictri*** J. Schröt.

in Cohn, Krypt.-fl. Schles. **3**(1): 282. 1887.

26. ***Entyloma verruculosum*** Pass.

in Rabenhorst, Fungi europ. 2253. 1877 & Nuovo Giorn. Bot. Ital. **9**: 239. 1877.

27. ***Entyloma winteri*** Linh.

in Linhart, Fungi hung. 206. 1884.

Order *DOASSANSIALES* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1312. 1997.

Family *DOASSANSIACEAE* (Azbukina & Karatygin) R. T. Moore *ex* P. M. Kirk, P. F. Cannon & J. C. David

Dictionary of the fungi: ix. 2001.

Doassansia Cornu

Ann. Sci. Nat. Bot., Sér. 6, **15**: 285. 1883.

1. ***Doassansia alismatis*** (Nees) Cornu

Ann. Sci. Nat. Bot., Sér. 6, **15**: 285. 1883.

2. ***Doassansia limosellae*** (J. Kunze) J. Schröt.

in Cohn, Krypt.-fl. Schles. **3**(1): 287. 1887.

3. ***Doassansia niesslii*** De Toni

J. Mycol. **4**: 17. 1888.

4. ***Doassansia sagittariae*** (Fuckel) C. Fisch.

Ber. Deutsch. Bot. Ges. **2**: 415. 1884.

Heterodoassansia Vánky

Mycotaxon **48**: 28. 1993.

1. ***Heterodoassansia hottoniae*** (Rostr.) Vánky

Mycotaxon **48**: 28. 1993.

Tracya Syd. & P. Syd.

Hedwigia, Beibl. **40**: 3. 1901.

1. ***Tracya hydrocharidis*** Lagerh.

in Vestergren, Bot. Not. **1902**: 175. 1902.

2. ***Tracya lemnae*** (Setch.) Syd. & P. Syd.

Hedwigia, Beibl. **40**: 3. 1901.

Class UREDINIOMYCETES *sensu* E. C. Swann & J. W. Taylor

Subclass MICROBOTRYOMYCETIDAE E. C. Swann

Mycologia **91**(1): 63. 1999.

Order *MICROBOTRYALES* R. Bauer & Oberw.

Canad. J. Bot. **75**: 1309. 1997.

Family *MICROBOTRYACEAE* R. T. Moore

Mycotaxon **59**: 17. 1996.

Bauerago Vánky

Mycotaxon **70**: 44. 1999.

1. ***Bauerago vuyckii*** (Oudem. & Beij.) Vánky

Mycotaxon **70**: 46. 1999.

Microbotryum Lév.

Ann. Sci. Nat. Bot., Sér. 3, **8**: 372. 1847, *emend.* Vánky, Mycotaxon **67**: 39. 1998.

1. ***Microbotryum anomalum*** (J. Kunze *ex* G. Winter) Vánky

Mycotaxon **67**: 39. 1998.

2. ***Microbotryum aviculare*** (Liro) Vánky

Mycotaxon **67**: 40. 1998.

3. ***Microbotryum bistortarum*** (DC.) Vánky

Mycotaxon **67**: 40. 1998.

4. ***Microbotryum cardui*** (A. A. Fisch. Waldh.) Vánky

Mycotaxon **67**: 41. 1998.

5. ***Microbotryum cichorii*** (Syd.) Vánky

Mycotaxon **67**: 42. 1998.

6. ***Microbotryum cordae*** (Liro) G. Deml & Prillinger

in Prillinger *et al.*, Bot. Acta **104**: 10. 1991.

7. ***Microbotryum dianthorum*** (Liro) H. Scholz & I. Scholz

Englera **8**: 206. 1988.

8. ***Microbotryum goeppertianum*** (J. Schröt.) Vánky

Mycotaxon **67**: 44. 1998.

9. ***Microbotryum holostei*** (de Bary) Vánky

Mycotaxon **67**: 44. 1998.

10. ***Microbotryum intermedium*** (J. Schröt.) Vánky

Mycotaxon **67**: 44. 1998.

11. ***Microbotryum kuehneanum*** (R. Wolff) Vánky

Mycotaxon **67**: 45. 1998.

12. ***Microbotryum lychnidis-dioicae*** (DC. *ex* Liro) G. Deml & Oberw.

Phytopathol. Z. **104**(4): 353. 1982.

13. ***Microbotryum major*** (J. Schröt.) G. Deml & Oberw.

Phytopathol. Z. **104**(4): 353. 1982.

14. ***Microbotryum marginale*** (DC.) Vánky

Mycotaxon **67**: 45. 1998.

15. ***Microbotryum pinguiculae*** (Rostrup) Vánky

Mycotaxon **67**: 48. 1998.

16. ***Microbotryum pustulatum*** (DC.) R. Bauer & Oberw.

Canad. J. Bot. **75**: 1309. 1997.

17. ***Microbotryum reticulatum*** (Liro) R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

18. ***Microbotryum scabiosae*** Vánky

Mycotaxon **67**: 52. 1998.

19. ***Microbotryum scorzonerae*** (Alb. & Schwein.) G. Deml & Prillinger

in Prillinger *et al.*, Bot. Acta **104**: 10. 1991.

20. ***Microbotryum silenes-inflatae*** (DC. *ex* Liro) G. Deml & Oberw.

Phytopathol. Z. **104**(4): 354. 1982.

21. ***Microbotryum stellariae*** (Sowerby) G. Deml & Oberw.

Phytopathol. Z. **104**(4): 354. 1982.

22. ***Microbotryum tragopogonis-pratensis*** (Pers.) R. Bauer & Oberw.

Canad. J. Bot. **75**: 1311. 1997.

23. ***Microbotryum vinosum*** (Tul. & C. Tul.) C. Denchev

Mycotaxon **50**: 331. 1994.

24. ***Microbotryum violaceo-verrucosum*** (Brandenb. & Schwinn) Vánky

Mycotaxon **33**: 372. 1988.

25. ***Microbotryum violaceum*** (Pers.: Pers.) G. Deml & Oberw.

Phytopathol. Z. **104**(4): 353. 1982.

Sphacelotheca de Bary

Vergl. Morph. Biol. Pilze, Myzet. Bacter.: 187. 1884.

1. ***Sphacelotheca hydropiperis*** (Schumach.) de Bary

Vergl. Morph. Biol. Pilze, Myzet. Bacter.: 187. 1884.

NOTES ON FOUR SPECIES OF *ANTHRACOIDEA*

In the last monograph on Polish smut fungi (Kochman & Majewski 1973) and in the subsequent reports (Romaszewska-Sałata 1975, 1977; Kućmierz 1976, 1977a, b; Braun & Hirsch 1978; Sałata *et al.* 1986; Mułenko 1989; Mułenko *et al.* 1995; Sałata & Mułenko 1996) *Anthracoidea caricis* (Pers.) Bref. *emend.* Nannf. is treated in Poland in its broad sense, reported from the following host plants: *Carex digitata*, *C. fuliginosa*, *C. hirta*, *C. michelii*, *C. montana*, *C. ornithopoda*, *C. pallescens*, *C. pilulifera* and *C. sempervirens*.

In the second half of the 20th century, this collective species was divided into some minor but homogenous species on the basis of host taxonomy and spore morphology: for example, *Anthracoidea angulata* (Syd.) Boidol & Poelt, *A. hostianae* B. Lindeb. *ex* Nannf., *A. humilis* Vánky, *A. irregularis* (Liro) Boidol & Poelt, *A. michelii* Vánky, *A. pseudirregularis* U. Braun, and *A. sempervirentis* Vánky (e.g., Boidol & Poelt 1963; Nannfeldt 1979; Vánky 1979, 1983; Braun 1982). The entire complex in Poland requires further re-examination.

For the present study we examined herbarium collections of infected *Carex fuliginosa* and *C. sempervirens*, and reconsidered records of *Anthracoidea caricis* on *Carex michelii*. In addition, our recent collecting trips in Poland yielded smutted plants of *C. hartmanii* and *C. humilis*, which had not been found to be infected by *Anthracoidea* species in Poland before. The species of *Anthracoidea* on these species of *Carex* are identified as follows:

Anthracoidea buxbaumii Kukkonen (Figs 1–3)

Ann. Bot. Soc. Zool. Bot. Fennicae 'Vanamo' **34**: 88. 1963.

Sori in ovaries, scattered in the inflorescence, as globose to subglobose, hard black bodies up to 2 mm in diameter, covered by a thin, silvery membrane when young, later powdery. Spores large, dark reddish-brown, ovoid, polyhedral to irregular, in plane view 14–25 × 20–28 µm, with 1–3 internal swellings and without light-refractive spots, wall up to 2 µm thick, rather evenly thickened, surface verruculose, warts rounded, up to 0.5 µm high.

SPECIMENS EXAMINED. POLAND. POLESIE: Bagno Bubnów swamp in Poleski National Park, on *Carex hartmanii* Cajand., 20 June 1997, *leg. W. Mułenko* (LBLM 8476, KRAM F-54088), same locality and host, 25 July 1998, *leg. W. Mułenko* (LBLM 8477).

Anthracoidea buxbaumii parasitizes *Carex buxbaumii* and *C. hartmanii*, sedges belonging to *Carex* sect. *Atratae*. In Europe, *Anthracoidea paniceae* Kukkonen on *Carex bicolor* may also occur on representatives of this section, but this host is accidental for this *Anthracoidea* species (Vánky 1994). *Anthracoidea buxbaumii* is apparently a rare smut fungus. Nannfeldt (1979) listed only few European countries where it was observed. Most records are from *C. buxbaumii*; the smut was known on this host from Finland, Norway, Sweden (Nannfeldt 1979) and the European part of Russia (Scholler *et al.* 2003). On *C. hartmanii* it was reported only from Hungary, Sweden (Nannfeldt 1979), Romania (Vánky 1985) and Slovakia (Paulech 1998). The finding reported here is the first one in Poland (Fig. 7), and the collections come from *C. hartmanii*. It seems that *Anthracoidea buxbaumii* on *C. buxbaumii* occurs in Northern Europe, while in Central Europe it infects *C. hartmanii*.

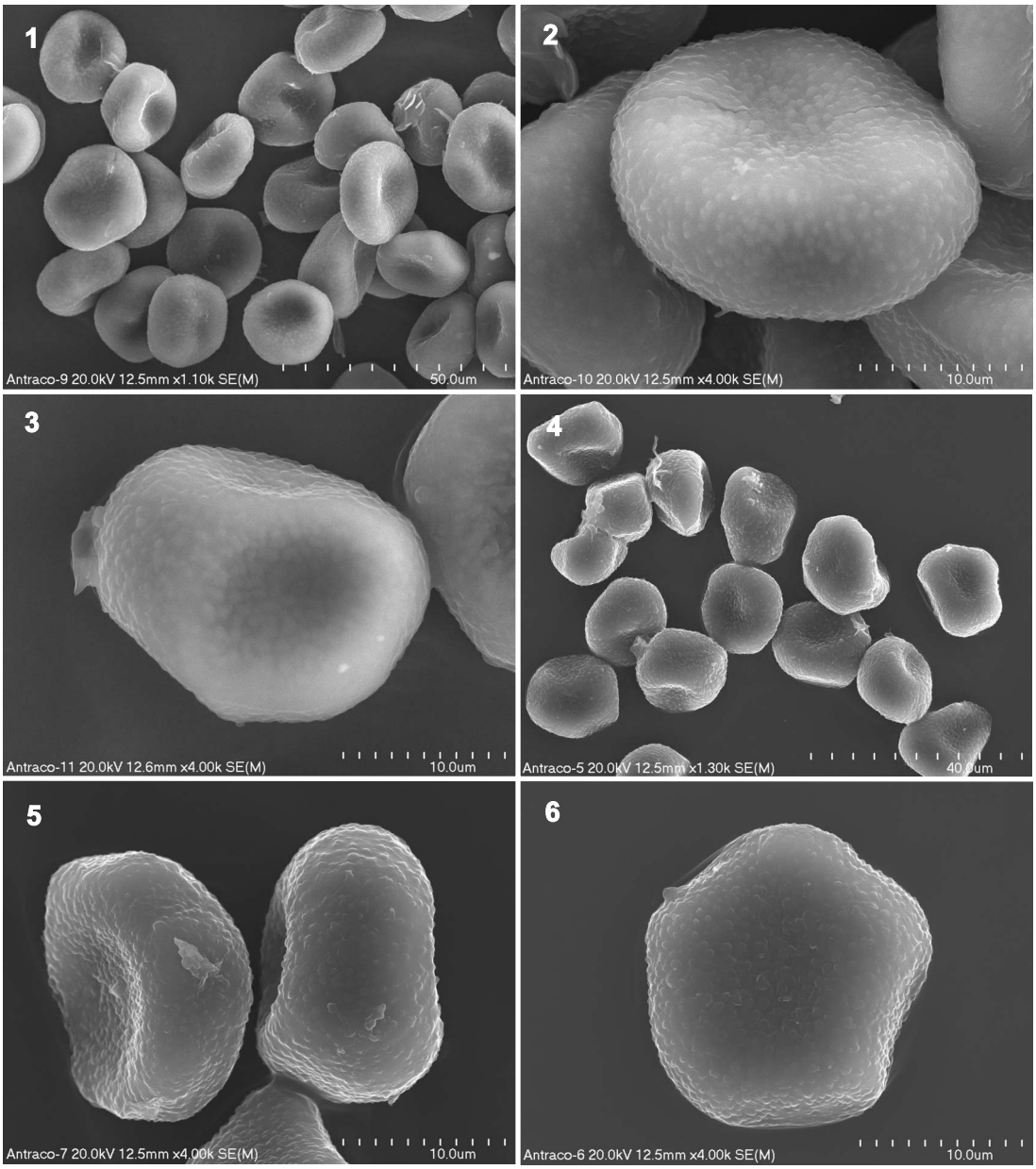
Anthracoidea humilis Vánky (Figs 4–6)

Mycotaxon **18**: 321. 1983.

Sori in ovaries, scattered in the inflorescence, as globose to subglobose, hard black bodies up to 2 mm in diameter, covered by a thin, silvery membrane when young, later powdery. Spores medium-sized, dark reddish-brown, polyhedral to irregularly subpolygonal, in plane view 16–21 × 18–25 µm, with 1–3 weakly seen internal swellings and with light-refractive areas, wall unevenly thickened, up to 3 µm thick, surface distinctly verruculose, warts rounded, up to 0.5 µm high, irregularly spaced.

SPECIMENS EXAMINED. POLAND. WYŻYNA MAŁOPOLSKA UPLAND: Biała Góra Reserve near Miechów, on *Carex humilis* Leyss., 3 May 2004, *leg. M. Piątek & J. Piątek* (KRAM F-54087); Wały Reserve near Racławice, on *Carex humilis* Leyss., 11 July 2004, *leg. M. Piątek & J. Piątek* (KRAM F-54015).

Anthracoidea humilis infects only *Carex humilis* belonging to *Carex* sect. *Digitatae*. In Europe, *A. irregularis* (Liro) Boidol & Poelt (on *C. digitata*, *C. ornithopoda*, *C. pallens*, *C. pediformis*) and *A. rupestris* Kukkonen (on *Carex glacialis*) also occur on representatives of this section. The former has very irregular spores, and the latter a thinner wall and abundant internal swellings. *Anthracoidea humilis* has been described relatively recently. Its holotype and isotypes come from Romania. In the original description the species was also reported from Austria and Germany (Vánky 1983), and further found in Switzerland, France (Scholz & Scholz 1988), Spain (Almaraz & Durrieu 1997) and Bulgaria (Denchev 2001). Now Poland must be added to the geographical range of *A. humilis* (Fig. 7). Two populations have been found in steppe reserves in the *Inuletum ensifoliae* plant association, of which *C. humilis* is a characteristic species. The infected ovaries appear and disappear relatively early in the vegetative season.



Figs 1–6. 1–3. Spores of *Anthracoidea buxbaumii* Kukkonen (SEM, from LBLM 8477). 4–6. Spores of *Anthracoidea humilis* Vánky (SEM, from KRAM F-54087).

The first find comes from the beginning of May. Only degraded sori were observed in the second locality found on 11 June. The most suitable collection time for *A. humilis* is in May and the first half of June.

Anthracoidea michelii Vánky (Figs 8–9)

Bot. Not. **132**: 223. 1979.

Sori in ovaries, scattered in the inflorescence, as subglobose, hard black bodies up to 2 mm in

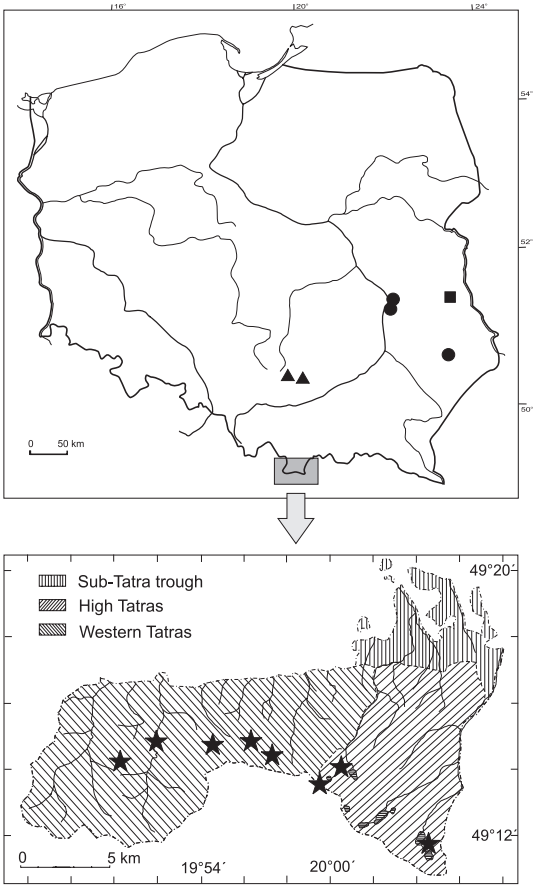


Fig 7. Distribution of discussed *Anthracoidea* species in Poland: ■ – *Anthracoidea buxbaumii* Kukkonen, ▲ – *Anthracoidea humilis* Vánky, ● – *Anthracoidea michelii* Vánky, ★ – *Anthracoidea sempervirentis* Vánky.

diameter. Spores medium-sized, reddish-brown to dark reddish-brown, quite variable in shape, subangular, polyhedral to irregular, in plane view 14–20 × 15–23 µm, with 1–2 internal swellings and common light-refractive areas, wall unevenly thickened, up to 3 µm thick, surface distinctly verruculose to papillate, warts rounded, up to 0.5 µm high.

SPECIMENS EXAMINED. UKRAINE. PODOLIYA: Dobrowlany, on *Carex michelii* Host, June 1914, *leg. A. Wróblewski* (KRAM F-2478); Szutromińce, on *Carex michelii* Host, 1935, *leg. Z. Kawecki* (KRAM F-54169).

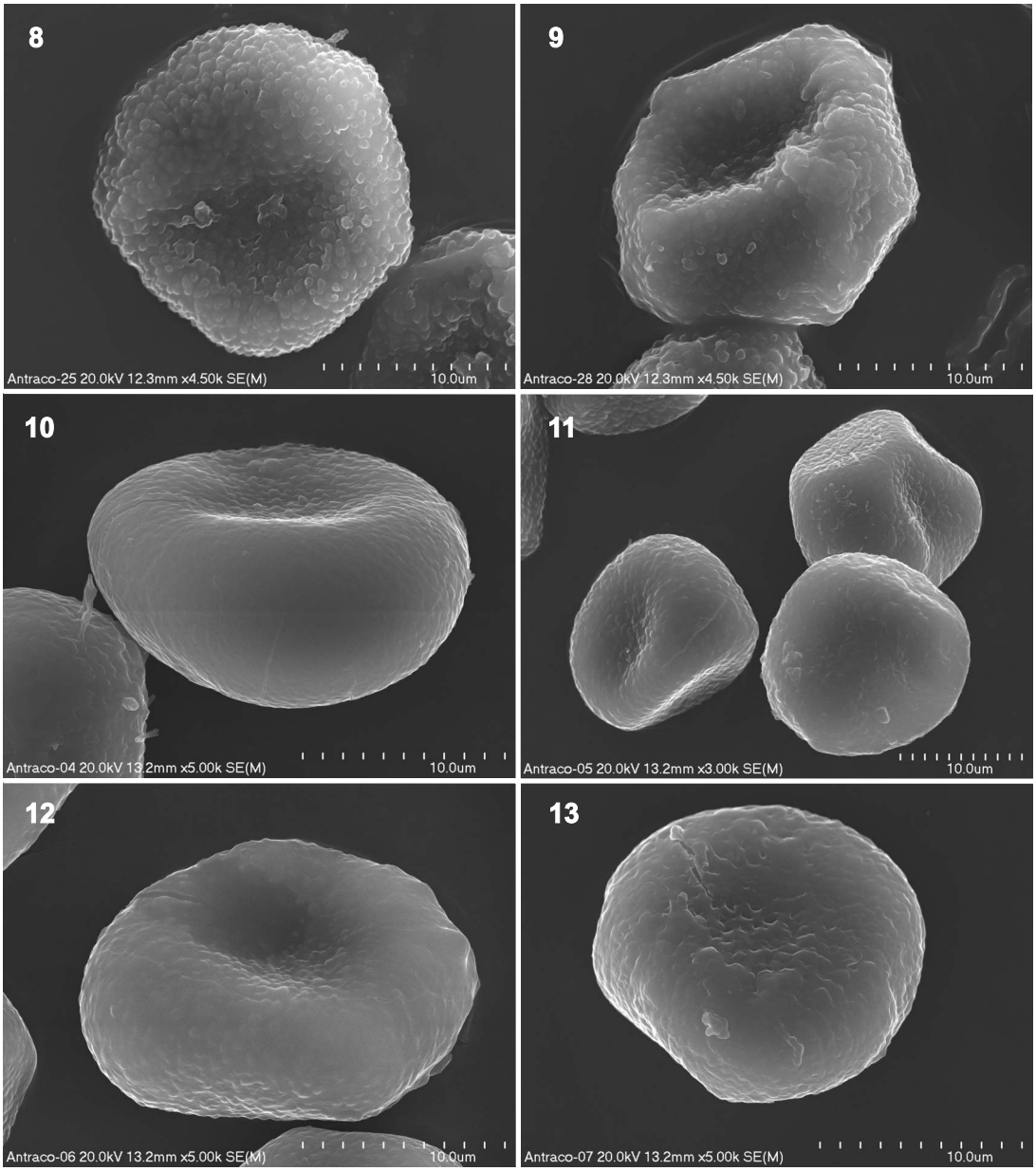
LITERATURE RECORDS. POLAND. WYŻYNA LUBELSKA UPLAND: Brody, on *Carex michelii* Host, June 1970–1972, *leg. J. Romaszewska-Sałata* (ubi?, Romaszewska-Sałata 1975, 1977); Mięćmierz near Kazimierz, on *Carex michelii* Host, June 1970–1972, *leg. J. Romaszewska-Sałata* (ubi?, Romaszewska-Sałata 1975, 1977); Okale near Kazimierz, on *Carex michelii* Host, June 1970–1972, *leg. J. Romaszewska-Sałata* (ubi?, Romaszewska-Sałata 1975, 1977).

Anthracoidea michelii parasitizes *Carex michelii* and *C. brevicollis*, sedges belonging to *Carex* sect. *Rhomboidales*. Representatives of this section in Europe are also infected by *A. pilosae* Vánky (on *Carex pilosa*); it differs by having larger spores and only occasional light-refractive areas. *Anthracoidea michelii* on *C. michelii* has been reported from several European countries including Austria, the Czech Republic, Hungary, Romania, Slovakia and Ukraine (Vánky 1979). The latter author reported *A. michelii* also from Poland, specifying the locality as 'Džvinogŕod-Podde' (= Dźwinogród-Podole), but this place is actually in Ukraine. In Bulgaria the smut has been found on *C. brevicollis* (Denchev 2001). From Poland, collections of *Anthracoidea* on *Carex michelii* have been recorded as *A. caricis* (Pers.) Bref. from three localities in the Wyżyna Lubelska upland (Romaszewska-Sałata 1975, 1977). These specimens were not available for re-examination (they are missing from LBLM where they should be deposited), but they belong to *A. michelii* in all probability. We prepared the morphology and SEM micrographs of this species using two collections of *Anthracoidea michelii* on *Carex michelii* from Ukraine. *Anthracoidea michelii* is recognized here for the first time in Poland (Fig. 7).

Anthracoidea sempervirentis Vánky
(Figs 10–13)

Bot. Not. **132**: 225. 1979.

Sori in ovaries, scattered in the inflorescence, as subglobose to ovoid, hard black bodies up to 2 mm in diameter. Spores medium-sized, dark reddish-brown, rounded, moderately polygonal to irregular, in plane view 15–22 × 19–25 µm, without internal swellings but sometimes with light-refractive spots, wall up to 2 µm thick, and up to 4 µm thick at the angles, surface finely ver-



Figs 8–13. 8–9. Spores of *Anthracoidea michelii* Vánky (SEM, from KRAM F-2478). 10–13. Spores of *Anthracoidea sempervirentis* Vánky (SEM, from KRAM F-54090).

ruculose, warts rounded, up to 0.5 μm, irregularly spaced or confluent.

SPECIMENS EXAMINED. POLAND. WESTERN CARPATHIANS: Tatra Mts, Przełęcz Liliowe pass, on *Carex sempervirens* Vill., June 1916, *leg. A. Wróblewski* (KRAM F-2500), same locality and host, 6 Aug. 1917, *leg. A. Wróblewski* (KRAM F-2485); Mały Kościelec Mt, on *Carex sempervirens* Vill., June 1916, *leg. A. Wróblewski* (KRAM F-2495), same locality and host, 5 Aug.

1917, *leg. A. Wróblewski* (KRAM F-2499); Dolina Kościeliska valley, on *Carex sempervirens* Vill., 13 Aug. 1917, *leg. A. Wróblewski* (KRAM F-2498); Kominy Tylkowe Mt, near Dolina Smytnia valley, on *Carex sempervirens* Vill., 13 Aug. 1917, *leg. A. Wróblewski* (KRAM F-2493); above Morskie Oko lake, on *Carex fuliginosa* Schkuhr (= misnamed *C. sempervirens* Vill., teste T. Majewski), 1957, *leg. B. Starmachowa* (KRAM F-9913); Sucha Dolina valley, 1580 m a.s.l., on *Carex fuliginosa* Schkuhr (= misnamed *Carex sempervirens* Vill., teste W. Paul), 15 Aug. 1979, *leg. B. Sałata* (LBLM 8474); Piekło rocks, 1450 m a.s.l., on *Carex fuliginosa* Schkuhr (= misnamed *Carex sempervirens* Vill., teste W. Paul), Aug. 1979, *leg. B. Sałata* (LBLM 8475); UKRAINE. Eestern Carpathians: Chornohora Mts, Kizie Ułohy Mt, 1860 m a.s.l., on *Carex sempervirens* Vill., 8 Aug. 1935, *leg. A. Środoń* (KRAM F-54090).

Literature records. POLAND. Western Carpathians: Tatra Mts, Świstówka, on *Carex fuliginosa* Schkuhr (= misnamed *C. sempervirens* Vill., teste T. Majewski), 1961, *leg. Z. Kawecki* (Starmachowa 1963; Kochman & Majewski 1973); Tatra Mts, on *Carex ferruginea* Scop., Sept. 1966, *leg. J. Kućmierz* (HUV, Vánky 1985).

Anthracoidea sempervirentis infects several species of *Carex* belonging to *Carex* sect. *Aulocystis*, but it occurs most commonly on *Carex sempervirens*. In Europe, *A. altera* Nannf. and *A. misandrae* Kukkonen may also parasitize on representatives of sect. *Aulocystis*, but they have rounded to slightly irregular spores with the wall evenly thickened. The geographical range of *A. sempervirentis* includes the mountains of Central and Southern Europe, where it was reported from several countries (Vánky 1979; Scholz & Scholz 1988; Almaraz & Durrieu 1997; Denchev 2001). In the Carpathians, including the Tatras, it is a fairly common species on *Carex sempervirens*. The collections by Antoni Wróblewski (given above) were previously published under the name '*Cintractia caricis* (Pers.) Magn.' (Wróblewski 1922). The two collections on *Carex fuliginosa* published as '*Anthracoidea caricis* (Pers.) Bref.' (Mułenko *et al.* 1995) suggested that the species may be *A. misandrae*, but examination of voucher specimens revealed that the host plant is actually *C. sempervirens*, and the smut is *A. sempervirentis*. Similarly, two collections on *C. fuliginosa* recorded by Starmachowa (1963) as '*Cintractia caricis* (Pers.) Magn.' are based on misidentifications of the host plants: it is indeed *C. sempervirens* (Kochman & Majewski 1973) smutted by *A. sempervirentis*. Vánky (1979) was the first author to report *Anthracoidea sempervirentis* from Poland under its specific name. He listed two collections of this fungus which, although he did not specify the localities, probably originated from the Tatra Mts. Later he recorded this smut on *Carex ferruginea* in the Tatras (Vánky 1985). In Polish literature, the name *A. sempervirentis* first appeared in a paper by Sałata and Mułenko (1996), and recently in the checklist by Mułenko *et al.* (2004). *Anthracoidea sempervirentis* is the most common *Anthracoidea* species in the Tatra Mts, surely more common than is shown on the map (Fig. 7). In addition to the Polish collections, we included a collection from Ukraine because the SEM micrographs were made from this specimen.

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