ACTA MYCOLOGICA
Vol. 36 (2): 203 – 209
2001

Colacogloea peniophorae (*Platygloeales*) in Poland

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Piątek M.: *Colacogloea peniophorae (Platygloeales) in Poland.* Acta Mycol. 36 (2): 203 – 209, 2001.
The fourth Polish locality of unusual auricularioid mycoparasite, *Colacogloea peniophorae* (Bourdot et Galzin) Oberw. et Bandoni, is reported and distribution of the fungus in Poland is reviewed. The taxonomy of the fungus is discussed and key to *Colacogloea* species is provided. Fungi parasitizes through colacosomes are briefly reviewed.

Key words: auricularioid fungi, mycoparasitism, colacosomes, distribution of fungi in Poland.

INTRODUCTION

In the course of chorological and ecological studies on wood-inhabiting saprobic basidiomycetes occurring in Tarnów, southern Poland, one specimen of corticioid fungus densely covered by pulvinate, gelatinous galls was found in May 2001. The presence of galls growing parasitically on the surface of host hymenium already in the field suggested the possible discovery of *Colacogloea peniophorae* (Bourdot et Galzin) Oberw. et Bandoni. Subsequent microscopic examination confirmed this assumption.

The aim of the present paper was to characterize the morphological features of *Colacogloea peniophorae* based on the new collection, to discuss taxonomy of the fungus and to show its distribution in Poland.

DESCRIPTION AND DISCUSSION

Colacogloea peniophorae (Bourdot et Galzin) Oberw. et Bandoni
Canad. J. Bot. 68: 2534. 1990.

Basidiomes pulvinate to effused, gelatinous, growing parasitically in and on the surface of host hymenium. Hyphae thin-walled, hyaline, with clamps. Basidia very numerous, auricularioid, without probasidia, transversely three-

septate, with long sterigmata; basidiospores self-replicating, 4.2–5.2 × 6.2–8.2 µm; conidia, 3.1–6.2 × 6.2–8.2(–10.4) µm, produced terminally on conidiophores (Fig. 1).

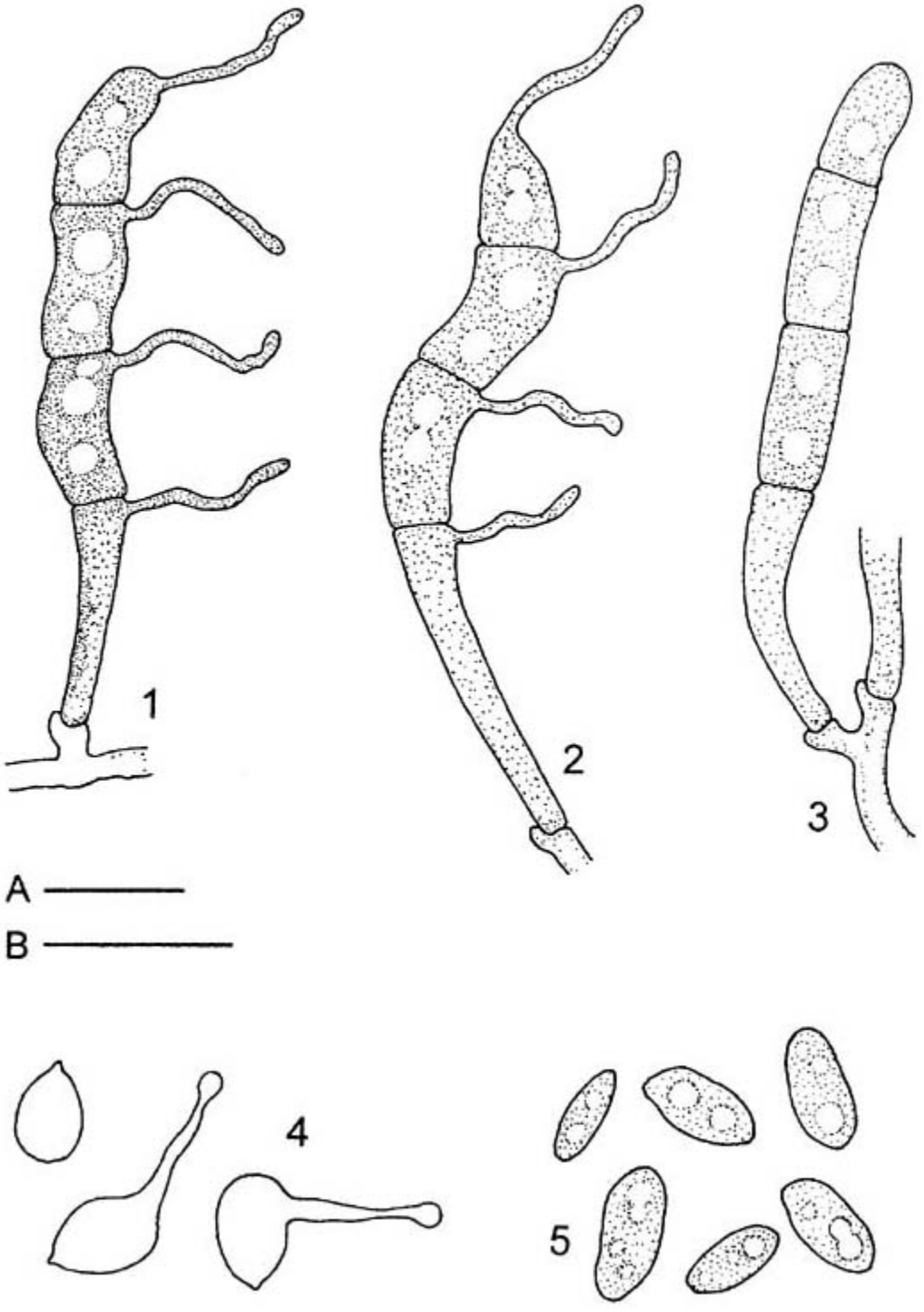

Fig. 1. *Colacogloea peniophorae*: 1, 2, 3 – auricularioid basidia, 4 – basidiospores, two of them self-replicating, 5 – conidia. Scale bars: A = 10 µm (4–5), B = 20 µm (1–3).

Mycoparasitic on hymenium of corticioid fungus; its determination was impossible because no basidia or basidiospores were found. Even so, the microstructure of parasite matched perfectly with literature descriptions (O b e r w i n k l e r et al. 1990) and the correct identification was doubtless.

T a x o n o m y: *Colacogloea peniophorae* is an unusual mycoparasitic heterobasidiomycete, one of the most remarkable amongst occurring in Poland. Its exact taxonomical position was explained only recently. In the past, in the name *Platygloea peniophorae* Bourdot et Galzin were included populations both from aphyllophoraceous and dacryomycetaceous hosts (vide W o j e w o d a 1981), the latter were treated as a separate variety *Platygloea peniophorae* var. *interna* L. S. Olive. W o j e w o d a (1977) transferred the species to the genus *Achroomyces* Bonord., with a following combination: *Achroomyces peniophorae* (Bourdot et Galzin) Wojewoda. This name is still used by some authors for populations on aphyllophoraceous fungi (e.g. H a n s e n and K n u d s e n 1997). O b e r w i n k l e r et al. (1990) and O b e r w i n k l e r (1990) made intense, comparative studies on species from the genus *Platygloea* J. Schroet. s.l. and showed that populations from aphyllophoraceous and dacryomycetaceous hosts are not conspecific. Moreover, they are quite different from *Platygloea disciformis* (Fr.) Neuhoff, the generitype of *Platygloea*. For these reasons two new separate genera were proposed, *Colacogloea* Oberw. et Bandoni and *Occultifur* Oberw., with representatives of *Colacogloea peniophorae* and *Occultifur internus* (L. S. Olive) Oberw. occurring on aphyllophoraceous and dacryomycetaceous hosts respectively.

Initially, the genus *Colacogloea* was described as monotypic, two more species, viz. *C. bispora* (Hauerslev) Oberw. et R. Bauer (O b e r w i n k l e r et al. 1999) and *C. papilionacea* R. Kirschner et Oberw. (K i r s c h n e r and O b e r w i n k l e r 2000), were added or described later. These three species can be determined on the basis of morphological features using the key given below. The occurrence of two remaining species in Poland is possible, as they are known in Central European countries: *C. bispora* in Denmark (H a u e r s l e v 1987, as *Platygloea bispora* Hauerslev) and *C. papilionacea* in Germany (K i r s c h n e r and O b e r w i n k l e r 2000). The former should be looked in the hymenia of *Tubulicrinis* Donk species. *Colacogloea papilionacea* was isolated from the bark beetles infesting conifers, but it is probably not regularly associated with bark beetles (K i r s c h n e r and O b e r w i n k l e r 2000).

Key to *Colacogloea* species

1. Basidiomes present, conspicuous as pulvinate, gelatinous galls on surface of host hymenium, basidia auricularioid, transverse 3-septate, conidia and conidiophores present, usually on *Hyphoderma praetermissum* . . . . ***C. peniophorae***
1. Basidiomes absent, fungi forming only basidia or basidia and conidiophores on ascomycetous or basidiomycetous hosts 2
2. Conidial stage absent, fungus forming only auricularioid, 1-septate basidia, intrahymenially in basidiomes of corticioid fungi (*Tubulicrinis*) . . ***C. bispora***
2. Conidial stage present, fungus forming auricularioid, 1-3-septate basidia and conidiophores with characteristic butterfly-like zygoconidia, on unknown ascomycetous host . . . . . ***C. papilionacea***

Distribution in Poland: *Platygloea peniophorae* s.l. has been rarely collected in Poland. In the monograph of tremellaceous fungi, Wojewoda (1977) reported none Polish localities of the fungus on aphyllophoraceous hosts, and one probable locality on *Dacryomyces stillatus* Nees: Fr. Later, he listed some collections from various parts of the country, but all were found on *Dacryomyces* Nees: Fr. (Wojewoda 1979, 1980, 1998), so these all populations actually represent *Occultifur internus*. Komorowska (1980) reported '*Achroomyces peniophorae*' from the Niepołomice Forest without details on its host fungus. Fortunately in KRAM there is herbarium specimen collected in this locality, which was found on *Hyphoderma ?argillaceum* (Bres.) Donk (det. W. Wojewoda), so it means that this collection refer to truly *Colacogloea peniophorae*, representing its first finding in Poland. However, under the name *Colacogloea peniophorae* the species was first published by Olesiński and Wojewoda (1987) on the basis of 1982 collection by Longin Olesiński in northeastern part of the country. Then the fungus was reported by Wojewoda (1998) from the Beskid Niski Mts. In two latter localities the species grew parasitically in basidiomes of *Hyphoderma praetermissum* (P. Karst.) J. Eriksss. et Å. Strid, which is a typical host fungus for *C. peniophorae* (Oberwinkler et al. 1990). The newly found station in Tarnów is the fourth record for this peculiar species in Poland (Fig. 2). Details of these all records are given below:

1. Central Poland Lowlands. Wzniesienia Mławskie Elevations: Ościsłowo near Glinojeck, grid square **Ce-52**, roadside, in basidiome of *Hyphoderma praetermissum* growing on lying branch under *Acer platanoides*, 1 Sept 1982, leg. L. Olesiński (KRAM F-19493) (Olesiński and Wojewoda 1987).
2. Western Carpathians. Beskid Niski Mts: Cergowa, grid square **Gf-22**, *Dentario glandulosae-Fagetum*, in basidiome of *Hyphoderma praetermissum* growing on lying trunk of tree, ? Jun 1979, leg. W. Wojewoda (Wojewoda 1998).

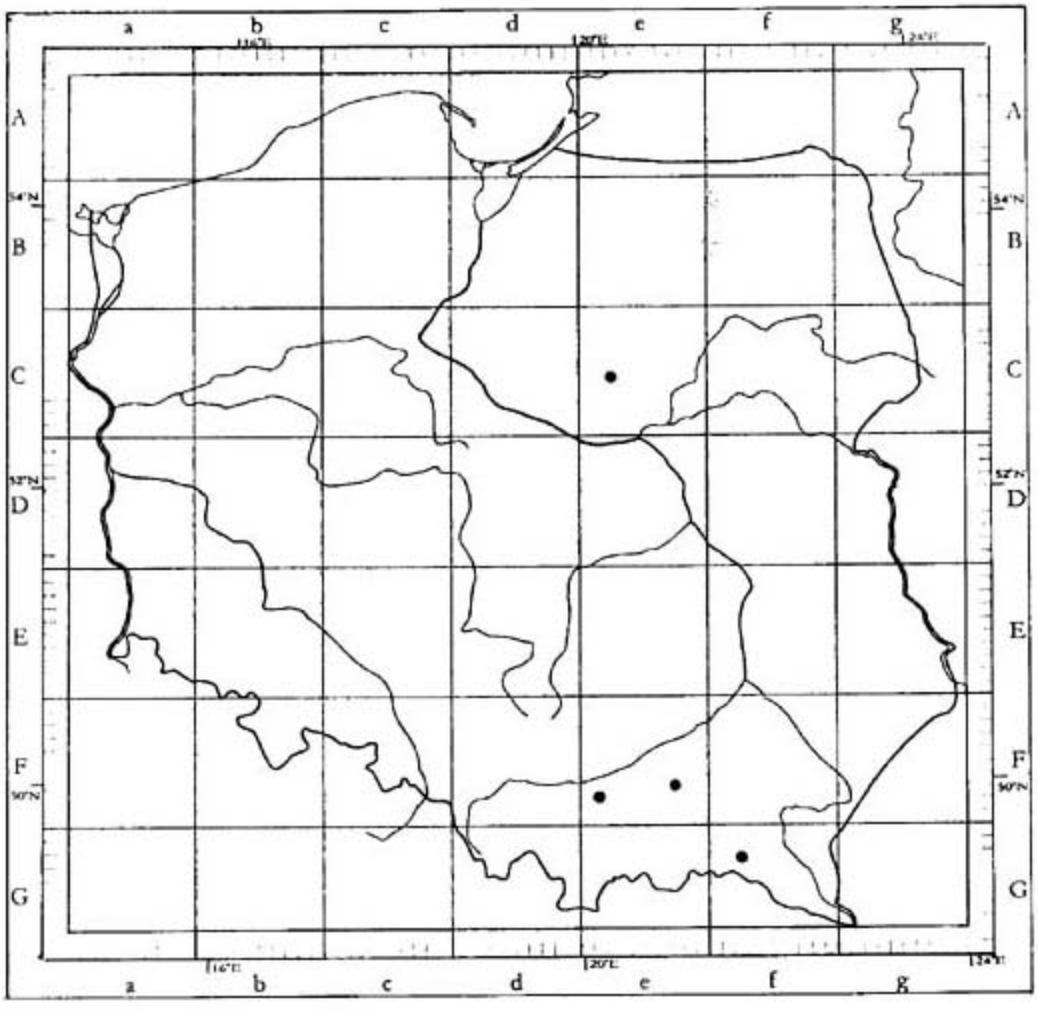

Fig. 2. Distribution of *Colacogloea peniophorae* in Poland.

3. Sandomierz Basin. Podgórze Bocheńskie Piedmont: Niepołomice Forest, forest division 101 near Niepołomice, grid square **Fe-71**, *Tilio-Carpinetum*, in basidiome of *Hyphoderma* ? *argillaceum*, 17 Jul 1978, leg. H. Komorowska (KRAM F-17207) (K o m o r o w s k a 1980).
4. Sandomierz Basin. Płaskowyż Tarnowski Plateau: Tarnów, Piaskówka – tree-stand near Piaskowa street, grid square **Fe-67**, in basidiome of unidentified corticioid fungus growing on fallen branch of *Betula pendula*, 18 May 2001, leg. M. Piątek (KRAM F-51493).

N o t e s o n m y c o p a r a s i t i c i n t e r a c t i o n s: Mycoparasitic, auricularioid fungi form various structures, which enable interactions with host fungus. Most of species have haustoria of tremelloid type, and such occur *inter alia* in *Achroomyces soranus* Hauerslev (H a u e r s l e v 1999), *Occultifur internus* (O b e r w i n k l e r 1990), *Spiculogloea minuta* P. Roberts (R o b e r t s 1997), *S. occulta* P. Roberts (R o b e r t s 1996), *S. subminuta*

Hauerslev (Hauerslev 1999) or *Zygogloea gemellipara* P. Roberts (Roberts 1994). A special type of host-parasite interactions occurs in *Colacogloea peniophorae*. The parasite penetrates host cells through colacosomes, which are organelles developed by parasite at the contact area between parasite and the host fungus and visible by transmission electron microscopy as vesicular bodies with electron-dense cores and electron-transparent margin (Bauer and Oberwinkler 1991).

Colacosomes were first observed and described in *Colacogloea peniophorae*, but subsequently found also in other taxa. These organelles were found in two remaining *Colacogloea* species, and in some monotypic genera, *Atractocolax* R. Kirschner, R. Bauer et Oberw., *Colacosiphon* R. Kirschner, R. Bauer et Oberw., *Cryptomycocolax* Oberw. et R. Bauer, *Heterogastridium* Oberw. et R. Bauer and *Krieglsteinera* Pouzar (Oberwinkler and Bauer 1990, Bauer et al. 1997, Kirschner et al. 1999, 2001). Otherwise, colacosomes were detected in the yeast-like genera *Leucosporidium* Fell, Statzell, I. L. Hunter et Phaff, *Rhodosporidium* Banno and *Sporidiobolus* Nyland (Bauer et al. 1997).

Acknowledgements: Dr. Urszula Bielczyk, Jacek W. Wieser, M. Sc. and Marian Wysocki, M. Sc. are thanked for kindly permitting me to reproduce their contour map of Poland. This paper was supported by Committee for Scientific Research project no. 6 P04G 034 18. The author is a scholarship holder of the Foundation for Polish Science.

REFERENCES

Bauer R., Oberwinkler F. 1991. The colacosomes: new structures at the host-parasite interface of a mycoparasitic basidiomycete. Bot. Acta 104: 53–75.

Bauer R., Oberwinkler F., Vánky K. 1997. Ultrastructural markers and systematics in smut fungi and allied taxa. Canad. J. Bot. 75: 1273–1314.

Hansen L., Knudsen H. (eds). 1997. Nordic Macromycetes. 3. Heterobasidioid, aphyllophoroid and gastromycetoid basidiomycetes. Nordsvamp, Copenhagen.

Hauerslev K. 1987. New species and notes on resupinate fungi. Friesia 11: 329–336.

Hauerslev K. 1999. New and rare species of heterobasidiomycetes. Mycotaxon 72: 465–486.

Kirschner R., Oberwinkler F. 2000. A new species of *Colacogloea* with zygoconidia. Sydowia 52: 195–203.

Kirschner R., Bauer R., Oberwinkler F. 1999. *Atractocolax*, a new heterobasidiomycetous genus based on a species vectored by conifericolous bark beetles. Mycologia 91: 538–543.

Kirschner R., Bauer R., Oberwinkler F. 2001. *Colacosiphon*: a new genus described for a mycoparasitic fungus. Mycologia 93: 634–644.

Komorowska H. 1980. Mushrooms. In: K. Grodzińska (ed.), Acidification of forest environment (Niepołomice Forest) caused by SO_2 emissions from steel mills. Inst. Bot., Pol. Acad. Sci., Kraków.

Oberwinkler F. 1990. New genera of auricularioid heterobasidiomycetes. Rept. Tottori Mycol. Inst. 28: 113–127.

Oberwinkler F., Bauer R. 1990. *Cryptomycocolax*: a new mycoparasitic heterobasidiomycete. Mycologia 82: 671–692.

Oberwinkler F., Bauer R., Bandoni R. J. 1990. *Colacogloea*: a new genus in the auricularioid Heterobasidiomycetes. Canad. J. Bot. 68: 2531–2536.

Oberwinkler F., Bauer R., Tschen J. 1999. The mycoparasitism of *Platygloea bispora*. Kew Bull. 54: 763–769.

Olesiński L., Wojewoda W. 1987 (1985). Data on the macromycetes flora of the North-Eastern Poland. Acta Mycol. 21 (2): 193–232

Roberts P. 1994. *Zygogloea gemellipara*: an auricularioid parasite of *Myxarium nucleatum*. Mycotaxon 52 (1): 241–246.

Roberts P. 1996. Heterobasidiomycetes from Majorca and Cabrera (Balearic Islands.). Mycotaxon 60: 111–123.

Roberts P. 1997. New Heterobasidiomycetes from Great Britain. Mycotaxon 63: 195–216.

Wojewoda W. 1977. Flora Polska. Grzyby (*Mycota*) 8, *Tremellales, Auriculariales, Septobasidiales*. PWN, Warszawa-Kraków.

Wojewoda W. 1979. The geographical distribution of the tremellaceous fungi in Poland. Acta Mycol. 15 (1): 75–144.

Wojewoda W. 1980. Materials on ecology of the Polish tremellaceous fungi. Acta Mycol. 16 (1): 3–41.

Wojewoda W. 1981. Mała flora grzybów. 2. *Tremellales, Auriculariales, Septobasidiales*. PWN, Warszawa-Kraków.

Wojewoda W. 1998 (1997–1998). The macrofungi (*Basidiomycotina*) of the Beskid Niski Mts. (the Polish Carpathians). I. The Heterobasidiomycetes and Aphyllophorales. Studia Ośr. Dokument. Fizjogr. 25: 295–334.

Colacogloea peniophorae (*Platygloeales*) w Polsce

Streszczenie

W pracy podano nowe stanowisko interesującego grzyba *Colacogloea peniophorae* (Bourdot & Galzin) Oberw. & Bandoni znanego dotąd w Polsce tylko z trzech rozproszonych stanowisk. *Colacogloea peniophorae* jest mikopasożytem wyrastającym na owocnikach grzybów kortycjoidalnych, przede wszystkim *Hyphoderma praetermissum* (P. Karst.) J. Erikss. et Å. Strid. W miejscu zetknięcia się strzępek obydwu grzybów pasożyt wytwarza specjalne struktury, które umożliwiają interakcję z żywicielem. Struktury te zostały po raz pierwszy opisane przez Bauera i Oberwinklera (1991) pod nazwą 'colacosomes' (ang.). Proponuje się dla nich spolszczoną nazwę kolakosomy (l. poj. kolakosom).

Kolakosomy widoczne są przez elektronowy mikroskop transmisyjny jako pęcherzykowate ciałka z elektronogęstym rdzeniem i obszarem brzeżnym przepuszczalnym dla elektronów. Kolakosomy wytwarzane są przez pasożyta przy wewnętrznej powierzchni komórki, poza cytoplazmą, ale wewnątrz ściany komórkowej. Następuje to po zetknięciu się strzępek pasożyta i żywiciela. W fazie finalnej następuje wniknięcie materiału z rdzenia kolakosomu do ściany komórkowej żywiciela. Wszystkie etapy ontogenezy kolakosomów są opisane szczegółowo przez Bauera i Oberwinklera (1991).

Dotychczas kolakosomy stwierdzono w kilku rodzajach grzybów aurikularioidalnych (*Atractocolax* R. Kirschner, R. Bauer et Oberw., *Colacogloea* Oberw. et Bandoni, *Colacosiphon* R. Kirschner, R. Bauer et Oberw., *Cryptomycocolax* Oberw. et R. Bauer, *Heterogastridium* Oberw. et R. Bauer i *Krieglsteinera* Pouzar) oraz drożdżoidalnych (*Leucosporidium* Fell, Statzell, I. L. Hunter et Phaff, *Rhodosporidium* Banno i *Sporidiobolus* Nyland).