ACTA MYCOLOGICA
Vol. XXVIII (1): 87-92
1993

Melanconium apiocarpon – the cause of the die-back of branches of Alnus glutinosa in Poland

HANNA KWAŚNA

Agricultural University in Poznań Wojska Polskiego 71C, 60-625 Poznań, Poland

K w a ś n a H.: *Melanconium apiocarpon – the cause of the die-back of branches of Alnus glutinosa in Poland.* Acta Mycol. XXVIII (1): 87-92, 1993.

Melanconium apiocarpon was the cause of the die-back of branches and quicksets of *Alnus glutinosa* in central Poland in 1991. The symptoms of disease and morphological features of the fungus were presented.
Key word: *Melanconium apiocarpon*, *Alnus glutinosa*, branches.

INTRODUCTION

During the summer of 1991 *Alnus glutinosa* L. stands in central Poland were observed to suffer from the die-back of branches and stems. The studies on the cause of the disease were carried out in the Department of Forest Pathology, Agricultural University in Poznań. The aim of the present work was to record the disease, describe its symptoms and present some characteristics of the pathogen.

MATERIAL AND METHODS

In the summer of 1991 fragmets of 1-10-year old branches and stems of *Alnus glutinosa* with external symptoms of infection were collected in central Poland. In the laboratory, the stems were surface sterilized with 10 % aqueous solution of sodium hypochlorite for 5 min. and rinsed twice with sterile water. After stems had dried, the tissue fragments from infected areas were excised, plated on potato dextrose agar (PDA) containing chlorotetracycline (50 µg per 1 ml) and incubated for 10-14 days at 23°C. Conidial morphology was observed using PDA and SNA (KH_2PO_4 – 1,0g, KNO_3 – 1,0 g, Mg SO_4 x 7 H_2O – 0,5 g, KCl – 0,5 g, glucose – 0,2 g, sucrose – 0,2 g, agar – 15 g, distilled water 1 l) agar. The influence of temperature on the mycelial

growth and sporulation of the fungi was examined on PDA medium at 15°, 20°, 25°, and 30°C. Ten plates were seeded with inoculum (1 mm in diam.)obtained from the edge of advancing fungal colonies and placed in completely random design in darkness at each temperature. The diameter of colonies was measured after 7 and 15 days of growth.

RESULTS

The branches of *Alnus glutinosa* stands situated in central Poland were infected mostly by *Melanconium apiocarpon* Link. The fungus was probably the main cause of die-back and crown wilt of trees. The disease was observed in all stages of growth. The infection of growing shoots and young quicksets was the most destructive and ended usually with early withering. Older branches were much more resistant. The fungus penetrated as far as the wood. Local necrosis progressed and developed into cankers. Bark necrosis and wood desiccation could lead to the blockage of water, hence crown wilting and partial die-back of the trees crown. The necrotic fragments of tissue were covered first with tiny, conspicuous cream or orange, numerous, protuberant specks which quickly turned into bigger (2-4 mm diam.), crowded, sometimes joined together, black lesions covered with asexual fructification of fungus (Fig. 1). The quicksets which had been produced from the infected material were dying immediately after planting.

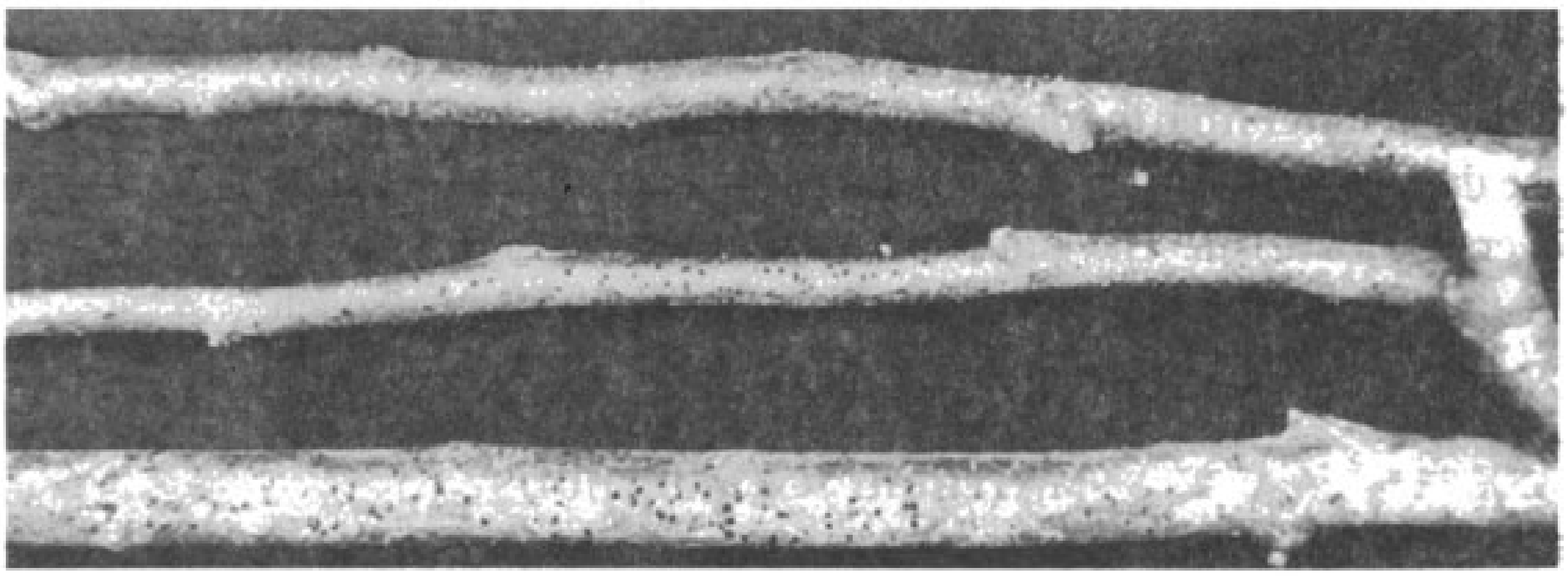

Fig. 1. Symptoms of *Melanconium apiocarpon* infection on branches of *Alnus glutinosa* (photo by M. Babkiewicz)

According to T u l a s n e (1963) *Melanconium apiocarpon* is only the stage of a few conidial stages of *Melanconis alni* Tul. The examined isolate of *Melanconium apiocarpon* has been accepted by IMI Collection as *Melanconis alni* (IMI 349 052), though its perfect stage was not observed. The fungus was identified on the basis of its morphological and cultural features and specificity of parasitism (tendency to attack the *Alnus*).

The fungus produced two kinds of spores: α conidia and ß conidia. The α conidia were oblong, oval rounded at one end and pointed at the base, sometimes egg-shaped or slightly elongated with a constriction in the middle. They measured 11,4-15,2 (17,1) x 6,6 -8,5 (9,0-9,5) µm, and were pale brown, smooth, thick walled, one--celled, guttulate or contained one big drop. The ß conidia were narrowly elliptical to cylindrical, mostly straight, sometimes only slightly curved. They measured 9,5-13,5 x 2,7-3,8 µm, were hyaline, smooth-walled, one-celled. They occurred sporadically, only in the acervuli on tree branches, never in culture (Fig. 2). Both kinds of conidia were formed in separate, sometimes only joined together, irregular acervuli, on conidiophores which were densly arranged within acervulus growing up from the basal stroma of mycelium. The teleomorphs were not observed either on dead branches or in culture.

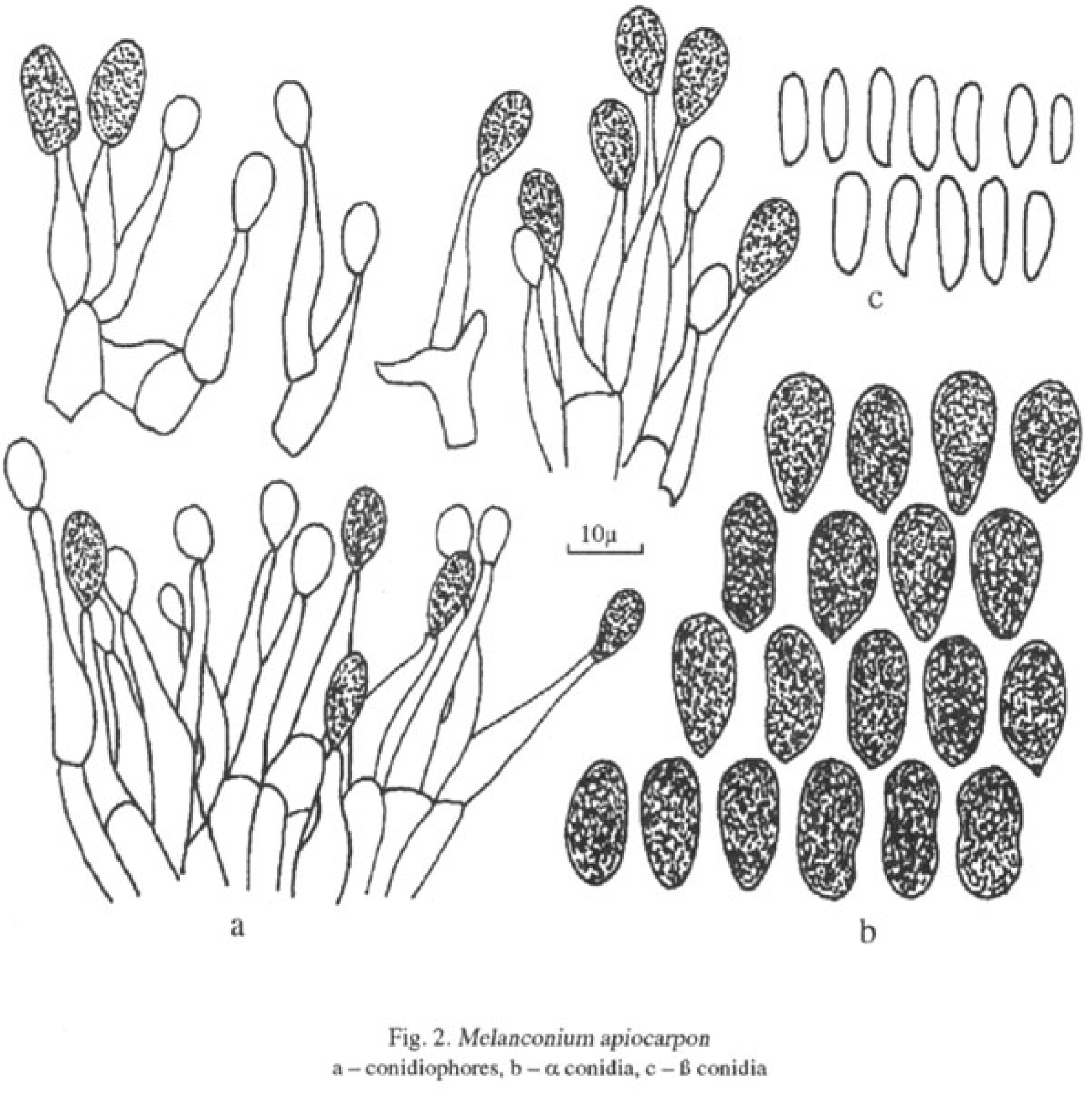

Fig. 2. *Melanconium apiocarpon*
a – conidiophores, b – α conidia, c – ß conidia

The dying branches of alder were occupied by two other fungi: *Cytospora occulta* Sacc. (IMI 349 054) and *Disculina vulgaris* (Fr.) Sutton (E l l i s, 1985). In the first phases of disease both of them had been detected only sporadically but after the disease advanced the conidial sporulation of *C. occulta* was observed much more often which gave indication of its tendency to occupy the dead tissue. The fungus penetrated the wood and caused its brown discolouration which extended beyond the limits of the infected part. On dead branches the fungus produced small, 1 mm in diam., protuberant, conical conidiomata from where the golden tendrils with conidia were emerging. Conidia were cylindrical, slightly curved, hyaline, one-celled, 5-6,0 µm long and 1,5 µm wide.

In the culture, *Melanconium apiocarpon* produced immersed, flat, dense, lanate to downy, white to grayish, aerial mycelium. Sporulation generally was localized in black acervuli. The growth of culture under "in vitro" conditions was optimum at 20°C (Tab. 1). The sporulation was stimulated at +25°C (Fig. 3). *Cytospora occulta* produced colonies with immersed, flat, downy, white to pale brown mycelium and reddish brown pigmentation in the agar. Sporulation was localized in the conidiomata. The growth of culture was optimum at +20°C (Tab. 1).

Table 1

The influence of temperature on the growth of the fungi (in mm)

Species of fungi	+15°	+20°	+25°	+30°
Cytospora occulta	80	90	85	80
Meianconium apiocarpon	36	71	30	4

Explanation: The culture of *C. occulta* and *M. apiocarpon* was measured after 7 and 15 days of growth, respectively

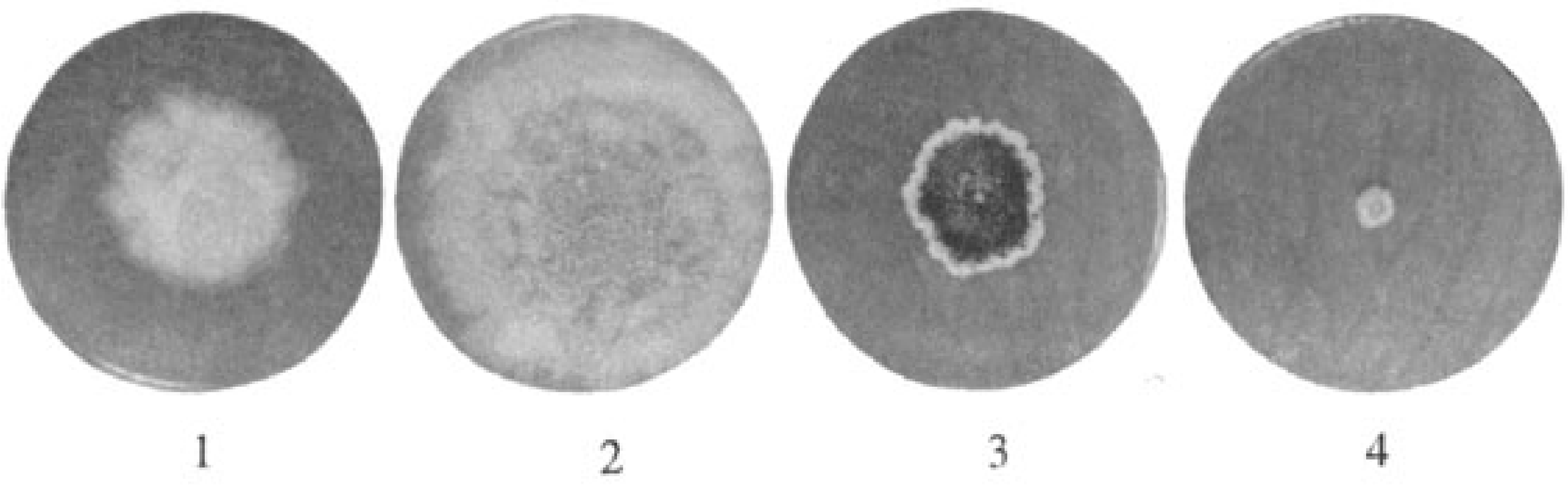

Fig. 3. *Melanconium apiocarpon* culture after 16 days of incubation:
1 – at +15°C, 2 – at +20°C, 3 – at +25°C, 4 – at +30°C
(photo by P. Łakomy)

DISCUSSION

There is no doubt that *Melanconium apiocarpon* (anamorph of *Melanconis alni*) can cause the infection of woody stems of *Alnus glutinosa*. Correct diagnosis of the disease relies on the detection of the early stages of symptom development and its link with fungus stem infection resulting in the blockage of water transport followed by the wilting syndrome.

This is not the first record on the occurrence of *Melanconis alni* in Poland. Infection of the stems of *Alnus incana* by fungus was observed by D o m a ń s k i and K o w a l s k i (1987) in the Upper Silesia Industrial District. It is the zone of remarkable impedance of industrial emissions which could suggest that the initial infection of woody parts is coincident with a temporary break-down of trees resistance affected by stress factors. The fungus did not occur very often and belonged to the specific group of fungi that caused systematical death of the single branches in the crown. Earlier the fungus was found in the Lower Silesia (S c h r o e t e r, 1908) and in Bieszczady Region (D o m a ń s k i et al., 1963). T r u s z k o w s k a (1976) found it on *Alnus glutinosa* in Silesia Region and on *A. incana* in South-Eastern part of Poland. C h l e b i c k i (1990) found it on the branches of *A. incana* in plant communities of Babia Góra Mountain in 1983.

It appears, that the infection of woody stems by *Melanconis* may be more common in *A. glutinosa* stands. The role *of Melanconis* may often be overlooked or misinterpreted. The earliest records on the occurrence of the fungus on the dead branches only (M u n k, 1957, E l l i s, 1985) should not suggest its ability to saprophitic activity only. The fungus can also occupy the living tissue and in the most severe form, the infection resulting in extensive crown wilting may be evidently the consequence of the lower trees resistance partially to stress and differences in individual tree response, as it was observed earlier in birch plantation infected by *Melanconium betulinum* (C a r t e r, 1967).

In all cases *Melanconis alni* was identified due to its teleomorphs. Only once, T r u s z k o w s k a (1967) found its anamorph on *Betula pubescens*.

The examined isolate produced only anamorph. According to T u l a s n e (1963) the shape of conidia as well as the occurrence of two kinds of conidial sporulation suggest the presence of *Melanconium apiocarpon*. The α conidia were however, a little bigger than those described by T u l a s n e which were 10-13,0 x 6,5-7,5 µm and corresponded more with the size given by L i n k (1825) which was 15 x 8 µm. Moreover, the ß conidia were also a little bigger than those described by T u l a s n e which were 6,5-8 µm long and 1,5 µm wide. Similar conidia were observed by W e h m e y e r (1941) on the plant material from the European collections. L i n k (1825) did not mention the presence of ß conidia at all. Considering the conidial sporulation of *Melanconis alni*, in Polish material, so far, only α conidia which correspond with conidia of *Melanconium apiocarpon* given by T u l a s n e (1863) were observed (T r u s z k o w s k a, 1976).

The literature records present the different species of *Melanconium* as the anamorph of *Melanconis alni*. T u l a s n e (1863) maintained that there were a few

forms of conidial sporulation of the fungus. G r o v e (1937) claimed that there was only one imperfect stage – *Melanconium apiocarpon* Link. M i g u l a (1913) described *Melanconium sphaeroideum* Link and C h l e b i c k i (1990) *Melanconium zonatum* Ell. et Ev. as the anamorphs of *Melanconis alni*. There is also *Melanconium dimorphum* Peck (S a c c a r d o, 1889) which produces two kinds of conidia and together with other *Melanconium* species can infect the *Alnus*, but considering the morphological characters of the examined fungus I decided to call it *Melanconium apiocarpon*.

The invasion of the dead tissues by *Cytospora occulta* is rather typical of this fungus (B u t l e r, 1949). The fungus is suspected to be facultative parasite: but it is clearly an intruder which, however, in this case alone, assists in the ultimate death of the tree. Its tendency to tinge the substratum was observed both in dead tissue and on the agar.

REFERENCES

B u t l e r E. J., J o n e s S. G., 1949. Plant pathology, London, pp. 888

C a r t e r J. C., 1967. Twelve unusual tree diseases. Arbortist's News 32: 9-15.

C h l e b i c k i A., 1990. Występowanie *Pyrenomycetes* i *Loculoascomycetes* oraz ich anamorf w zbiorowiskach roślinnych Babiej Góry. Acta Mycol. 15 (2): 51-143.

D o m a ń s k i S., G u m i ń s k a B., L i s i e w s k a M., M a j e w s k i T., S k i r g i e ł ł o A., T r u s z k o w s k a W., W o j e w o d a W., 1963. Mikoflora Bieszczadów Zachodnich II. Acta Mycol. 15: 3-75.

D o m a ń s k i S., K o w a l s k i T., 1987. Fungi occurring on forests injured by air pollutants in the Upper Silesia and Cracow industrial regions. X. Mycoflora of dying young trees of *Alnus incana*. Eur. J. For. Path. 17, 337-348.

E l l i s M. B., E l l i s J. P., 1985. Microfungi on Land Plants, New York, pp. 92.

G r o v e W. B., 1935-1937. British stem – and leaf-fungi. Cambridge.

L i n k H. F., 1825. Species Plantarum, 2: 90.

M i g u l a W., 1913. Kryptogamen-Flora von Deutsch-Osterr. Schweiz. pp. 619.

M u n k A., 1957. Danish *Pyrenomycetes*. Dansk. Bot. Arkiv. 17 (1): 1-491.

S a c c a r d o P. A., 1889. Sylloge Fungorum, vol. X. pp. 472.

S c h r o e t e r J., 1908. *Pyrenomycetes*. Die Pilze Schlesiens II. Breslau.

T r u s z k o w s k a W., 1 967. Notatki mikologiczne z Pojezierza Augustowskiego i Białowieży. Acta Mycol. 3: 201-208.

T r u s z k o w s k a W., 1976. Grzyby z rodzaju *Pseudovalsa*, *Melanconis* i *Cryptospora* występujące w Polsce. Acta Mycol. 12: 91-112.

T u l a s n e L. R., T u l a s n e C., 1863. Selecta Fungorum, Carpologia, 2, Paris.

W e h m e y e r L. E,. 1941. A revision of *Melanconis*, *Pseudovalsa*, *Prosthecium* and *Titiania*. Ann. Arbor. Univ. Mich. Press.

Melanconium apiocarpon – the cause of the die-back of branches of *Alnus glutinosa* in Poland

S t r e s z c z e n i e

W roku 1991 stwierdzono w Polsce zamieranie 1-10 letnich gałęzi *Alnus glutinosa*. Wyprodukowane z nich sadzonki zamierały krótko po posadzeniu. Przyczyną choroby było *Melanconium apricarpon* (st. doskonałe *Melanconis alni*), które dotychczas znajdowano raczej na martwym materiale roślinnym. Przedstawiono objawy choroby oraz cechy morfologiczne grzyba.