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STUDIES IN THE CORTICIA OF YUGOSLAVIA  
II. SOME FREQUENT AND WIDE  
SPREAD SPECIES

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An account is given of the distribution in Yugoslavia of 15 common and frequent species of corticia, together with their substrate, number of localities, altitude range etc. Only few of them were published earlier from a greater number of localities, and some were mentioned only once or twice in the literature for this country. In connection with *Aleurodiscus amorphus* its parasites, *Tremella mycophaga* and *T. simplex*, are also discussed.

Introduction

When investigating the occurrence of a group of animals or plants — or fungi — in a particular territory, one is tempted to emphasize the finds of rare species, particularly those which are new for that region. The present author was not exempt from this (understandable) weakness, as is visible from the first instalment of this series (Tortiĉ 1980). Now, this second paper gives an account of the distribution in Yugoslavia of a number of generally common and wide spread species of corticia. However, since this group has not been investigated systematically in this country before, many of the species presented were mentioned in literature only once or very few times.

Materials and Methods

Data published about corticia (fam. *Corticaceae* and some related groups) in Yugoslavia are very sparse; moreover, the revision could not be made in many cases because of the lack of voucher specimens. A few exsiccata by W. Voss in the Museum of Natural Science, Ljubljana

(LJUM), published by him in 1889—92, and particularly a large collection by V. Lindtner preserved in the Museum of Natural Science in Beograd (BEO), part of which was published by Pilát (1937), and Pilát and Lindtner (1938) were revised or determined. Mostly, however, the author had to rely on her own investigations and observations, with only a few data by some other collectors. Her collections are deposited in the herbarium of the Botanical Department, Faculty of Science, University of Zagreb (ZA).

The species are arranged alphabetically. After citing the publications, approximate number of localities in each of the Republics of Yugoslavia, as far as known, is given. In some cases the localities are distributed over a larger territory, but sometimes several are situated rather near to one another, for instance only about 5—10 km apart in a larger mountain or in a National Park. Localities which are more closely situated, only a few km apart, were counted as one. Altitude range, substrate and other data, such as types of forests, frequency of occurrence as established up to now, are added. Voucher specimens of all the species listed are preserved at ZA, of most of them also in BEO, and of those published by Pilát (1937) and Pilát and Lindtner (1938) both at BEO and the National Museum, Prague (PRM). Of course, all collected material could not be preserved and many specimens were discarded after the microscopical examination; some easily recognized species were often only noted in field.

As could be expected, it turned out that some regions of Yugoslavia have been better investigated than others, and from many there is not a single reference. In short, as is generally known, such investigations show rather the distribution of investigators or at least their hunting grounds than the actual distribution of the fungi studied.

### List of species investigated

*Aleurodiscus amorphus* (Pers.) Rabh. Stoitzner (1869), Voss (1889—92) both as *Corticium amorphum*, Pilát and Lindtner (1938), Tortić (1973), Hočevar et al. (1980b).

Predominantly bound to *Abies*, here *Abies alba*, growing on dead branches still attached to the living tree, more rarely on prostrate ones. Only once a few specimens were collected from a dead branch of a living tree of *Picea abies* (Igman mountain near Sarajevo). The localities range from Pohorje mountain near Maribor further through Slovenia (8), Croatia (9), Bosna and Herzegovina (3), Serbia (2) to Korab mountain near Mavrovo in Macedonia (2). In localities known this species usually occurs abundantly, and is surely widely distributed in Yugoslavia. Most localities are in the mountains, in beech-and-fir or pure fir forests, from about 700 up to 1500 m altitude, but *A. amorphus* was collected in a few cases at quite low altitudes, the lowest about 150 m (Krakovo near Kostanjevica in Slovenia), in a lowland oak forest with planted conifers, among them fir. Apparently, the fungus follows here its main host.

*A. amorphus* is frequently parasitized by *Tremella mycophaga* G. W. Mart. and *T. simplex* Jacks. et Mart. ap. G. W. Mart., which are macroscopically identical and differ microscopically by clamped hyphae and basidia divided into four parts, with four spores in the first, whilst in the second the hyphae are clampless and the basidia divided into two parts, with two spores. A revision of the material available from Yugo-

slavia showed that *T. simplex* (10 localities) was collected more often than *T. mycophaga* (6 localities). The most curious collection was from Pohorje, where both species were found on *A. amorphus* growing on the same tree, perhaps even the same branch. For Yugoslavia, only *T. mycophaga* was published by Pilát (1953) who found it on *A. amorphus* collected in Korab mountain. However, in the material from Korab in BEO (two of the specimens are duplicates from PRM, determined by Pilát) the present author found *T. simplex* as a parasite! Here apparently also both species were involved.

*Byssomerulius corium* (Fr.) Parm. Schulzer et al. (1886), Ranojević (1902) both as *Merulius corium*, Jaap (1916), Pilát (1937), Pilát and Lindtner (1938) as *Merulius papyrinus*, Hočev ar et al. (1980a).

Not a rare species although only few localities have been published and not many are known even now (in Croatia 12, in Slovenia and Serbia 3 each, and in Macedonia 4). It occurs mostly at lower altitudes, the highest are at about 700 m e. g. Plitvička jezera Nat. Park. Several collections are from the Mediterranean region: Adriatic coast and the valley of the river Vardar. Usually it is found on prostrate branches or standing dead young trunks of a wide variety of hosts: *Alnus glutinosa*, *Buxus sempervirens*, *Carpinus betulus*, *Cornus mas*, *Corylus avellana*, *Euphorbia wulfenii*, *Fraxinus* sp., *Malus domestica*, *Nerium oleander*, *Platanus orientalis*, *Populus* sp., *Prunus persica*, *Quercus* sp., *Q. coccifera*, *Q. ilex*, *Robinia pseudacacia*, *Salix* sp., *Syringa vulgaris*, *Vitis vinifera*.

*Chondrostereum purpureum* (Fr.) Pouzar. Schulzer et al. (1866), Stoitzner (1869), Voss (1889—92), Ranojević (1902), Protić (1903, 1904), Vouk and Pevalek (1915), Jaap (1916), Škorić (1928), Pilát (1937), Krstić (1950), Maček (1961), Tortić (1962, 1964), Marinković and Šmit (1965), Tortić (1966), Čolić (1968), Serafimovski et al. (1968), Grujoska (1970), Grujoska and Prljinićević (1972), Jelić and Tortić (1973), Hočev ar and Tortić (1975). Hočev ar et al. (1980 a, c). Mostly as *Stereum purpureum*. (Purely phytopathological publications are not cited.)

A well known saprophyte, also a dangerous parasite particularly of fruit-trees, therefore often published. Known from Slovenia (8 localities), Bosnia and Herzegovina (5), Serbia (6), Macedonia (4), Monte Negro (1), but surely occurring in many places. The altitudes range from the sea coast to somewhat over 1000 m. It usually grows on freshly felled wood, also on living trees, and was found mostly on *Fagus sylvatica*. As other hosts were noted: *Abies alba*, *Aesculus hippocastanum*, *Alnus glutinosa*, *Betula* sp., *Carpinus betulus*, *Juglans regia*, *Populus* sp., *Salix* sp., *S. alba*, and various fruit-trees.

*Cylindrobasidium evolvens* (Fr.) Jülich. Schulzer et al. (1886) as *Thelephora evolvens*, Stoitzner (1869), Voss (1889—92), Picbauer (1930), Pilát and Lindtner (1938) all as *Corticium laeve*, Hočev ar and Tortić (1975), Hočev ar et al. (1980a, b, c).

There are about 12 localities known in Slovenia, 15 in Croatia and 2 each in Bosnia and Herzegovina as well as Macedonia, but this common species is surely widely spread in those Republics and also in others. It is sometimes found on injured living trees, but usually on freshly felled

dead wood and was noted from lowlands (100—150 m for instance Zagreb) up to over 1500 m altitude (Šar mountain). Known substrates are *Acer* sp., *A. campestre*, *A. obtusatum*, *Carpinus betulus*, *Corylus avellana*, *Fagus sylvatica*, *Ostrya carpinifolia*, *Salix* sp. Several others were also noted but could not be determined with certainty and were therefore not taken into account. Schulzer (1866) cites it from *Pinus* sp.

*Hyphoderma praetermissum* (Karst.) Erikss. et Strid. Pilát and Lindtner (1938) as *Gloeocystidium praetermissum* and *G. caliciferum*.

This very variable species was collected recently many times (a few older collections were also determined now) and proved to be widely spread in Yugoslavia. It was found in all the Republics although in few localities: five in Slovenia, eight in Croatia, and in others two in each, but seems to be quite frequent, since in some better investigated regions it was collected rather often and there are, for instance, several localities in the Plitvička Jezera National Park. The fungus is characterized and easily recognized by its cystidia, particularly gloeocystidia with yellow contents, which are, however, not always developed in great numbers. It occurs at altitudes from the sea coast up to over 1500 m, in lowland floodplain forests of *Populus*, also those of *Quercus*, in beech forests, beech-and-fir, pine forests, mixed forests and also in parks. Substrates are both broadleaved trees and conifers: *Abies alba*, *Alnus glutinosa*, *Castanea sativa*, *Corylus avellana*, *Fagus sylvatica*, *Picea abies*, *Pinus nigra*, *P. halepensis*, *Populus* sp., *Quercus* sp., *Taxus baccata*.

*Hyphoderma radula* (Fr. ex Fr.) Donk Schulzer et al. (1866), Protić (1903), both as *Radulum orbiculare*, Vouk and Pevalek (1915) as *Radulum molariforme* (not quite certain), Pilát and Lindtner (1938) as *Radulum orbiculare*, Tortić (1976), Hočevár et al. (1980a, b, c).

This species is generally frequent. Although some of the earliest published localities are not quite certain — some similar species might have been involved — it occurs surely also in those. It was recorded in all the Republics, but the number of localities is not great: in Slovenia 9, Croatia 14 (several of them in the Plitvička Jezera Nat. Park), Bosnia and Herzegovina 2, and in Serbia, Montenegro and Macedonia one each. Further investigation would surely result in many more finds. Altitudes of localities are from about 100 m to 1400 m and it occurs in various forests, but has most often been collected in fir forests from *Abies alba*. Krieglsteiner (1977) reports it also as most frequently occurring on fir in some fir forest in W. Germany. The second frequent substrate in Yugoslavia was *Prunus avium*; others were *Alnus glutinosa*, *Betula* sp., *Corylus avellana*, *Fagus sylvatica*, *Picea abies*, *Quercus* cf. *cerris*, *Sorbus aucuparia*. It grows mostly on prostrate branches, but also on prostrate and standing dead trunks and on stumps.

*Hyphodontia quercina* (Fr.) John Erikss. Schulzer et al. (1866) as *Radulum quercinum* and *R. fagineum*, Wettstein (1888) as *Radulum fagineum*, Voss (1889—92) as *R. quercinum*, Protić (1903) as *R. fagineum*, Pilát and Lindtner (1938), Ranković (1955) as *R. quercinum*, Hočevár et al. (1980a).

A frequent species although not many localities are known: Slovenia 8, Croatia 13, Bosnia and Herzegovina 3, Serbia 1, Macedonia 1, but

in some it has been collected many times, as in Krakovo forest near Kostanjevica in Slovenia (a lowland oak forest). Most localities are at lower altitudes, under 700 m, but some reach up to over 1000 m, and the habitats are oak forests, oak with hornbeam, beech forests. Substrates are *Abies alba*, *Acer* sp., *Carpinus betulus*, *Corylus avellana*, *Fagus sylvatica*, *Prunus avium*, *Quercus* sp., *Ulmus* sp. It was most often found on *Carpinus*, frequently also on *Corylus*; on *Abies* it was collected only once. It usually grows on dead branches, particularly on those which are still attached to the living tree.

*Merulius tremellosus* Fr. Schulzer et al. (1866), Wettstein (1888), Voss (1889—92), Ranojević (1902), Protić (1921/22), Tortić (1964), Marinković and Smit (1965), Tortić (1966), Jelić (1967), Colić (1968), Jelić and Tortić (1973), Hočevvar and Tortić (1975), Tortić and Cekova (1975), Hočevvar et al. (1980a, b, c).

An easily recognisable species and therefore often recorded in literature. Still, not many localities have been known up to now: Slovenia 3, Croatia 14, Bosnia and Herzegovina 3, Serbia 6, Macedonia 3. The altitudes range from lowlands, about 100 m (e. g. Pančevo) to 1300 m (Peručica). It was recorded from stumps and prostrate branches and logs of *Abies alba*, *Carpinus betulus*, *Castanea sativa*, *Corylus avellana*, *Fagus sylvatica*, *Pinus* sp., *Populus alba*, *Quercus* sp., *Q. robur*, *Salix* sp., *Ulmus* sp., but seems to grow predominantly on *Fagus*.

*Peniophora cinerea* (Fr.) Cooke. Stoitizner (1869), Voss (1889—92), Protić (1903, 1904), all as *Corticium cinereum*, Keissler (1912), Jaap (1916), Pilát (1937), Pilát and Lindtner (1938), Tortić (1979), Hočevvar et al. (1980a, b, c).

Since the older data could not be checked, as there are no exsiccates available, it is possible that in some cases another similar species was involved. It was recorded in several Republics: Slovenia (9), Croatia (11), Bosnia and Herzegovina (5), Serbia (2), Macedonia (5), from the sea-coast up to over 1500 m altitude (Sar mountain). The number of localities in reality is certainly much larger; in some of them it has been collected several times. It occurs on dead branches of many trees and shrubs: *Acer* sp., *A. monspessulanum*, *Alnus glutinosa*, *Betula* sp., *Buxus sempervirens*, *Carpinus betulus*, *C. orientalis*, *Castanea sativa*, *Coronilla emerus*, *Corylus avellana*, *Cytisus hirsutus*, *Fagus sylvatica*, *Fraxinus* sp., *Juniperus oxycedrus*, *Olea europaea*, *Ostrya carpinifolia*, *Quercus* sp., *Rhamnus fallax*, *Rosa canina*, *Syringa vulgaris*, *Tilia* sp., *T. cordata*, *T. tomentosa*, *Ulmus* sp.

*Peniophora piceae* (Pers.) John Erikss. Tortić (1973), Hočevvar et al. (1980b).

Typical substrate of this species is *Abies alba*, on which it develops most readily on dead branches still attached to the living tree, but can grow also on those fallen to the ground. The majority of the collections were made by the author. For that reason the number of localities known is not great (Slovenia 5, Croatia 9, Bosnia and Herzegovina 4, Macedonia 1) but in some it was rather abundant and it is surely widely spread in mountain fir forests as well as those of beech and fir, where it was found at altitudes of about 600 to 1500 m.

*Peniophora quercina* (Pers.) Cooke. Schulzer et al. (1866) as *Thelephora quercina*, Stoitznier (1869), Wettstein (1888), Voss (1889—92), Protić (1903), all four as *Corticium quercinum*, Jaap (1916), Petrak (1922), Picbauer (1928), Ranojević and Jurišić (1938), all as *Peniophora corticalis*, Ranković (1955), Jelić and Tortić (1973), Hočev ar and Tortić (1975), Hočev ar et al. (1980a, c).

Very common, particularly in oak forests on fallen branches, but frequent also in beech forests. Mostly at lower altitudes from sea-coast up, although recorded even at 1400 m (Korab mountain). Known localities in Slovenia are 9, in Croatia 14, Bosnia and Herzegovina as well as Serbia 3 each, Montenegro and Macedonia one each. The most frequent substrates are various species of oak: *Quercus cerris*, *Q. ilex*, *Q. pubescens*, *Q. robur*, *Q. petraea* and also *Fagus sylvatica*. Other recorded substrates are *Acer* sp., *Betula* sp., *Castanea sativa*, *Tilia* sp., *Viscum album*.

*Phanerochaete sordida* (Karst.) Erikss. & Ryv. Pilát and Lindtner (1938) as *Peniophora cremea*; Hočev ar et al. (1980 b).

This fungus seems to be in fact rather common in Yugoslavia (as it is in other parts of Europe), but, except the localities published and a few collections by other workers which the author determined, most data about its distribution here are the result of the investigations by the present author and the localities are therefore not numerous: in Slovenia, 5, Croatia 8, Bosnia and Herzegovina 3, Serbia 3, Macedonia 2. In intensively investigated regions it is very frequent and was, for instance, collected many times in the Plitvička Jezera National Park, which includes most localities known of this species in Croatia. Altitudes range from lowlands, about 100 m (Pančevo near Beograd), to high mountains over 1500 m (Šar Mountain). The substrate are prostrate or thinner standing dead trunks and also branches of *Abies alba*, *Acer pseudoplatanus*, *Carpinus betulus*, *Corylus avellana*, *Fagus sylvatica*, *Ostrya carpinifolia*, *Picea abies*, *Pinus peuce*, *Quercus* sp., *Rubus* sp. Predominant substrate is *Fagus*, but frequently also *Corylus*.

*Phlebia rufa* (Pers. ex Fr.) M. P. Christ. Keissler (1912), Pilát and Lindtner (1938), Jelić and Tortić (1973), all as *Merulius rufus*, Hočev ar et al. (1980a, b, c).

Although published only few times, most recent investigations have proved that it is widely spread, even if recorded only in three republics: in Slovenia in 7 localities, in Croatia in 10 and in Macedonia in 4; in some of them, which were visited often, it was collected many times. The colour varies from dull brown to bright orange, but it is easily recognised by folded, merulioïd hymenophore. It grows on dead prostrate branches and trunks and the substrate is very varied: *Alnus glutinosa*, *Carpinus betulus*, *Corylus avellana*, *Eucalyptus* sp. (fallen leaves), *Fagus sylvatica*, *Picea abies*, *Pinus* cf. *halepensis*, *Prunus avium*, *Quercus* sp. *Q. robur*, *Rhamnus frangula*; it was most often found on *Fagus*.

*Radulomyces confluens* (Fr.) M. P. Christ. Tortić (1979), Hočev ar et al. (1980a).

Although mentioned only very recently in the literature for Yugoslavia, the species is here common and wide spread. Most collections are by the author, except several by other collectors, which she determined, too. In Slovenia 11 localities have been established up to now, in

Croatia 9 (several of them in Plitvička Jezera National Park) and in Serbia one. It was collected from the sea-coast up to about 700 m in oak forests, beech or beech-and-fir forests, mixed forests, often in parks, even in a small city garden in Zagreb, on dead branches and stumps of *Abies alba*, *Acer* sp., *A. obtusatum*, *Carpinus betulus*, *Clematis vitalba*, *Corylus avellana*, *Crataegus* sp., *Fagus sylvatica*, *Juniperus communis*, *Ostrya carpinifolia*, *Picea abies*, *P. pungens*, *Quercus* sp., *Rosa* sp., *Sambucus nigra*, *Sarothamnus scoparius*, *Taxus baccata*, *Tilia* sp.

*Vuilleminia comedens* (Nees ex Fr.) R. Maire. Schulzer et al. (1866) as *Thelephora comedens*, Wettstein (1888), Voss (1889—92), Protić (1901, 1904), Bubák (1903), all as *Corticium comedens*, Jaap (1908, 1916), Pilát and Lindtner (1938), Tortić (1979), Hočvar et al. (1980a, b, c).

Dead branches, often still attached to living trees and shrubs, characteristically decorticated by this species can be found almost everywhere; but it is often dried up and cannot be checked microscopically. Therefore, although noticed often, only the localities published and the ones from which the finds were examined are taken into account here (in Slovenia 7, Croatia 9, Bosnia and Herzegovina 4, Serbia and Montenegro 2 each, and in Macedonia 1). As substrate were noted: *Acer* sp., *Alnus glutinosa*, *A. incana*, *Carpinus betulus*, *Castanea sativa*, *Corylus avellana*, *Fagus sylvatica*, *Ostrya carpinifolia*, *Quercus* sp., *Q. cerris*, *Q. ilex*, *Q. pubescens*, *Q. robur*, *Salix* sp. Altitudes range from the sea-coast to about 1500 m (Korab Mt.).

### Discussion and Conclusions

Corticia, as a group, are not only interesting scientifically, but they also play an important role in the life of forest communities by decomposing the wood debris and in this way preparing the substrate for higher plants. However, as pointed out, no particular attention was paid to them in Yugoslavia earlier. Therefore, since systematical investigations of this group in this country were started only very recently, for many generally common and frequent species only relatively few localities have been established even now. However, as they proved to be abundant in some areas, this allows us to conclude that they may be common also elsewhere.

Owing to the lack of space, only a part of frequent species in Yugoslavia could be presented in this short survey; others will be treated in some future contribution.

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## SAŽETAK

ISTRAŽIVANJA PORODICE CORTICIACEAE U JUGOSLAVIJI  
II. NEKE ČESTE I RASPROSTRANJENE VRSTE

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Ukratko je prikazana rasprostranjenost 15 vrsta korticioidnih gljiva u Jugoslaviji. Zbog ograničenog prostora lokaliteti nisu navedeni poimence, nego je dan samo njihov broj u pojedinim republikama. Označene su najviše i najniže nadmorske visine na kojima su nađene pojedine vrste, zatim tipovi šuma, domaćini, a po potrebi dodani su i drugi podaci. U vezi s *Aleurodiscus amorphus* diskutirani su i nalazi dviju tremeloidnih gljiva koje na njemu parazitiraju, *Tremella mycophaga* i *T. simplex*.

Iako su sve gljive o kojima se raspravlja općenito česti i rasprostranjeni razarači drvnih otpadaka (i zbog toga imaju vrlo važnu ulogu u

životu šumskih zajednica, pripremajući teren za razvoj višeg bilja), tek je o malo njih pisano više puta u našoj mikološkoj literaturi, a neke su spomenute samo jednom ili dvaput, kako se vidi iz citata literature uz svaku vrstu. Ni sada još nije ustanovljeno mnogo lokaliteta. Razlog je tome što ta grupa gljiva nije kod nas donedavno sistematski istraživana, a ne postoji ni dovoljan broj istraživača.

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