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# NEW RECORDS FOR YUGOSLAVIA OF SOME RESUPINATE POLYPORES

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Recently, a number of polypores has been published as new for Yugoslavia (e. g. Tortić 1977, 1977a, 1979, Tortić and Hočevar 1977, Tortić and Kotlaba 1976), and many more continue to be found. Seven further species not known previously in this conutry are presented here. Two of them, common or at least not rare in Europe, are apparently frequent in mountain forests in Yugoslavia also. All used to belong to the genus *Poria*, which was later broken up into several new genera, based on the different structure of the fruitbodies, but is still used by many authors to accomodate the species with as yet uncertain taxonomic relationships. They were found on dead wood, on which they grow according to the literature, too. It is known that some fungi infect live trees and produce fruitbodies only on dead wood, but in such cases the wood is not as rotten as it was here in most collections. Therefore, we can safely assume that all those species are pure saprophytes, developing on wood already somewhat decayed by other fungi.

The specimens are preserved for the most part in ZA (Botanical Institute, Faculty of Science, Zagreb), some in BEO (Natural History Museum, Beograd). If not stated otherwise, they were determined by the author. Short descriptions were made on the basis of the specimens examined, supplemented in some instances by details from the literature, from where data on distribution, hosts, as well as the type of rot (particularly if not clearly visible in the wood adhering to the specimens) were taken also. The nomenclature is according to Domański (1972); some synonyms and also names used by Ryvarden (1976. 1978) are added in brackets.

*Ceriporiopsis placenta* (Fr.) Domań. [= *Poria placenta* (Fr.) Cooke sensu John Erikss. = *Tyromyces placenta* (Fr.) Ryv.]. The species is not difficult to recognise if its resupinate fruitbodies show the typical red

or salmon colour (which can be in various shades), as did those examined by the author, but it can also be whitish, yellowish, greyish etc. Pores are rather large, (1)2—4 per mm. Hyphal system monomitic, with thin-walled, clamped generative hyphae, 3—4 μm broad, which turn light red in cresyl blue*. Spores are cylindric or elongated elliptic, 5.5—7 × 2.5—3 μm, and strongly cyanophilous. This species grows on coniferous wood in forests and buildings and causes its intensive and rapid decomposition (brown rot). In North America it is more or less common, but is less frequent in Europe (Domański 1972). Ryvarden (1976) considers it to be very rare.

Voucher specimens exist for Yugoslavia from only three localities, which are, however, very far apart: Meja near Kranj, 365 m, in a mixed wood of conifers and deciduous trees, on a rotten fragment of wood (conifer?) 16. 7. 1973, leg. V. Hudoklin. ZA. — Plitvička jezera Nat. park, Babin Potok, 800—850 m, on a carbonized stump of *Picea abies*, 8. 8. 1973, leg. M. and S. Tortić. ZA. — Divčibare on Maljen mountain, near Valjevo, ca 970 m, on *Pinus* sp., 29. 9. 1946, leg. V. Lindtner. BEO herb. Lindtner 6356.

*Fibroporia gossypia* (Speg.) Parmasto [= *Tyromyces resupinatus* (B. et G.) Bond. et Sing. = *Antrodia gossypia* (Speg.) Ryv.] is characterized by a soft, friable after drying, white or whitish subiculum and very friable, whitish tubes which turn yellow-brown when mature or dry. Pores rather large, 2—4 per mm. Hyphal system dimitic, with thin- or somewhat thick-walled, clamped generative hyphae, 3—4.5 (5) μm broad, and thick-walled skeletals, 3—4.5 μm, found only in subiculum where they are rather sparse. Spores are very numerous, hyaline, ellipsoid, 4.5—6 × 2—3 μm.

According to Domański (1972) this species occurs in Europe and is relatively common, growing on wood of conifers, particularly *Picea* and *Pinus*, causing brown rot. Ryvarden (1976), however, says that it is very rare and is of the opinion that it may be identical with *Fibroporia destructor* (Schrad. ex Fr.) Parmasto, which is found in mines and similar habitats.

In Yugoslavia only a single locality is known now: Varoško Rebro above the village of Gračani on the slopes of mountain Medvednica near Zagreb, about 300 m, on a stump of *Pinus* sp. (probably *P. nigra*), 21. 1. 1979, leg. M. and S. Tortić. ZA. The specimen agrees well with the description by Domański (1972) who points out that the spores are always very numerous, as they were here.

Skeletal hyphae of this species do not react with Melzer's reagent and cotton blue. Curiously, they remained hyaline also in cresyl blue, in which skeletals and other thicker walled hyphae of the majority of species investigated for this reaction (mostly polypores but also some others) showed a stronger or weaker change to red, blue or various shades of violet. This indifference to cresyl blue has been observed by the author up to now also in *Fibroporia vaillantii*, a close relative of *F. gossypia*, *Piptoporus betulinus*, *Lentinus cyathiformis* and some others. David (1980) uses it as one of the characters of the genus *Tyromyces* s. stricto.

*Fibuloporia donkii* Domań. [= *Poria mollusca* (Pers. ex Fr.) Cooke sensu Bres.]. Fruitbody at first white, later yellow, with margin sometimes merging into thin mycelial strands, which are best visible in the

* The product used was: Dr. G. Grübler et Co, Leipzig

infected wood. Subiculum white, very thin, pores rather small, 4—6 per mm. Hyphal system monomitic with clamped generative hyphae, 2—4 μm broad, which in cresyl blue turn red with a violet tinge and are often encrusted by small crystals. Spores are ovate to subglobose, 3—3.5 × 2—2.5 μm. The species causes white rot of the wood of conifers and deciduous trees and is distributed in Europe, North America, Asia, Australia (Domański 1972).

Several localities in Yugoslavia are known now. In some the species was collected repeatedly and as they are rather far apart it is certainly widely spread and probably not rare. Up to now it has been found only on conifers, *Abies* and *Picea*. It is interesting to note that in two collections, from two different localities, the wood on which the fungus grew showed both white and brown rot, which means that at least one species causing brown rot was present there, too.

Localities: Kočevski Rog, near Novo Mesto, Daleč hrib, cca 700 m, on the wood of a conifer (later determined as that of *Picea abies*), 18. 5. — 2. 6. 1965, leg. V. Lindtner. BEO 9307. — Kočevski Rog, Pečke nature reserve 800—900 m, on a rotten stump of *Abies alba*, 10. 11. 1977, leg. M. Tortić and S. Hočevar. ZA. — Risnjak Nat. park near Delnice: Leska, on stumps of *Abies alba*, about 700 m, 17. 7. 1971 and 19. 10. 1978 (tubes in the second collection partly in two layers), both leg. M. Tortić, the first det. F. Kotlaba and Z. Pouzar; Koprive, on rotten stumps of *Abies alba*, about 750 m, 20. 10. 1978, leg. M. Tortić. All three collections in ZA. — Velebit mountain range, Štirovača, 1100 m, on a rotten log of *Abies alba* (both white and brown rot in the wood under the fruitbody), 13. 8. 1973, leg. M. and S. Tortić. ZA. — Plitvička jezera Nat. park, Čorkova uvala, virgin forest of beech and fir, cca 900 m, on rotten prostrate trunks or stumps of *Picea abies* (4. 5. 1974) and *Abies alba* (9. 10. 1976, 19. 7. 1977), all leg. M. and S. Tortić. ZA. In the collection of 19. 7. 1977 the wood showed both white and brown rot. — Tara mountain near Titovo Užice, Mitrovac, in mixed forests on trunks, alt. 1080 m, 13—20. 7. 1960, leg. V. Lindtner. BEO 7751, 7754. The second det. Z. Pouzar. The wood was too rotten for identification but without doubt coniferous (either *Picea* or *Abies* which grow in this locality). — Goč mountain near Kraljevo, Dobra Voda, between 900 and 1000 m, on stumps of *Abies alba*, 10—12. 10. 1967, leg. M. Jelić and M. Tortić, det. F. Kotlaba and Z. Pouzar. ZA.

*Incrustoporia alutacea* (Lowe) Reid. Fruitbody white, later cream, with small pores, 5—6 per mm, and very short tubes. Well developed mycelial strands at the margin. Hyphal system dimitic, with thin-walled clamped generative hyphae, 2—3(3.5) μm broad. Skeletals thick-walled to solid, only 1.5—2 μm broad. Hyphal ends are encrusted. Spores allantoid, very small and difficult to measure, particularly as they were few; according to the literature their size is 2.5—3.5 × 0.75—1.5 μm. Domański (1972) states that the species is very common in Europe, America and Australia, where it grows on wood of deciduous and coniferous trees and causes white rot, but it seems to be rare in northern Europe since Ryvarden (1976) mentions only a single record from Fennoscandia.

In Yugoslavia a voucher specimen was collected at Pijava Gorica near Ljubljana, about 300 m, 29. 2. 1972 by V. Hudoklin in a mixed wood of beech, spruce etc. where it was overgrowing fallen leaves and a very small rotten twig (perhaps *Quercus* sp?). It is preserved at ZA.

*Incrustoporia stellae* (Pil. ex Pil.) Domań. [= *Poria stellae* (Pil.) Pil.] This species is perennial, forming up to 7 layers of tubes; each layer is

up to 3 mm thick. Pores very small, 5—6 per mm, pore surface white when fresh, later or when dried, cream with reddish tint, cream grey or grey brownish. Hyphal system dimitic with thinwalled, clamped generative hyphae and numerous thick-walled to solid skeletals, 3—4 μm broad, which are strongly interwoven and agglutinated. Hyphal ends, particularly at the edge of dissepiments, are densely encrusted by small crystals, as in the preceeding species. Numerous fusiform cystidioles are present in the hymenium. Hyphal pegs mentioned by Lowe (1966) were also observed. Spores very narrow, allantoid, hyaline, 3.5—4 × 0.7 μm. Various authors give somewhat different measurements: Domański (1972) 3—4(5) × 0.7—1 μm, Lowe (1966) 4—5 × 0.5—1 (1.5) μm, Ryvarden (1976) 3.5—5(5.5) × 0.7—1.2(1.5) μm. It grows on logs of conifers causing white rot in Europe (known from Fennoscandia, Poland, USSR), northern part of Asia (Siberia) and North America, and is rather rare. (Domański 1972, Ryvarden 1976).

In Yugoslavia it was collected to date in three localities far apart from one another: Pohorje mountain near Maribor, Šumik nature reserve, about 1100 m, on a prostrate trunk of *Abies alba* (?), 14. 7. 1975, leg. S. Hočevar and R. Habjanič. ZA. — Plitvička jezera Nat. park, several times in three places from 800 to 900 m, 2.5., 9.8. and 2. 11. 1975, 8. and 12. 7. and 9. 10. 1976, 22. 7. and 9. 10. 1977, all leg. M. and S. Tortić. ZA. The fungus grew on prostrate trunks of *Picea abies*, in one case perhaps on *Abies alba*, and is apparently not rare in this area. — Igman mountain near Sarajevo, Veliko polje, 1200 m, on a log of *Abies alba* (?), 30. 6. 1975, leg. S. Rončević and M. Tortić. ZA.

A very close relative, *I. tschulymica*, was found in the same National park, but is known from some other localities in Yugoslavia, too (Tortić 1979).

The genus *Incrustoporia* is characterized in the first place by encrusted hyphal ends and by small, thin, allantoid spores. Ryvarden (1976), however, places in it also *I. percandida* with much larger and broader spores Another striking character can be added, allready mentioned by Tortić (1979): in all species examined skeletals are intensively metachromatic, i. e. they turn red in cresyl blue.

*Poria lenis* (Karst.) Sacc. [ = *Antrodia lenis* (P. Karst.) Ryv.]. Fruitbody milk-white, later cream, with very thin subiculum and short tubes, 1—3 mm long. Pores small, 4—7 per mm. Hyphal system dimitic, generative hyphae clamped, thin-walled, skeletals very thick-walled. Both kinds of hyphae are rather narrow, 1—3 μm in diameter. Stellate crystals, somewhat similar to those in *Resinicium bicolor* (Alb. et Schw. ex Fr.) Parm. are often very numerous, namely in sterile specimens, and are based either on short hyphal branches or directly on hyphae. Spores cylindric, curved, according to Domański (1972) (2.5)3—5(6) × 1—2 (3) μm, according to Lowe (1966) 3.5—4(5) × 1—2 μm and according to Ryvarden (1976) 3—4.5 × 1—1.5 μm. It occurs in Europe, Asia and America on dead wood of conifers, rarely on deciduous trees, where it causes white rot.

This fungus was collected in Yugoslavia in several localities: Kočevski Rog near Novo Mesto, nature reserve Rajhenavski Rog, about 900 m, on prostrate trunks of *Abies alba*, 7. 10. 1976, 9. 11. 1977, both leg. S. Hočevar. ZA. — Kočevski Rog, Pečke nature reserve, 800—900 m, on prostrate trunk of *Abies alba*, 11. 7. 1978, leg. M. and S. Tortić and S. Hočevar. ZA. — Risnjak National Park near Delnice, Smrekovac, about 1150 m, on a prostrate trunk of probably *Abies alba* (wood too

rotten for exact identification), 20. 7. 1971, leg. M. Tortić, det. F. Kotlaba and Z. Pouzar. ZA. — Plitvička jezera Nat. park, Čorkova uvala virgin forest of beech and fir, 900 m, on prostrate trunks of *Abies alba*, 8. 7. 1976, 10. 10. 1977, leg. M. and S. Tortić. ZA. — Plitvička jezera Nat. park, Babin Potok, pine forest with spruce and fir, 850 m, on prostrate trunk of probably *Pinus* sp. (not quite certain), 23. 6. 1978, leg. M. Tortić and M. Pejčinović. ZA. — Glavatičevo near Boračko jezero south of Konjic, Orlov kuk, between 400 and 600 m, on a stump of *Pinus nigra* in a pine wood, 19. 6. 1972, leg. M. Tortić, det. Z. Pouzar. ZA.

The species is probably frequent in Yugoslavia at least in extensively exploited mountain forests and nature reserves. In such sites it was found also in Poland (Domański 1972). It is rather common in southern parts of Fennoscandia (Ryvarden 1976).

Curiously, all collections were sterile. However, stellate crystals which were present in all specimens allowed a relatively easy identification. Another distinct character was the reaction of skeletals in cresyl blue: they turned intensively violet with a red tinge.

*Poria rivulosa* (Berk. et Curt.) Cooke [= *Rigidoporus rivulosus* (Berk. et Curt.) David]. Fruitbody white when fresh, later turning grey or yellowish grey, composed of many smaller fruitbodies confluing together. Tubes short, according to David (1971) up to 3 mm long, pores 3—5 per mm. Hypal system monomitic, hyphae clamped, 2—3 μm in diameter. In hymenium fusiform cystidioles. Spores globose, smooth, hyaline, about 4.5 μm, distinctly cyanophilous. It has been noticed, as already stated by David (1971) that the basidia are constricted in the middle, and that the hyphae are metachromatic (red) in cresyl blue.

This species is known from North America, occurring on coniferous wood. It was published some years ago as new for Europe by David (1971) who collected it on carbonized wood of *Pinus* sp.

Now, it was found also in Yugoslavia: Planina pod Golico above Jesenice (near the Austrian border) at about 1000 m, on a rotten and carbonized log of a hardwood, probably *Fagus sylvatica*, 26. 8. 1975, leg. M. and S. Tortić. ZA. The identification was confirmed by A. David (Lyon). There were at first some difficulties in correct determination owing to the fact that the substrate (host) was not a conifer.

David (1971) argued that this species showed close relationship with the genus *Rigidoporus* and named it therefore *R. rivulosus;* however, the transfer was not made in accordance with the rules and is therefore illegitimate. She discussed its similarities with other species of *Rigidoporus* and pointed out also some differences, but did not compare their reactions in cresyl blue. Since the same author recently used this reaction, in her study of the genus *Tyromyces*, as one of the characters for the establishment of taxonomic relationships (David 1980), I would like to add here some of my observations on such reactions in the species of *Rigidoporus*. Even if we take this genus sensu stricto, and still more if we regard it in a broader sense as delimited by Pouzar (1966), who included also the genus *Oxyporus*, there are considerable differences in the colour of the hyphae after treatment with cresyl blue, and several groups can be recognised. For instance, the hyphae of *R. nigrescens* and *R. ulmarius* turn blue to violet blue, those in *R. undatus* (particularly the thick-walled ones and cystidia) and in *R. (Oxyporus) latemarginatus* turn red, as do those in *Poria rivulosa*, whilst the hyphae in several *Oxyporus* sp. turn deep blue violet with a red tinge.

The range of colours obtained with cresyl blue is rather broad and varied and it is not enough to say that the hyphae of a species are metachromatic or not. The differences in colours are however difficult to describe, although usually easy to observe. As cresyl blues of different provenances give different shades of colour, it is recommended to choose and use only one product.

## Summary

Seven species of resupinate polypores are presented as new for Yugoslavia. Two of them, *Fibuloporia donkii* and *Poria lenis*, were found in several localities and are probably widely spread and not rare in this country; also they are generally not rare in Europe. *Ceriporiopsis placenta* and *Incrustoporia stellae* are known now from three localities, whilst *Fibroporia gossypia*, *Incrustoporia alutacea*, and *Poria rivulosa* were each collected in only one locality. Some observations by the author, particularly regarding the reactions of the hyphae in cresyl blue, are added.

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## SAŽETAK


### NEKOLIKO RESUPINATNIH VRSTA FAM. *POLYPORACEAE*, NOVIH ZA JUGOSLAVIJU

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U toku intenzivnih istraživanja gljiva porodice *Polyporaceae* u širem smislu, koja se provode u novije vrijeme, pronađene su i stalno se još pronalaze mnoge vrste koje nisu dosad bile poznate za Jugoslaviju, iako se neke od njih smatraju općenito dosta čestima. Dio ih je objavljen (npr. Tortić 1977, 1977a, 1979, Tortić i Hočevar 1977, Tortić i Kotlaba 1976). Ovdje je prikazano daljih sedam, novih za našu zemlju, sve s resupinatnim plodištima, koje su se prije ubrajale u rod *Poria*. Taj je rod sada na osnovi razlika u građi plodišta razdijeljen u više manjih rodova, no mnogi ga autori još upotrebljavaju za vrste za koje se zasad tačno ne zna sistematska pripadnost.

Ako nije navedeno drugačije, primjerke je odredila autorica, a čuvaju se većinom u ZA (Botanički zavod Prirodoslovno-matematičkog fakulteta, Zagreb), neki i u BEO (Prirodnjački muzej, Beograd). Opisi su sastavljeni na osnovi pregledanih primjeraka, samo katkad dopunjeni detaljima iz literature, odakle su uzeti i podaci o rasprostranjenosti, supstratu, vrsti truleži. Nomenklatura je prema Domańskom (1972), a u zagradi su dodani neki sinonimi kao i nazivi kako ih upotrebljava Ryvarden (1976, 1978). Iznesena su i neka opažanja autorice, u prvom redu o reakcijama hifa s krezil-plavilom.

*Fibuloporia donkii* Domań. i *Poria lenis* (Karst.) Sacc. nađene su na po više lokaliteta, međusobno udaljenih, a na nekima su sabrane u dva-tri navrata. Zaključuje se da su vjerojatno u nas rasprostranjene u planinskim šumama i mogu se ubrojiti u česte vrste, pogotovu što i inače u Evropi nisu rijetke. I jedna i druga rastu na trulom drvu četinjača, prva na *Abies* i *Picea*, a druga je nađena na *Abies*, rjeđe na *Pinus*. *Fibuloporia donkii* je monomitična i njezine generativne hife postaju u krezil-plavilu crvene, dok je *Poria lenis* dimitična, a skeletne joj hife u krezil-plavilu postaju intenzivno ljubičaste s crvenim daškom. Svi pregledani primjerci ove druge vrste bili su sterilni, ali su se mogli prepoznati po karakterističnim zvjezdastim kristalićima, koji su česti upravo u sterilnim plodištima.

*Ceriporiopsis placenta* (Fr.) Domań. sensu John Eriksss. i *Incrustoporia stellae* (Pil ex Pil.) Domań., nađene su na tri međusobno vrlo udaljena lokaliteta. Ova posljednja je na području Nacionalnog parka Plitvička jezera dosta raširena.

Ostale su vrste sabrane zasad samo na po jednom nalazištu. *Fibroporia gossypia* (Speg.) Parm. i *Incrustoporia alutacea* (Lowe) Reid nisu prema Domańskom (1972) rijetke, pa će se vjerojatno naći ponovo na drugim mjestima. U prvo spomenutoj ustanovljena je jedna zanimljiva karakteristika: njezine skeletne hife ostaju u krezil-plavilu hijaline, što je dosad opaženo samo u malo vrsta od mnogih koje su u tom smislu istraživane. *Poria rivulosa* (Berk. et Curt.) Cooke inače je poznata u Sjev. Americi, a u Evropi je prvi put ustanovljena pred nekoliko go-

dina u Francuskoj (D a v i d 1971). Nalaz u Jugoslaviji je dakle drugi u Evropi. Ovdje je sabrana na drvu listače (vjerojatno bukve), iako se u literaturi navodi da raste na četinjačama.

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