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THE FAMILY *HERICIACEAE* AND THE GENUS *CLIMACODON* IN YUGOSLAVIA

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All except one of the species treated in this paper were included earlier in the family *Hydnaceae* in a broad sense, characterized by the hymenophore in the form of spines. On the basis of differing microscopical structures several families, among them *Hericiaceae*, were in recent times split off from this group, which is, however, still in use for the accomodation of some genera with uncertain taxonomic status, such as for example *Climacodon* (Domański 1975). This author places in *Hericiaceae* also the genus *Laxitextum*, which belonged earlier to *Stereaceae* because of its smooth hymenophore, and we therefore include it here, although other authors, Parmasto (1968), Eriksson and Ryvarden (1976) are of the opiniom that its more natural place is with *Corticiac-ae*.

The members of *Hericiaceae*, as well as the macromorphologically similar *Climacodon* spp., are lignicolous, growing sometimes on living trees as parasites, more often on dead wood as saprophytes, and are for the most part rather rare, even if widely spread. Although nearly all of them were published for Yugoslavia, it was from only one or very few localities and in most cases there were no voucher specimens.

Here we present their distribution in Yugoslavia as known up to now on the basis of our investigations and existing herbarium collections which we have revised.* The localities given in the literature are cited too. They can be assumed to be realiable as the majority of the species discussed are easily recognisable; some doubtful data are pointed out.

* The specimens cited are preserved at: Institute of botany, University of Zagreb (ZA), Natural History Museum, Beograd (BEO), National Museum, Prague (PRM), Natural History Museum, Ljubljana (LJUM), Natural History Museum, Wien (W) and in Institute of Botany of the Natural Sciences Faculty, Beograd.

Hyphal structures as described in the literature and according to our own observations are mentioned briefly for each species in connection with our study of microreactions with cresyl blue*, which is a continuation of the investigations by the first author (T o r t i ć 1976).

The altitudes of the localities, given here mostly in round numbers, were often indicated either exactly or approximately within 100 to 200 m. In other cases, particularly in published localities which were sometimes cited vaguely, as a large and high mountain or the vicinity of a particular town, we are able to give only approximative and probable lower and upper limits.

Hericiaceae

Most genera belonging to this family have a hymenophore in the form of positively geotropically oriented spines; in only one genus the hymenophore is smooth. Hyphal system is monomitic, consisting solely of clamped generative hyphae, which are of various kinds and are amyloid in the genus *Hericium*. Numerous gloeocystidia are present in the hymenium. Spores are short, ellipsoid to nearly globose, hyaline, strongly amyloid. They are described in the literature as finely verrucose in some species, but smooth in others. Detailed observations (in Melzer's reagent) showed that they were verrucose in all the species discussed here except in *Creolophus cirrhatus*. This was confirmed by scanning electron micrographs (SEM)** which were, to our knowledge, published only for a few species of *Hericiaceae*, i. e.: *Hericium erinaceum* (P e g l e r and Y o u n g 1972) — not seen, *H. coralloides* (K e l l e r 1976), *Laxitextum bicolor* (E r i k s s o n and R y v a r d e n 1976). The ornamentation of our specimens agrees very well with that of the published ones. The warts in some species are in the form of short ridges which sometimes make a beginning of a reticulum. A more detailed study is needed to evaluate the significance of these surface patterns for the taxonomy of this group of fungi.

Creolophus cirrhatus (Pers. ex Fr.) P. Karst. (= *Hydnum cirrhatum* Pers. ex Fr., *H. corrugatum* Fr., *H. diversidens* Fr.).

The hyphae are inflating, i. e. their diameter widening (up to 14 μm) or narrowing suddenly, thin- to thick-walled, with the thick-walled ones predominant in the context, whilst the spinal trama is made of the thin-walled ones (M a a s G e e s t e r a n u s 1962). However, we found thick-walled hyphae also in the upper part of older spines, near the context. In cresyl blue the hyphae turned violet, the ones with thicker walls becoming more intensively coloured, and the spore wall turned violet red. The spores were almost globose or short ellipsoid, smooth under the light microscope, about 3.5—4 × 3—3.5 μm. In SEM they are smooth too — an exception in this family (Fig. 1a).

The species grows in the northern temperate zone on dead wood of *Fagus, Betula, Carpinus* and some others (N i k o l a j e v a 1961). Acording to J a h n (1965) it was found always on *Fagus* in Germany, except once on *Fraxinus*, but in Scandinavia, north of the northern boundary of *Fagus* area, it grows particularly on *Betula* and is known there as *Hydnum corrugatum*.

* We used the product: Dr. Grübler et Co, Leipzig.

** Spores were photographed with a Stereoscan 600 in the Institute of biology, University of Ljubljana.

Voucher specimens exist for the following localities: Golovec near Ljubljana, alt. 400—450 m, on dead *Fagus* branches, 25 VIII 1880, l. et d. W. Voss as *Hydnum diversidens*, rev. M. Tortić. LJUM (Voss 1889—92). — Belinovec near Rogatec (E Slovenia), beech forest, alt. 700 m, on a fallen *Fagus* trunk, l. et d. S. Hočevar and M. Tortić 24 X 1975. ZA. — Krakovski gozd near Kostanjevica (SE Slovenia), lowland oak forest, alt. 150 m, on wood of *Quercus robur*, l. et d. S. Hočevar 28—31 V 1974. ZA (Hočevar and Tortić 1975). — Žumberačko gorje mountains (W Croatia, W of Zagreb), Kumićevac, beech wood, alt. 700 m, on a *Fagus* stump, l. M. and S. Tortić, d. M. Tortić, 6 VIII 1972. ZA. — Varaždinske toplice near Varaždin (N Croatia), mixed broadleaved wood, alt. ca 300 m, on a *Carpinus* stump, l. M. and S. Tortić, d. M. Tortić, 12 VIII 1974. ZA. — Near Petrinja (S of Zagreb), Javor, mixed broadleaved forest, alt. cca 200—300 m, on a dead wood probably of *Fagus*, 22 IX 1963, l. M. and S. Tortić, d. M. Tortić, rev. R. A. Maas Geesteranus. ZA (Tortić 1968).

In Schulzer's manuscript: Pilze aus Slavonien, which is preserved at the University Library, Zagreb, this species is clearly described and drawn under no. 350 as *Hydnum diversidens*. It was found by him in: Kunjevci forest near Vinkovci (E Croatia), alt. 90 m, on a stump of *Carpinus*, VIII 1874.

No specimen was preserved from: Medvednica mountain near Zagreb, Varoško Rebro, alt. 300—400 m, beech forest, on a stump of perhaps *Fagus*, l. et d. M. Tortić 10 XI 1963.

This species was published several times as *Hydnum cirrhatum*, but without descriptions or existing specimens: Iševnica in Gorski kotar (W Croatia), alt. ca 300 m, on a stump of cherry tree. Škorić 1929. — Maksimir Park in Zagreb, alt. 135 m. Vouk and Pevalek 1916. — Igman mountain near Sarajevo, alt. probably 1000—1500 m, rare on beech trunks. Protić 1921/22. — Avala near Beograd, alt. 300—500 m, on rotten oak branches, VII 1893. Baroševi ć 1902. — Južni Kučai near Ćuprija (central Serbia), alt. probably 800—900 m, on lying *Fagus* trunks and worked wood. Marinković and Šmit 1965. All these data are very probably correct, as the species is not difficult to recognise.

According to the experience of the first author, usually only one or two specimens of *C. cirrhatus* were found in a given locality. It seems therefore to be rare in Yugoslavia, altough widely spread. Schulzer (Manuscript) mentions that he found it only twice in 40 years of his mycological experience. In this country it occurs particularly on beech, but was noted also on *Carpinus*, *Quercus* and *Prunus*.

Dentipellis fragilis (Pers. ex Fr.) Donk (= *Hydnum fragile* Pers. ex Fr., *Dryodon fragilis* (Pers. ex Fr.) Bourd et Galz., *Dryodon nodulosus* (Fr.) Cejp sensu Pilát).

Hyphae not inflating, thin-walled, cca 3—4 (5) μm in diameter, metachromatic in cresyl blue becoming intensively red with a violet tinge. Spores nearly globose to (more often) short ellipsoid, (4.5) 5—5.5 (6) × × (3.5) 4—4.5 (5) μm. In some collections the majority of spores seems to be smooth under light microscope, but in a few a faintly verrucose wall can be noticed, whilst in other collections the spores are distinctly verrucose even under lower magnification (× 600). In SEM it is visible that the warts are in the form of short riges, which are, at least partly, concentrically arranged. (Fig. 1b).

Bourdot and Galzin (1928) state that the species was found in Sweden, France and Austria. Neubert (1969) who found it for the first time in Germany, on beech, cites an information by Dr. A. Pilát that *D. fragilis* is very frequent in Europe in mountainous parts of Czechoslovakia and generally in Carpathian Mountains, where it occurs almost exclusively on rotten beech wood; one find, however, was on *Abies*.

According to Nikolajeva (1961) this saprophyte grows, except in Europe, also in the Asian part of the USSR; she lists as supports, except *Fagus*, also *Tilia, Alnus, Fraxinus* and some others, and cites, but with a question mark, a find on *Abies*.

Localities in Yugoslavia: Kočevski Rog mountain near Novo Mesto (SE Slovenia), beech and fir forest, in two localities: near Stara Žaga, alt. 850 m, on a beech log, 29 X 1975, and in Pečke nature reserve, alt. 800—900 m, on beech logs and stumps 28 X 1975 and 23 VIII 1976; ibid. on a dead standing *Abies* tree in a cancerous injury caused by *Melampsorella caryophyllarum*, 23 VIII 1976. All specimens l. and d. S. Hočevar and M. Tortić. ZA — Donačka gora mountain near Rogatec (E Slovenia), beech forest alt. between 800 and 880 m, on prostrate *Fagus* trunk l. and d. S. Hočevar and M. Tortić 23 X 1975. ZA. — Pohorje mountain near Maribor (NW Slovenia), Šumik nature reserve, beech and fir forest, alt. 1100 m, on dead beech wood, 16 VII 1975, l. and d. S. Hočevar and M. Tortić. ZA. — Velebit mountain (W Croatia, at the seacoast), Klepina duliba, beech and fir forest, alt. about 1000 m, on a beech log, 13 VIII 1973, l. and d. M. and S. Tortić. ZA. — Plitvice National Park near Titova Korenica (SW Croatia), on two localities: Upper Lakes, beech forest, alt. 600 m, on beech log, 2 VIII 1972 and Čorkova uvala, beech and fir forest, alt. 1000 m, several times on lying beech trunks: 21 X 1973, 16 VIII 1974, 2 XI 1975, all l. and d. M. and S. Tortić. ZA. — Oštrelj near Bosanski Petrovac (W Bosnia), alt. 1000—1400 m, on beech wood, IX 1973, l. M. Uščuplić. Specimen at the Forestry Faculty, Sarajevo, determined by the first author. — Romanija mountain near Sarajevo, Tisa, alt. 1300 m, on a beech log, l. M. Uščuplić 29 IX 1972 d. M. Tortić. ZA. — Goč mountain near Kraljevo (central Serbia), alt. 1000—1100 m, on beech wood, 26 XI 1949, l. V. Lindtner, d. M. Tortić, BEO; ibid. on beech wood, 19 VII 1966, l. M. Jelić, d. F. Kotlaba and Z. Pouzar, Herb. Bot. Inst. Beograd and ZA. — Južni Kučaj near Čuprija (E Serbia), Troglan Bare, alt. 800—900 m. on rotten *Fagus* wood, l. V. Lindtner 25. IX 1947, d. A. Pilát, rev. F. Kotlaba. PRM 560788. BEO herb. Lindtner 6614; ibid. 9—23 XI 1947 l. V. Lindtner, d. M. Tortić. BEO herb. Lindtner 6672. — Kopaonik mountain (W Serbia), above Glog, alt. not indicated but probably above 1000 m, on *Fagus* wood, 24 IX 1953, l. V. Lindtner, d. A. Pilát, rev. F. Kotlaba. PRM 685723 (duplicate probably in BEO but not found up to now). — Šar planina mountain (at the boundary of Serbia and Macedonia), beech forest, on two localities: Crni Kamen, alt. 1100 m. PRM 488996, duplicate in BEO, and Ljuboten, 1500—1800 m. PRM 489361, 489368, 489377, 489454, 490691, 490736 (duplicate of the last in BEO). All specimens were collected VII 1937 on *Fagus* by A. Pilát and V. Lindtner, determined by A. Pilát as *Druodon nodulosum* (Pilát and Lindtner 1938). The material was revised by F. Kotlaba 15. II 1974. — Jakupica mountain (central Macedonia), beech forest near the mountain hut Karadžica, alt. 1400 m, on rotten beech logs, 27 IX 1975, l. and d. M. Tortić and M. Cekova. ZA.

As the species was found on the cited localities mostly in large quantities, it is obviously not only widely spread but also frequent in mountain forests of Yugoslavia and is here bound almost exclusively on beech. Its find on *Abies* was surprising, but is apparently not unique.

Fig. 1. Scanning electron micrographs of the spores of: a) *Creolophus cirrhatus*, Javor near Petrinja, 22 IX 1963; b) *Dentipellis fragilis*, Plitvice Nat. park, 21 X 1973; c) *Laxitextum bicolor*, Komovi, 13 VII 1973. (Photo O. Urbanc-Berčič).

Sl. 1. Scanning elektronske fotografije spora od: a) *Creolophus cirrhatus*, Javor kod Petrinje, 22. IX 1963; b) *Dentipellis fragilis*, Nac. park Plitvice, 21. X 1973; *Laxitextum bicolor*, Komovi, 13. VII 1973. (Foto O. Urbanc-Berčić).

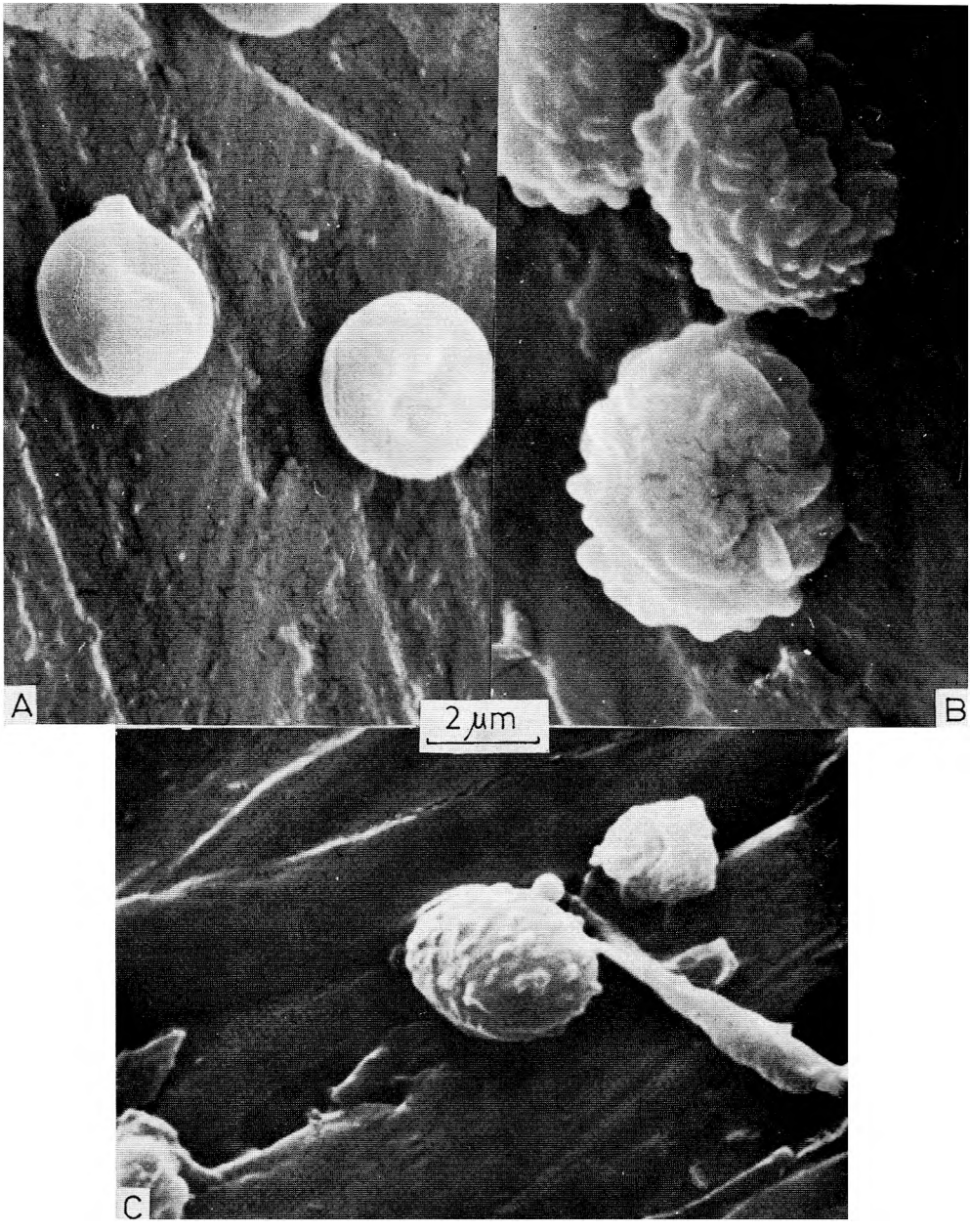

Fig. 1. — Sl. 1.

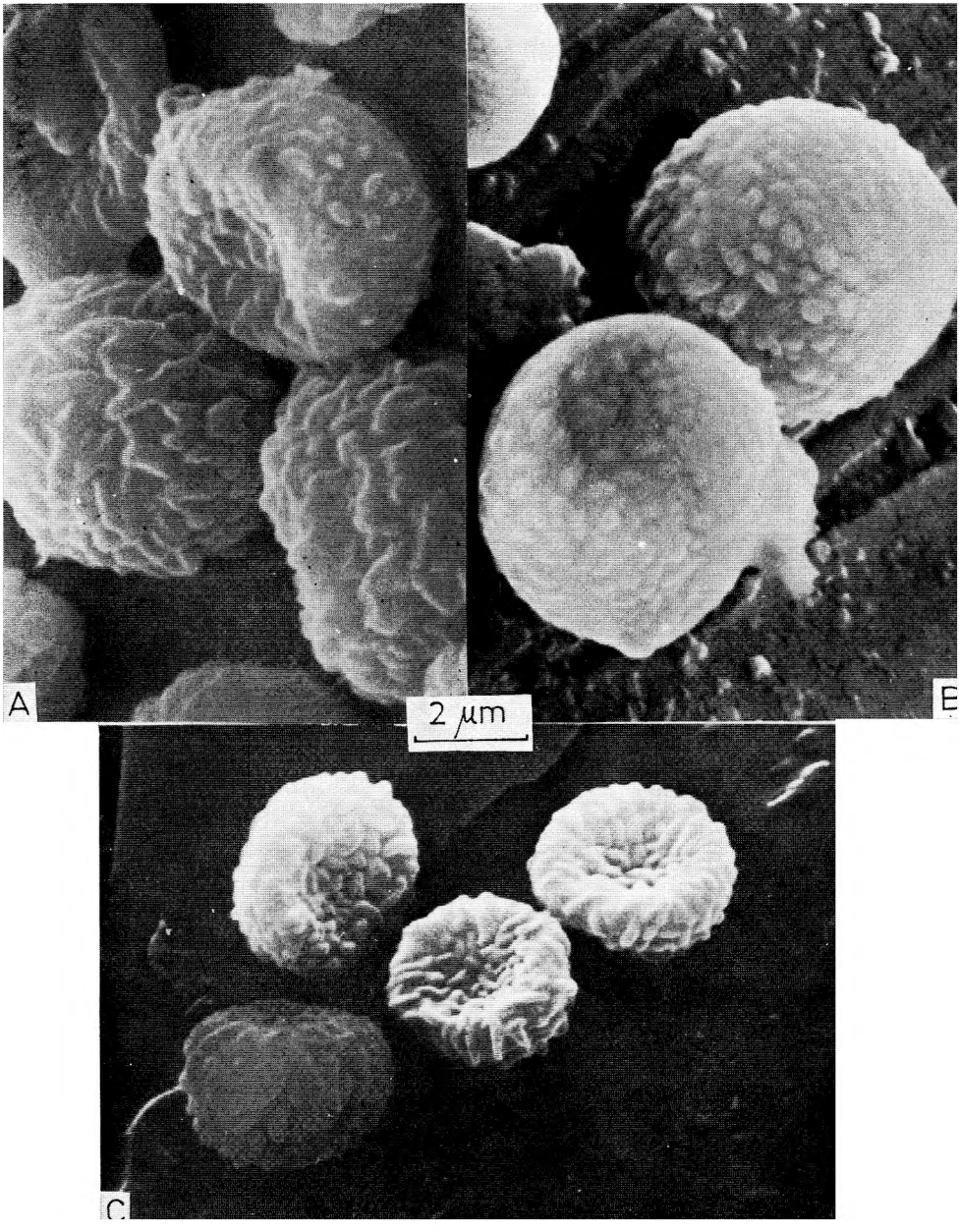

Fig. 2. — Sl. 2.

Hericium Pers. ex S. F. Gray. In all the species of this genus hyphae are strongly amyloid, inflating (up to 20 μm in diam.), with walls thin in very young parts but soon thickening in both spinal trama and in context; the lumen in older parts of the context may become almost obliterated (M a a s G e e s t e r a n u s 1963). In cresyl blue the walls in thin-walled hyphae turn reddish. The thick-walled hyphae absorb the dye slowly, but after some time many turn violet. Spore walls become reddish or violet in cresyl blue.

Three of the species described for this genus were found in Yugoslavia. Although having many characters in common, they can be easily distinguished by their macroscopic aspect, mode of life and dimensions of the spores.

Hericium erinaceum (Bull. ex Fr.) Pers. (= *Hydnum erinaceum* Bull. ex Fr., *Dryodon erinaceus* (Bull. ex Fr.) P. Karst.)

Spores broadly ellipsoid or nearly globose, 6—7 × 5—5.5 (6) μm. They appeared to be finely verrucose in some collections, in others most of them smooth. In SEM even the seemingly smooth ones were ornamented with short ridges, which could be partly ramified, forming the beginnings of a mesh. (Fig. 2a)

The fungus grows mainly as a parasite on injured parts of old living oaks and beeches in the northern temperate zone (K r e i s e l 1961), but is rare in most regions (J a h n 1965). Other hosts cited are *Juglans, Ailanthus, Malus, Sorbus* (B o u r d o t and G a l z i n 1928, J a h n 1965).

Localities with voucher specimens: Medvednica mountain near Zagreb, Gračec, alt. between 300 and 400 m, in a hollow of a living *Quercus* (probably *petraea*), 6 X 1963, l. et d. M. Tortić ZA (T o r t i ć 1968). — Lička Plješevica mountain near Titova Korenica (S. Croatia) Bijele Vode, alt. cca 1100—1200 m, on a living *Fagus sulvatica*, 17 IX — 3 X 1965, l. et d. V. Lindtner, BEO 8784. — Fruška Gora mountain near Novi Sad (NW Serbia), Zmajevac alt. 450 m, on a living *Quercus petraea*, 25 IX 1972, l. et d. M. Jelić, Herb. Bot. inst. Beograd and ZA. — Južni Kučaj mountain near Čuprija (E Serbia) alt. 900 m, on a *Fagus* trunk, 27 IX 1947, l. P. Turajlić, d. V. Lindtner, BEO herb. Lindtner 6625.

Localities from the literature, without voucher specimens: Near Vareš (W Bosnia), on old beech trunks and on an alder tree near river Stavnia in the vicinity of Vareš, alt. probably 750—850 m, P r o t i ć 1903. — Vučja Luka, on old beech trunk, alt. 1200—1400 m, and in a forest near Skakavac, alt. about 1200 m. Both localities are in the vicinity of Sarajevo. P r o t i ć 1904. — Near Beograd (alt. 100—200 m or somewhat higher), and near Šabac (W of Beograd), alt. 80—100 m or somewhat more, on old oaks, X 1893, 1896, R a n o j e v i ć 1902, Tara, Mitrovac, nature reserve with omorika, on rotting stumps and standing trees, Č o l i ć 1968 — recognisable photo.

The species is macroscopically easily recognisable and we can assume with great probability that it was correctly identified in all cases. In Yugoslavia it is probably rather rare.

Fig. 2. Scanning electron micrographs of the spores of: a) *Hericium erinaceum*, Lička Plješevica, 17 IX — 3 X 1965; b) *H. coralloides*, Goč, 6 VII 1964; c) *H. ramosum*, Buković, 22 IX 1975. Photo O. Urbanc-Berčič.

Sl. 2. Scanning elektronske fotografije spora od a) *Hericium erinaceum*, Lička Plješevica, 17. IX — 3. X 1965; b) *H. coralloides*, Goč, 6. VII 1964; c) *H. ramosum*, Buković, 22. IX 1975. (Foto O. Urbanc-Berčič).

Two species, *Hericium coralloides* (Scop. ex Fr.) S. F. Gray and *H. ramosum* (Bull. ex Mérat) Let. were not clearly distinguished by earlier authors and the data from the literature cannot be interpreted with certainty, particularly if the substrate is not indicated. The synonymy of those species is rather confusing and authors do not agree as to which species is designated by a particular name. In this paper we followed Domański (1975).

H. coralloides (Scop. ex Fr.) S. F. Gray (*Hericium alpestre* Pers., *H. flagellum* (Scop.) ex Pers.). Some consider *Hericium clathroides* (Pall. ex Fr.) Pers. as a synonym of this species, whilst others are of the opinion that this is a synonym of the following one.

Spores nearly globose, under light microscope finely verrucose or smooth, 5—6 × 4.5—5.5 μm, in one collection even 6.5—7 × 5.5—6.5 μm, therefore mostly somewhat smaller, only occasionally larger than in preceeding species, but always larger than in the following one. In SEM they are distinctly verrucose, the warts partly in the form of very short ridges (Fig. 2b).

The fungus occurs in the northern temperate zone on dead wood of *Abies, Picea,* according to some also on *Fagus* (Kreisel 1961). In Germany it was found only on conifers, especially on *Abies* (Nuss 1973).

Localities with voucher specimens: Kočevski Rog mountain (SE Slovenia), Pečke nature reserve, alt. 800—900 m, beech and fir forest, mostly on dead standing but also on lying *Abies* trees, 4 IX and 28 X 1975, 23 VIII 1976, l. et d. S. Hočevar. ZA. — Risnjak National Park near Delnice (W Croatia), alt. 700 m, on lying *Abies* trunk, 25 X 1962, l. et d. M. Tortić. ZA. It was found there several other times too, but not collected. (Tortić 1966). This was the first certain published locality of this species in Yugoslavia. — Burnik on Drgomalj mountain near Delnice, alt. probably between 800 and 1000 m, in a hollow and on a log of *Abies,* 20 and 25 IX 1966, l. Z. Majcen, d. M. Tortić. ZA. — Medvednica mountain near Zagreb, alt. ca 900 m, beech and fir forest, on a log of *Abies,* 4. X 1975, l. et d, M. and S. Tortić. ZA. — Beli Vrh near Vrhovine (SW Croatia), alt. cca 800—900 m, on *Abies* log, 19 IX 1973, l. et d. M. and S. Tortić. ZA. — Plitvice Nat. park near Titova Korenica (SW Croatia), Čorkova uvala, alt. 1000 m, beech and fir forest, on a log of *Picea abies* 21 X 1973. 2 XI 1975. l. et d. M. and S. Tortić. ZA. (found several times on the same log) — Igman mountain near Sarajevo, Ravna Vala, on a standing dead *Abies* tree, alt. 1300 m. l. M. Usčuplić 11 XI 1969, d. M. Tortić. ZA. — Goč mountain near Kralievo (central Serbia) alt. 1000—1100 m, beech and fir forest, on *Abies* wood. l. et d. M. Jelić 5 VII 1964. Herb. Bot. inst. Beograd and ZA. The second author observed the species in this locality several times.

H. ramosum (Bull. ex Mérat) Let. (= *Hericium clathroides* (Pall. ex Fr.) Pers., *Hydnum caput ursi* Fr. *Hydnum, Dryodon* or *Hericium coralloides* according to many authors).

Spores are the smallest of all three species of *Hericium,* short ellipsoid (4) 4.5—5.5 × 3.5—4 μm, smooth or finely verrucose under light microscope. In SEM their ornamentation is more similar to that in *H. erinaceus* than in *H. coralloides,* being in the form of ridges which can also show beginnings of ramification (Fig. 2c).

This species develops on dead wood, exceptionally as a parasite on very old trees, mostly on *Fagus,* but also *Fraxinus, Juglans, Morus, Quercus, Ulmus* (Kreisel 1961). It is widely spread in the northern temperate zone. In Scandinavia, north of the beech area, it occurs particularly on *Betula* and on *Populus tremula* (Jahn 1965).

Localities with voucher specimens: Petrova gora near Vojnić (central Croatia) alt. probably between 300 and 500 m, on wood of *Fagus?* l. G. Lojda X 1967, d. M. Tortić. ZA .— Fruška Gora mountain near Novi Sad (NW Serbia), Zmajevac, alt 450 m, on dead fallen *Carpinus* trunk, l. et d. M. Jelić 27 IX 1970. Herb. Bot. inst. Beograd. — Beograd, Botanical garden, alt. 100 m, on *Morus alba,* l, et d. V. Lindtner as *Dryodon coralloides.* BEO herb. Lindtner 2057 (without date). — Južni Kučaj near Ćuprija (E Serbia), Troglan Bare, alt. 800—900 m, on rotten trunks of *Fagus,* 22 IX 1947, l. et d. V. Lindtner as *Dryodon coralloides.* BEO 2736. — Jablanik above Bebići on Povljen mountain near Valjevo (W Serbia), alt. between 600 and 1200 m, on rotten *Fagus* wood, 25 VIII 1954, l. et d. V. Lindtner as *Dryodon coralloides.* BEO 5570. — Goč mountain near Kraljevo (central Serbia) beech and fir forest, alt. 1100 m, on a *Fagus* log, l. et d. M. Jelić and M. Tortić 10 X 1967. ZA. — Šar Planina mountain (at the boundary of Serbia and Macedonia), Crni Kamen above Kačanik, alt. 1100 m, on rotten *Fagus* trunks, 17 VII 1937, l. et d. V. Lindtner as *Dryodon coralloides.* BEO herb Lindtner 4147. This is probably the duplicate of PRM 489056 (Pilát and Lindtner 1938). — Korab mountain (Macedonia, at the Albanian border), alt. 1400 m, on *Fagus* wood, l. et d. A. Pilát and V. Lindtner VII 1937. PRM 489514, duplicate in BEO (Pilát and Lindtner 1938). — Buković mountain (W Macedonia), Straža, alt. 1200 m, beech forest with oak etc., on a log of *Fagus,* l. et d. M. Tortić and M. Cekova 22 IX 1975. ZA.

The species was found also on: Donačka gora near Rogatec (E Slovenia) alt. 800—850 m, beech forest, on a *Fagus* log, 23 X 1975, d. M. Tortić and S. Hočevar. The specimen could not be collected as it was a small fragment in bad state, but was recognisable.

In the literature *Hydnum coralloides* is cited in several papers from various localities in Yugoslavia. If the beech (or some other hardwood) was indicated as support, it can be assumed with reasonable certainty that *H. ramosum* was meant. On the other hand, there is a possibility that the substrate was not always correctly identified.: Velebit mountain (W Croatia, along the sea-coast). Rusovo near Oštarije, alt. 1100—1300 m, on beech bark. Moesz 1938. — Maksimir Park in Zagreb, alt. 135 m, on *Quercus.* Kišpatić 1948/49. — Near Vareš (central Bosnia), alt. 850 m, on the way towards Borovica, on old beech. Protić 1903. — Near Skakavac, alt. 1200 m, and on Igman mountain, probably between 1200 and 1500 m, (both localities in the vicinity of Sarajevo) on *Fagus.* Protić 1904. — Ripanj near Beograd, alt.. 200—250 m, on old trunks of *Fagus* and *Quercus,* X 1893. Ranojević 1902. — Mountains Goč, alt. probably 1000—1100 m. Južni Kučaj, alt. 800—900 m, Boranja, Čemerno (central Serbia), on *Fagus* wood. Marinković and Šmit 1965. — Vranje, (S Serbia), alt cca 500 m, on old *Morus alba.* Simić 1897. — Dejanovec near Mavrovo (W Macedonia), alt. up to 1290 m, on beech wood, as *Hericium coralloides.* IX 1969. Grujovska 1970.

In three data from the literature no substrate is given and we cannot even guess which of the two species was meant, as both beech and fir grow on the localities cited: On old stumps near Idrija (W Slovenia) and on rotten wood in Snježna jama on Rog mountain (SE Slovenia). Voss 1889—92. — Medvednica mountain near Zagreb, on rotten wood. Vouk and Pevalek 1915 Tara Mitrovac. nature reserve with omorika, on rotten logs and stumps. Čolić 1968. This last might be true *H. coralloides,* according to a not particularly clear photo.

Apparently, both species are wide spread in this country, but are more frequent only on particular localities. *H. coralloides,* for instance, was found several times in the National Parks Risnjak and Plitvice; on Kočevski Rog very large fruitbodies were noted, mostly on standing dead *Abies* trees in the nature reserve Pečke, but also in other places of the same mountain.

Up to now, *H. coralloides* was found in Yugoslavia mostly on *Abies,* in one locality on *Picea,* whilst *H. ramosum,* although it grew mostly on *Fagus,* was noted also from other hosts: *Carpinus, Morus* and *Quercus.*

Laxitextum bicolor (Pers. ex Fr.) Lentz. (= *Stereum fuscum* (Schrad.) Quél., *Stereum bicolor* (Pers. ex Fr.) Fr.).

As already stated, this genus was placed earlier in *Stereaceae,* but is now included either in *Hericiaceae* as the only genus with smooth hymenophore (Domański 1975) or *Corticiaceae* (Eriksson and Ryvarden 1976). Upper part of the context is brown, constructed of brown generative hyphae cca 3—4 μm in diameter with rather thick walls and numerous clamps; lower part is made of hyaline, slightly narrower thin-walled, frequently incrusted hyphae with many clamps (Jahn 1971, Eriksson and Ryvarden 1976). Hyphal walls turned red violet in cresyl blue in the lower layer, but violet blue in the upper, since the original brown colour combined with the coloration in cresyl blue. Therefore in the sections both layers clearly differ: the upper is blue or violet blue, the lower reddish violet or violet red. Spores very finely echinulate, which is hardly noticeable even under oil immersion objective, ellipsoid, 5—5.5 × 3 μm. In SEM they are seen to be ornamented with warts (Fig. 1c, see also Eriksson and Ryvarden 1976).

This species is cosmopolitic, growing on dead wood, particularly on fallen branches, in the first place of *Fagus,* but also on *Corylus, Alnus, Betula, Quercus etc.* (Jahn 1971).

Localities in Yugoslavia with voucher specimens: Planica near Rateče (NW Slovenia), 900 m, on *Fagus,* VI 1908, leg. K. Keissler, det. v. Höhnel as *Stereum fuscum.* W (Keissler 1912). The specimen was seen by the first author. — Kočevski Rog near Novo Mesto (SE Slovenia), nature reserve Pečke, 800—900 m, on a prostrate *Fagus trunk,* 23 VIII 1976, l. et d. S. Hočevar and M. Tortić. ZA. It was found there by S. Hočevar also on 21 VIII 1976, and in another locality on the same mountain on 26 VIII 1976. — Plitvice National Park near Titova Korenica (SW Croatia), Medveđak, alt. 700 m, beech forest, on a *Fagus* log, 10 VII 1976, in two other places on *Fagus* 6 and 9 X 1976, all. l. et d. M. and S. Tortić. ZA. — Komovi mountains (Crna Gora, near the Albanian border), Preslo, alt. 1500—1700 m, beech forest, on a *Fagus* log, 13 VII 1973, l. et d. M. and S. Tortić. ZA (Tortić 1974). — Šar planina mountain (at the boundary of Serbia and Macedonia), Ljuboten, 1500—1800 m, on *Fagus* wood, l. A. Pilát and V. Lindtner, d. A. Pilát. PRM 490676 (Pilát and Lindtner 1938). — Korab mountain, (W Macedonia, at the Albanian border), alt. 1400 m, on *Fagus* wood, l. A. Pilát and V. Lindtner, d. Pilát. PRM 489475 (Pilát and Lindtner 1938).

Although only six sure determined localities of *L. bicolor* are known for Yugoslavia, it is probably not very rare here, but not easily noticeable, growing in many cases on the underside of rotten wood, as pointed out by Jahn (1971).

»*Hydnaceae*«

Climacodon pulcherrimus (Berk. et Curt.) Nikol. (= *Hydnum pulcherrimum* Berk. et Curt., *Donkia pulcherrima* (Berk. et Curt.) Pilát).

Hyphal system monomitic, generative hyphae thin-walled, not inflating, in younger parts of the context and in the trama of the spines without clamps, in older parts of the context two to four clamps in a whorl on one septum and the hyphae may become thick-walled. (Maas Geesteranus 1962). In cresyl blue hyphal walls turned light violet red. Spores hyaline, not amyloid, elliptic, 3.4—4.5 × 1.5—2.2 μm (Domański 1975).

The species is known from the northern temperate zone and from tropical America and Africa. In Europe it grows on stumps and trunks of hardwoods, as *Fagus, Quercus, Betula* and some others, occasionally on *Abies* (Nikolajeva 1961).

Localities in Yugoslavia with voucher specimens: Medvednica mountain near Zagreb, lower slopes above the village Gračani, alt. probably 300—400 m, on a stump of an unkown hardwood, 30 VI 1963, l. B. Vrtar, d. R. A. Maas Geesteranus. ZA (Tortić 1968 — this was the first published find in Yugoslavia although not stated then as such). Goč mountain near Kraljevo (central Serbia), alt. 1000—1100 m, on a rotten *Fagus* trunks in beech and fir forest, near river Sokolja 7 IX 1948, l. V. Lindtner, d. M. Tortić. BEO 3069; ibid. Gvozdačka reka, 12—30 VII 1950. l. V. Lindtner, d. M. Tortić. BEO 3528. The second author collected and determined it in the same locality on 19 VIII 1966. — Južni Kučaj mountains near Ćuprija (E Serbia), Troglan Bare, alt. 900 m, on rotten *Fagus* trunks, 22 VIII 1947, l. V. Lindtner, d. A. Pilát, rev. F. Kotlaba. PRM 560796. This is the duplicate of BEO herb. Lindtner 6586, which was revised by us.

It is probable that *C. pulcherrimus* will be found elsewhere in Yugoslavia, but it does not seem to be frequent here.

Climacodon septentrionalis (Fr.) P. Karst. (= *Hydnum septentrionale* Fr., *Creolophus septentrionalis* (Fr.) Banker).

Hyphal system is monomitic, generative hyphae septate, in younger parts without clamps, in older with only one clamp per septum, not several as in preceeding species. In addition to thin-walled hyphae, in the context there are numerous hyphae with very thick walls, many without lumen (Maas Geesteranus 1962). In hymenium numerous spindle-shaped cystidia metachromatic in cresyl blue as are similar cystidia in *Climacocystis borealis* (Kotlaba and Pouzar 1958). We found them also weakly, but distinctly, cyanophilous. The hyphae in the spines proved to be metachromatic in cresyl blue too, turning violet red, whilst thick-walled hyphae in the context turned violet after some time. Spores hyaline, ellptic, 4.5—5 × 2—2.5 μm (Domański 1975) or 3.5—4 × 2 μm (Nikolajeva 1961).

C. septentrionalis grows in the northern temperate zone as a parasite on living broadleaved trees. It is spread in northern and eastern Europe, but is rare already in the central part (Kreisel 1961). As hosts are given *Fagus, Acer, Aesculus, Betula, Juglans, Ulmus, Populus* (Kreisel 1961, Nikolajeva 1961).

In Yugoslavia this species has not been published to date. The only known locality is: Goč mountain near Kraljevo (central Serbia), Bela Reka, alt. 1000—1100 m, on rotten *Fagus* wood, 12—30 VII 1950, l. V. Lindtner, d. M. Tortić. BEO 3553.

This is apparently its southernmost locality in Europe. It is interesting to note that *C. pulcherrimus*, whose area of distribution includes also tropics, was found on the same mountain and almost the same locality.

Summary

The distribution in Yugoslavia of members of the family *Hericiaceae* (as delimited by Domański 1975) as well as of two species of the genus *Climacodon* is presented on the basis of the authors' investigations and existing herbarium specimens. Data from the literature without voucher specimens were taken into account, as the fungi are for the

most part easily recognisable. *Climacodon septentrionalis* (Fr.)P. Karst. is published here for the first time for Yugoslavia; others have been published earlier from one or several localities, but by adding our data we were able to give a clearer picture of their occurrence in this country. *Dentipellis fragilis* (Pers. ex Fr.) Donk particularly proved to be very frequent in mountain forests on beech wood, but was found once also on fir. Reactions of hyphae in cresyl blue are described for each species. Scanning electron micrographs of spores of *Hericiaceae* are added, showing the spore walls to be ornamented with warts or short ridges in all species discussed except in *Creolophus cirrhatus* (Pers. ex Fr.) P. Karst. where it is smooth. Such micrographs have so far been published for three species of this family. Of course, it is necessary to study collections from several localities for a given species in order to establish intraspecific variability of the sporal ornamentation. Only on the ground of such observations will it be possible to evaluate its significance in the taxonomy of *Hericiaceae*.

*

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SADRŽAJ

PORODICA *HERICIACEAE* I ROD *CLIMACODON* U JUGOSLAVIJI

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Vrste gljiva o kojima se govori u ovom radu bile su ranije (osim jedne) obuhvaćene porodicom *Hydnaceae* u širem smislu, karakteriziranom himenoforom u obliku bodlji. Kasnije je, na osnovi razlika u mikroskopskoj strukturi, odvojeno nekoliko porodica, među njima *Hericiaceae*,

a *Hydnaceae* su zadržane za rodove kojima se još ne može utvrditi pravi taksonomski položaj, kao što je slučaj s rodom *Climacodon* (Domański 1975). Prema ovom autoru u *Hericiaceae* pripada i *Laxitextum bicolor* koji se prije ubrajao u *Stereaceae*, pa smo stoga tu vrstu ovdje također obradili, iako je neki, kao Parmasto (1968), Eriksson i Ryvarden (1976), stavljaju u *Corticiaceae*.

Prikazane vrste, općenito dosta rijetke, rastu kadgod na živom, češće na mrtvom drvu. Iako su, osim jedne, već objavljene za Jugoslaviju, bilo je to samo s jednog ili s malo nalazišta; uz to većinom ne postoje herbarski primjerci pa se podaci ne mogu provjeriti. Autori zbog toga navode u prvom redu lokalitete na osnovi vlastitih istraživanja i postojećih eksikata koje su pregledali. Ipak su dodani i nalazi iz literature, koji se mogu smatrati uglavnom vjerodostojnima, jer se većina ovih vrsta može lako prepoznati. Na taj je način dobivena jasnija slika o rasprostranjenju tih gljiva u našoj zemlji.

Za svaku je vrstu opisana ukratko anatomska struktura, koja je već ranije proučena (Maas Geesteranus 1962, 1963, Jahn 1971, Eriksson i Ryvarden 1976). Uz to su dodana naša vlastita zapažanja, u prvom redu reakcije hifa s krezil plavim, što je nastavak istraživanja M. Tortić (1976).

Spore nekoliko predstavnika porodice *Hericiaceae* snimljene su u novije vrijeme na scanning elektronskom mikroskopu, npr. *Laxitextum bicolor* (Eriksson i Ryvarden 1976), *Hericium coralloides* (Keller 1976), *H. erinaceus* (Pegler i Young 1972). Ovdje objavljujemo takve fotografije spora svih vrsta o kojima je bilo govora, gdje se vidi da je površina jedino kod *Creolophus cirrhatus* glatka, a kod ostalih je izbočena u bradavice ili kratke grebene (sl. 1a, b, c; 2a, b, c). Svakako će biti potrebno da se od jedne vrste istraže na taj način spore iz materijala s više lokaliteta i da se ustanovi eventualna varijabilnost ornamentike. Tek će se onda moći zaključivati od kakve i kolike je vrijednosti površinska struktura spora u taksonomiji ove porodice.

Kao nova vrsta za Jugoslaviju ovdje se objavljuje *Climacodon septentrionalis* (Fr.)P.Karst., s jednim dosad poznatim nalazištem kod nas, koje je vjerojatno najjužnije u Evropi. Za *Dentipellis fragilis* (Pers. ex Fr.) Donk je ustanovljeno da je čest u našim planinskim šumama na drvu bukve; jednom je izuzetno nađen na jeli. Od ostalih vrsta čini se da su dosta rijetke *Creolophus cirrhatus* (Pers. et Fr.) P. Karst., *Climacodon pulcherrimus* (Berk. et Curt.) Nikol. i *Hericium erinaceus* (Bull. ex Fr.) Pers., dok su *Hericium coralloides* (Scop.ex Fr.) S. F. Gray, *H. ramosum* (Bull.ex Mérat) Let. i *Laxitextum bicolor* (Pers.ex Fr.) Lentz nađene na većem broju lokaliteta, ponegdje u više navrata i s dosta primjeraka i vjerojatno su više rasprostranjene.

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