

MACROMYCETES IN SOME CHESTNUT FORESTS IN THE VICINITY OF ZAGREB

MILICA TORTIĆ and MARIA LISIEWSKA

(Institute of Botany, Faculty of Science, University of Zagreb, and Institute of Biology,
University A. Mickiewicz, Poznań)

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Introduction

The species presented in this paper were for the most part already published, together with other fungi from the same region, in floristic lists (TortiĆ 1964, 1968), where, however, usually only the localities were mentioned, the type of the forest being given in rarer instances. The existing data have now been revised and supplemented by new collections, as well as by phytocenological analysis of several localities, in order to give a survey of the mycoflora of a least some of the chestnut forests in the territory of Yugoslavia.

The association investigated is *Quercu-Castanetum croaticum* as described by Horvat (1938). One of our localities (Gračec) was analysed by him, although not necessarily exactly the same plot.

The nomenclature of *Agaricales* is according to Moser (1967) and of *Polyporaceae* s. l. according to Domański (1974, 1975); that of the species from other groups is as used by most authors.

The species are arranged in two tables: those growing on soil and litter and those growing on dead or living wood. Their frequency is represented as follows: r — rare, n — numerous, a — abundant. Numerals before the letters designate how many times a species was found in a given locality.

Some species were only noted, but not collected. Others are preserved at the Institute of Botany of the Natural Sciences Faculty, Zagreb (ZA), and several also at the Institute of Biology UAM, Poznań.

General features of the territory investigated

Three localities are situated on the lower slopes of Medvednica near Zagreb, not far apart, and the other three are near Petrinja (about

60—70 km south of Zagreb) on the slopes of Zrinjska gora. All the three on Medvednica and one near Petrinja were now reambulated and analysed phytocenologically. A few species were collected in a chestnut wood at Liganj near Opatija, on lower slopes of Učka.

From the phytogeographical point of view, the chestnut forests investigated are situated in two climazonal vegetation areas: the ones near Zagreb and Petrinja in the medium variant of as. *Quercus petraeae-Carpinetum illyricum* Horv. and the one near Opatija in the warmer subarea of as. *Carpinetum orientalis adriaticum* H-ić. Both climax areas and subareas are well characterized climatologically (Bertović 1975).

The climatic conditions in those regions are represented by some data from corresponding meteorological stations for the period of 1948—

1960 (Kirigin, Šinik, Bertović 1971)

Met. station	a	b	c	d	e	f	g
Zagreb-Grič	11.7	39.8	-30.0	82	969	42.2	5.6
Petrinja	10.6	40.3	-19.4	70	874	16.8	6.0
Opatija	14.5	37.0	-10.6	70	1686	4.9	4.8

a) mean annual air temperature (°C), b) absolute maximum air temperature, c) absolute minimum air temperature, d) mean annual relative air humidity (%), e) mean annual precipitation (mm), f) average annual number of days with frost, g) mean annual cloudiness

All the forest associations investigated are in the climatic zone C-warm-moderate rain climate in the sense of V. Köppen and their designation is "C f w b x" (Zagreb-Grič, Petrinja) and "C f s a x" (Opatija). According to Thornthwait climatic classification, the vicinity of the stations Zagreb-Grič and Petrinja belong of the humid climate, and the vicinity of Opatija to the perhumid climate.

Chestnut forests are rather widely distributed in northern Croatia, mostly on clayey and sandy deposits and rocks poor in limestones (green slates, flint, carbonate sandstones, lower and upper triassic shales etc.). There they develop on shallow, acid soils, poor in alkalis. However, they sometimes grow well on limestones too, for instance lithothamnium limestones at Medvednica, on deep acidified soils (Anić 1940). In Istria, the chestnut stands are widely spread particularly on the slopes of Učka in the vicinity of Lovran and Opatija, where they thrive very well on deep, fresh, terra rossa over limestones; frequently the trees are surrounded by large rocks. The chestnut in this region is also often cultivated and even grafted (Anić 1942).

As described by Horvat (1938), the main tree species in *Quercocastanetum* is *Quercus petraea*, with abundant admixture of *Castanea vesca*. *Fagus silvatica* is frequent too, but the other tree species are rarely present. The shrub layer is scarce in typical plots. Herb layer is very characteristic, consisting of a number of acidophilous plants, such as several *Luzula* spp., *Vaccinium myrtillus*, *Genista* spp., *Cytisus* spp. etc. Moss layer is particularly rich and well developed. Regularly present are *Polytrichum attenuatum*, *Hypnum cupressiforme* and *Leucobryum glaucum*.

Chestnut forests in Istria represent a particular but very similar association, *Quercocastanetum submediterraneum* Anić (Anić 1953).

The localities investigated

a) Medvednica mountain near Zagreb

1. Gračec above the village Gračani, alt. 300 m, exp. SE. Shrub layer poorly developed.

<p>a₁ <i>Castanea sativa</i> a₂ <i>Quercus petraea</i> <i>Fagus sylvatica</i> b <i>Carpinus betulus</i> <i>Corylus avellana</i> <i>Frangula alnus</i> c <i>Luzula nemorosa</i> <i>Melampyrum vulgatum</i> <i>Genista tinctoria</i> <i>G. germanica</i> <i>Veronica officinalis</i> <i>Calluna vulgaris</i></p>	<p><i>Luzula campestris</i> <i>Vaccinium myrtillus</i> <i>Lathyrus montanus</i> <i>Cytisus supinus</i> <i>Pteridium aquilinum</i> <i>Gentiana asclepiadea</i> <i>Galium vernum</i> <i>Convallaria majalis</i> d <i>Polytrichum attenuatum</i> <i>Hypnum cupressiforme</i> <i>Dicranum scoparium</i> <i>Leucobryum glaucum</i></p>
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2. Varoško Rebro, on a ridge parallel to the first, alt. 350—400 m, exp. NE on a not steep slope. At the beginning of the path many elements of beech forest in the herb layer, in somewhat higher altitude typical acidophilous chestnut forest on clayey soil, with rather old trees. Shrub layer not too dense. Other trees occur only singly. Few mosses.

<p>a₁ <i>Castanea sativa</i> a₂ <i>Quercus petraea</i> <i>Fagus sylvatica</i> <i>Carpinus betulus</i> b <i>Corylus avellana</i> <i>Frangula alnus</i> <i>Acer campestre</i> d <i>Melampyrum vulgatum</i> <i>Gentiana asclepiadea</i> <i>Galium silvaticum</i></p>	<p><i>Euphorbia</i> sp. <i>Polygonatum multiflorum</i> <i>Sanicula europaea</i> <i>Aegopodium podagraria</i> <i>Circaea lutetiana</i> <i>Asarum europaeum</i> <i>Asperula odorata</i> <i>Oxalis acetosella</i> <i>Pulmonaria officinalis</i></p>
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At a higher altitude the herb layer is acidophilous with plentiful *Luzula nemorosa*, *Genista tinctoria*, *Oxalis acetosella* and mosses.

3. Medvedgrad above the village Šestine, alt. 300—350 m, exp. SE. Slope mostly gentle, steeper only in one part. Shrub layer in some places rather dense. *Melampyrum vulgatum* numerous, *Calluna vulgaris* and mosses scarce.

<p>a <i>Quercus petraea</i> <i>Castanea sativa</i> <i>Fagus sylvatica</i> b <i>Castanea sativa</i> <i>Carpinus betulus</i> <i>Pirus piraster</i> <i>Cornus sanguinea</i> <i>Acer campestre</i> <i>Laburnum anagyroides</i> c <i>Hieracium murorum</i> <i>Melampyrum vulgatum</i></p>	<p><i>Calluna vulgaris</i> <i>Luzula campestris</i> <i>Pteridium aquilinum</i> <i>Gentiana asclepiadea</i> <i>Galium vernum</i> <i>Convallaria majalis</i> <i>Cytisus nigricans</i> <i>Sarothamnus scoparius</i> d <i>Polytrichum attenuatum</i> <i>Hypnum cupressiforme</i></p>
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In the higher parts of this locality more chestnuts and characteristic species in the herb layer.

▼ <i>Cyathellus cornucopioides</i> Pers.	6/r-a	1/r	1/r	1/r	2/n	1/a
<i>Amanita phalloides</i> (Váill. ex Fr.) Secr.	2/r	1/r	1/r	1/r	1/n	1/n
<i>Russula delicata</i> Fr.	1/r	1/n	1/n	1/n	1/r	1/r
<i>Amanita caesarea</i> (Scop. ex Fr.) Pers. ex Schw.	1/r	.	1/r	1/r	1/n	1/r
<i>Lecanum griseum</i> (Quél.) Sing.	1/n	.	1/r	1/r	1/n	1/n
<i>Cortinarius trivialis</i> Lge.	1/n	1/n	.	.	.	1/n
<i>Boletus calopus</i> Fr.	1/r	.	.	.	1/r	.
<i>Lactarius pallidus</i> Pers. ex Fr.	1/n	1/r	.	.	.	1/n
<i>Boletus appendiculatus</i> Schff. ex Fr.	1/r	.	.	.	.	1/r
<i>Hydnum repandum</i> Fr.	2/n	1/r	2/r-n	.	2/n	.
<i>Russula marci</i> Sing.	1/a	1/r	1/r	1/r	1/r	.
<i>Inocybe fastigiata</i> (Schff. ex Fr.) Quél.	1/r	.	1/r	1/r	.	.
<i>Cantharellus tubaeformis</i> Fr. var. <i>lutescens</i> Fr.	4/r-n	1/n	1/r	1/r	1/n	.
<i>Russula violacea</i> Quél.	.	1/r	1/r	1/r	1/n	.
<i>Cortinarius collinitus</i> Fr.	1/r	1/r	1/r	1/r	1/r	.
<i>Russul't virescens</i> (Schff.) Fr.	.	.	1/n	1/n	1/r	.
<i>Lactarius piperatus</i> (L. ex Fr.) S. F. Gray.	.	1/n	.	.	1/r	.
<i>Pseudocaterellus sinuosus</i> (Fr.) Corner ex Heinem.	2/n	.	.	.	1/n	.
<i>Cantharellus cibarius</i> Fr.	5/r-n	1/r	.	.	2/r	.
<i>Calocybe ionides</i> (Bull. ex Fr.) Donk	.	1/r	.	.	2/r	.
<i>Lactarius volemus</i> Fr.	.	1/n	.	.	1/r	.
<i>Cortinarius bivellus</i> Fr.	1/n	1/r	.	.	1/n	.
<i>Tylopholus felixus</i> (Bull. ex Fr.) Karst.	.	1/r	1/n	1/n	1/r	.
<i>Russula alutacea</i> Fr. em. Melz & Zv.	.	1/r	1/r	1/r	1/r	.
<i>Rhodophyllus nidorosus</i> (Fr.) Quél.	.	1/n	1/r	1/r	.	.
<i>Russula vesca</i> Fr.	1/n	.	.	.	1/n	.
<i>Hebeloma longicaudum</i> (Fr.) ss. Lge.	1/r	.	1/r	1/r	1/r	.
<i>Russula laurocerasi</i> Melz.	.	.	1/n	1/n	1/r	.
▼ <i>Ramaria formosa</i> (Fr.) Quél.	4/r-n	2/r-n	1/n	1/n	.	.
<i>Hygrophorus russula</i> (Schff. ex Fr.) Quél.	2/n	1/r	1/r	1/r	.	.
<i>Russula fellaea</i> Fr.	1/r	1/r	1/r	1/n	.	.
<i>Cantharellus cinereus</i> Fr. ex Pers.	1/n	.	.	1/r	.	.
<i>Collybia butyracea</i> (Bull. ex Fr.) Quél. var. <i>asema</i> Fr.	1/r	.	.	1/r	.	.
<i>Hydnellum conopactum</i> (Fr.) Nikol.	2/r	.	.	.	.	.
<i>Hygrophorus eburneus</i> (Bull. ex Fr.) Fr.	2/r-n	1/n	.	.	.	.
<i>Tricholoma sulphureum</i> (Bull. ex Fr.) Quél.	1/r	2/r-n	.	.	1/r	.
<i>Cortinarius himmuleus</i> (Sow. ex Fr.) Quél.	1/n	1/r	.	.	1/r	.
<i>Lactarius blennius</i> Fr.	1/n	1/r	.	.	1/r	.
<i>Leotia lubrica</i> Pers.	1/n	1/r	.	.	1/r	.
<i>Amanita muscaria</i> (L. ex Fr.) Hooker	1/r	1/n	.	.	1/n	.

Subassociation	<i>Q. METCO-Castanetum croaticum</i>						Q-C submed.
	Region	Medvednica		Neighbourhood of Petrinja		Istria	
		Gračac	Varosko Rebro	Medved- grad	Cepeliš			Mostec	Taborište
Number of observations	9	5	2	3	1	1	1
Number of species	89	54	35	57	33	21	13
<i>Sullus piperatus</i> (Bull. ex Fr.) O. Kuntze	1/r	1/r	.	.	.	.	.
<i>Macrolepiota excoriata</i> (Schff. ex Fr.) Mos.	1/r	1/r	.	.	.	.	.
<i>Hebeloma sinapians</i> (Paulet ex Fr.) Gill.	1/n	1/r	.	.	.	.	.
<i>Russula chamaeleonina</i> Fr.	1/r	1/r	.	.	.	.	.
<i>Ranaria boivryis</i> (Fr.) Ricken	1/r	1/r	.	.	.	.	.
<i>Dermocybe cinnamomolutes</i> (Orton) Mos.	3/r-n	.	.	.	.	.	.
<i>Tricholoma saponaceum</i> (Fr.) Quéf.	2/r-n	.	.	.	.	.	.
<i>Phellodon confluens</i> (Pers.) Pouz.	2/n	.	.	.	.	.	.
<i>Mycena pura</i> (Pers. ex Fr.) Quéf.	2/r	.	.	.	.	.	.
<i>Mycena epipterygia</i> (Scop. ex Fr.) Gray	1/n	.	.	.	.	.	.
<i>Lactarius aeris</i> (Bolt.) Fr.	1/n	.	.	.	.	.	.
<i>Lactarius subdulcis</i> Bull. ex Fr.	1/n	.	.	.	.	.	.
<i>Hygrophorus poetarum</i> Heim	1/n	.	.	.	.	.	.
<i>Collybia peronata</i> (Bolt. ex Fr.) Sing.	1/n	.	.	.	.	.	.
<i>Tricholoma sciodes</i> (Sect.) Mert.	1/n	.	.	.	.	.	.
<i>Cortinarius azureus</i> Fr.	1/n	.	.	.	.	.	.
<i>Lepista nuda</i> (Bull. ex Fr.) W. G. Smith	1/n	.	.	.	.	.	.
<i>Phylloporus rhodoxanthus</i> (Schw.) Bres.	1/r	.	.	.	.	.	.
<i>Clavariadelphus pistillaris</i> L. ex Fr.	1/r	.	.	.	.	.	.
<i>Helvella crispa</i> (Scop.) Fr.	1/r	.	.	.	.	.	.
<i>Mycena galopoda</i> (Pers. ex Fr.) Quéf.	1/r	.	.	.	.	.	.
<i>Collybia cirrhata</i> (Schum. ex Fr.) Kummer	1/r	.	.	.	.	.	.
<i>Lactarius glaucescens</i> Crossl.	1/r	.	.	.	.	.	.
<i>Lactarius circellatus</i> Fr.	1/r	.	.	.	.	.	.
<i>Lyophyllum infumatum</i> (Bres.) Kühn.	1/r	.	.	.	.	.	.
<i>Cortinarius caesiocyaneus</i> Britz.	1/r	.	.	.	.	.	.
<i>Tricholoma scalpturatum</i> (Fr.) Quéf.	1/r	.	.	.	.	.	.
<i>Clitocybe inversa</i> (Scop. ex Fr.) Quéf.	1/r	.	.	.	.	.	.
<i>Macrolepiota procera</i> (Scop. ex Fr.) Sing.	1/r	.	.	.	.	.	.

▼ <i>Hydnellum spongiosipes</i> (Peck) Pouz.	1/r	.	.	.	.	.	.	.	.
<i>Amanita geminata</i> (Fr.) Gill.	1/r	.	.	.	.	.	.	.	.
<i>Sarcodon scabrosus</i> (Fr.) Bourd. et Galz.	1/r	.	.	.	.	.	.	.	.
<i>Russula paludosa</i> Briz.	1/r	.	.	.	.	.	.	.	.
<i>Xerocomus chryseniteron</i> (Bull. ex Fr.) Quél.		1/n	.	.	.	.	.	.	.
<i>Stropharia aeruginosa</i> (Curt. ex Fr.) Quél.		1/n	.	.	.	.	.	.	.
<i>Corinarius bovinus</i> Fr.		1/r	.	.	.	.	.	.	.
<i>Hebeloma radicosum</i> (Bull. ex Fr.) Ricken		1/r	.	.	.	.	.	.	.
<i>Tricholoma ustale</i> (Fr. ex Fr.) Kummer		1/r	.	.	.	.	.	.	.
<i>Lyophyllum fimosum</i> (Pers. ex Fr.) Kuhn. ex Ort.		1/r	.	.	.	.	.	.	.
<i>Coltricia porennis</i> (L. ex Fr.) Murrill		1/r	.	.	.	.	.	.	.
<i>Amanita spissa</i> (Fr.) Kummer		1/r	.	.	.	.	.	.	.
<i>Lactarius veidus</i> Fr.		1/n	.	.	.	.	.	.	.
<i>Hygrophorium nemoreus</i> (Lasch.) Fr.		1/r	.	.	.	.	.	.	.
<i>Lycoperdon perlatum</i> Pers.		1/r	.	.	.	.	.	.	.
<i>Xerocomus subtomentosus</i> (L. ex Fr.) Quél.		.	.	.	.	.	.	.	.
<i>Clitocybe gibba</i> (Pers. ex Fr.) Kummer		.	.	.	.	.	.	.	.
<i>Russula rosea</i> Quél.		2/r-n	.	.	.	.	.	.	.
<i>Boletus regius</i> Krbh.		2/r-n	.	.	.	.	.	.	.
<i>Peziza badia</i> Pers. ex Fr.		1/n	.	.	.	.	.	.	.
<i>Russula xerampelina</i> (Schff. ex Secr.) Fr.		1/n	.	.	.	.	.	.	.
<i>Lactarius acerrimus</i> Briz.		1/r	.	.	.	.	.	.	.
<i>Boletus edulis</i> Bull. ex Fr.		1/r	.	.	.	.	.	.	.
<i>Scleroderma verrucosum</i> Pers.		1/r	.	.	.	.	.	.	.
<i>Boletus edulis</i> Bull. ex Fr.		2/n-a	.	.	.	.	.	.	.
<i>Lecanum crocoidius</i> (Let.) Watling		1/n	.	.	.	.	.	.	.
<i>Boletus rhodoxanthus</i> Kboh.		1/n	.	.	.	.	.	.	.
<i>Rhodophyllus simianus</i> (Bull. ex Fr.) Sing.		1/n	.	.	.	.	.	.	.
<i>Amanita inaurata</i> Secr.		1/r	.	.	.	.	.	.	.
<i>Russula aurata</i> With.		1/r	.	.	.	.	.	.	.
<i>Corinarius bulliardii</i> (Fr.) Fr.		1/n	.	.	.	.	.	.	.
<i>Amanita crocea</i> (Quél.) Sing.		1/r	.	.	.	.	.	.	.
<i>Lactarius deceptus</i> Quél.		1/r	.	.	.	.	.	.	.
<i>Lepiota clypeolaria</i> (Bull. ex Fr.) Kummer		1/r	.	.	.	.	.	.	1/r
<i>Collybia dryophila</i> (Bull. ex Fr.) Kummer		1/r	.	.	.	.	.	.	1/n
<i>Russula lepida</i> Fr. f. <i>lactea</i> Möller		.	.	.	.	.	.	.	1/n

Table 2. Macromycetes noted in the investigated oak-chestnut forests — B. Lignicolous species

Subassociation	<i>Quercus-Castanetum croaticum</i>							Q-C submed.
	Medvednica			Neighbourhood of Petrinja				
	Grabeč	Varoško Rebro	Medved- grad	Cepeliš	Mostec	Taborište	Istria	
Number of observations	9	5	2	3	1	1	1	
Number of species	15	14	8	21	3	9	2	
<i>Collybia fusipes</i> (Huds. ex Fr.) Quéf.	1/r	3/r	1/r	2/r-n	.	1/r	1/r	
<i>Hypoholoma fasciculare</i> (Huds. ex Fr.) Kummer	1/n	2/r-n	1/n	1/n	.	1/n	1/n	
<i>Oudemansiella radicata</i> (Relhan ex Fr.) Sing.	1/r	1/r	.	1/r	1/n	.	.	
<i>Fistulina hepatica</i> (Schaef.) ex Fr.	4/r	1/r	.	2/r	1/n	.	.	
<i>Trametes versicolor</i> (L. ex Fr.) Pilát	1/r	.	1/n	1/n	.	1/n	.	
<i>Stereum kirsutum</i> (Willd. ex Fr.) S. F. Gray	2/n-a	2/r-a	1/n	1/n	.	1/n	.	
<i>Psathyrella hydrophila</i> (Bull. ex Merat) R. Mre.	.	1/r	1/r	.	.	.	.
<i>Onophalotus olearius</i> (DC. ex Fr.) Sing.	.	.	1/r	.	.	.	.
<i>Hypoholoma sublateralium</i> (Fr.) Quéf.	1/n	2/r-n	.	1/a	.	1/n	.	
<i>Collybia bresadolae</i> (Kuhn & Romagn.) Sing.	3/n	1/r	.	2/n	.	1/n	.	
<i>Panellus stypticus</i> (Bull. ex Fr.) Karst.	.	1/r	1/n	1/n	.	1/a	.	
<i>Mycena incinata</i> (Fr.) Quéf.	2/n	1/a	1/n	1/a	.	1/r	.	
<i>Phellota gummosa</i> (Lasch.) Sing.	1/n	1/n	.	1/r	1/r	.	.	
<i>Trametes gibbosa</i> (Pers. ex Pers.) Fr.	2/r-n	.	.	.	.	.	.
<i>Leucites betulina</i> (L. ex Fr.) Fr.	2/r	.	.	.	.	.	.
<i>Mycena galericulata</i> (Scop. ex Fr.) S. F. Gray	1/n	.	.	.	.	.	.
<i>Phellinus torulosus</i> (Pers.) Bourd. et Galz.	1/r	.	.	.	.	.	.
<i>Abortiporus biennis</i> (Bull. ex Fr.) Sing.	1/r	.	.	.	.	.	.
<i>Mycena polygramma</i> (Bull. ex Fr.) S. F. Gray	1/r	.	.	.	.	.	.
<i>Hirschioporus pergamenus</i> (Fr.) Bond. et Sing.	.	1/n	.	.	.	.	.
<i>Inonotus nodulosus</i> (Fr.) Pilát	.	1/n	.	.	.	.	.
<i>Marasmiellus ramealis</i> (Bull. ex Fr.) Sing.	.	1/n	.	.	.	.	.
<i>Laetiporus sulphureus</i> (Bull. ex Fr.) Murrill	.	1/r	.	1/n	.	.	.	
<i>Crepidotus mollis</i> (Bull. ex Fr.) Kummer	.	1/r	.	1/n	.	.	.	
<i>Oudemansiella platyphylla</i> (Pers. ex Fr.) Mos.	.	.	.	1/r	.	.	.	
<i>Tremella foliacea</i> Pers. ex Fr.	.	.	.	1/r	.	.	.	
<i>Scytinostroma galactinum</i> (Fr.) Donk	.	.	.	1/r	.	.	.	
<i>Marasmius rotula</i> (Scop. ex Fr.) Fr.	.	.	.	1/r	.	.	.	
<i>Pluteus salicinus</i> (Pers. ex Fr.) Kummer	.	.	.	1/r	.	.	.	
<i>Mycena vitilis</i> (Fr.) Quéf.	.	.	.	1/r	.	.	.	
<i>Armillariella tabescens</i> (Scop. ex Fr.) Sing.	.	.	.	1/n	.	1/n	.	
<i>Hymenochaete rubiginosa</i> (Dicks. ex Fr.) Lev.	.	.	.	1/n	.	1/n	.	

b) Vicinity of Petrinja, slopes of Zrinjska gora

1. Forest Javor near Cepeliš, above the village Pecki. Partly very shaded with many young chestnut trees growing out of old stumps in clusters. Herb layer in those places very poor. Exp. SE, slope very steep, at a somewhat higher altitude, 250 m, with southern exposure, older wood with herb layer.

a	<i>Castanea sativa</i>	<i>Primula vulgaris</i>
b	<i>Castanea sativa</i>	<i>Sanicula europaea</i>
	<i>Fagus silvatica</i>	<i>Cephalanthera longifolia</i>
	<i>Cornus mas</i>	<i>Rubus</i> sp.
	<i>Ligustrum vulgare</i>	<i>Acer campestre</i>
c	<i>Genista tinctoria</i>	<i>Galeopsis pubescens</i>
	<i>Luzula campestris</i>	<i>Circaea lutetiana</i>
	<i>Pteridium aquilinum</i>	<i>Tamus communis</i>
	<i>Galium verum</i>	<i>Athyrium filix-femina</i>
	<i>Aposeris foetida</i>	<i>Mycelis muralis</i>
	<i>Fraxinus ornus</i>	<i>Daphne mezereum</i>
	<i>Epimedium alpinum</i>	d <i>Polytrichum attenuatum</i>

On the southern slope at lower altitudes there are many *Quercus petraea* in the tree layer.

2. and 3. South of Petrinja single observations were made several years ago on two localities (Mostec, Taborište) which were not visited again.

c) Istria

A single observation was made at Liganj, alt. 300 m on the slopes of Učka in a chestnut wood, apparently cultivated as it was walled in. The trees were growing in a meadow, rather far apart.

Some notes on the mycoflora of chestnut forests

The species of higher fungi presented in the Tables were collected or noted over several years, from July to the beginning, in one instance even towards the end of November. However, the localities were not visited regularly, not even the same number of times (some only once) and as the aspects of the mycoflora change with the seasons, many species now missing in one or more localities would certainly be found there during more intensive investigations. It is therefore impossible at the moment to make some definite conclusions about the species characteristic of chestnut forests in the region investigated. However, some comparison can be made with the mycoflora of related forests in Yugoslavia and other countries.

Chestnut forests in Europe were investigated, as far as we know, only by Bohus and Babos (1967), who point out that their data are only of an informative character, due to the scarcity of such forests in Hungary. They were struck by the occurrence of *Tylopilus felleus* in large quantities, which species usually forms mycorrhiza with conifers,

and consider it as characteristic of chestnut forest. In our tables, *T. fel-leus* is noted in two localities, but in each only one specimen was found, growing at the base of living chestnuts. Other species, mentioned by the Hungarian authors as characteristic and noted also in Yugoslav chestnut forests, are *Lactarius camphoratus*, *Cantharellus tubaeformis*, *Phellodon confluens*. *Lactarius chrysorrhoeus*, which was found here in all the localities investigated, and is noted in the tables mostly as numerous or even abundant, is according to them a character species of calcifugous oak forests, but also equally frequent in Castaneo-Quercetum. The first author found it in fact in various oak forests too, in a somewhat lesser degree than in chestnut forests.

Some of the species recorded are (Lisiewska 1974) characteristic of the whole order of Fagetalia, as *Lactarius vellereus*, *L. subdulcis*, *Russula cyanoxantha*, *R. lepida*, *R. nigricans*, *Oudemansiella platyphylla*, *Ou. radicata*, *Craterellus cornucopioides* and others. Several are companions of beech, which is often present in chestnut forest, such as *Lactarius blennius*, *L. pallidus*, *Russula mairei*, etc., or grow typically on beech wood, such as *Inonotus nodulosus*.

Otherwise, as can be seen in the tables, the mycoflora of chestnut forests is rather different from that of the beech forests and shows many similarities with that of oak forests. This was to be expected, as the oak is the main tree species in the association investigated and surely exerts a considerable influence on the composition of its mycoflora; moreover, many species, followers of the oak, are at the same time bound probably more or less also to chestnut. Unfortunately, there exist no mycocenological analyses of various oak forests on the territory of Yugoslavia which could be compared with our tables. For comparison were used therefore published lists from lowland oak forests (Jelić and Tortić 1973, Hočevar and Tortić 1975, 1976), as well as the field notes by the first author, and also some mycocenological publications from Poland (Lisiewska 1965, Ławrinowicz 1973).

As already mentioned, *Lactarius chrysorrhoeus* was noted in large quantities in all the localities investigated. Quite a number of species, found several times or only once or twice, were noted in both oak and chestnut forests and hardly or never in others. Such were *Lactarius decipiens*, *Tricholoma acerbum*, *T. sejunctum*, *Boletus queletii*, *B. rhodoxanthus*, various hydnums as: *Hydnellum spongiosipes*, *H. compactum*, *Phellodon confluens*, *Sarcodon scabrosus*. The occurrence of hydneous species can be explained by their preference for acid soil. Some of the species occur frequently for instance in Polish oak-hornbeam forests (*Galio-Carpinetum* and *Tilio-Carpinetum*) such as: *Amanita phalloides*, *Russula delica*, *R. virescens*, *Leccinum griseum*, *Lepista nuda* etc. (Lisiewska 1965, 1974, Ławrinowicz 1973).

Among acidophilous species, noted usually in acidophilous beech and oak forests or even in coniferous ones, are, for instance: *Tylophilus felleus*, *Amanita fulva*, *A. citrina*, *A. muscaria*, *Russula adusta*, *R. alutacea*, *R. xerampelina*, *Lactarius camphoratus*, *Coltricia perennis* and others.

In the forests investigated a relatively small number of lignicolous species was found and we mention here the most interesting ones: *Omphalotus olearius* on a stump of *Carpinus* at Medvedgrad and rather numerous at Cepeliš, probably in connection with chestnut roots, *Fistulina hepatica* on living chestnut trees and on stumps, *Collybia fusipes* on chestnut stumps or under living trees, *Hymenochaete rubiginosa* on stumps of both chestnut and oak, *Phellinus torulosus* on chestnut stump, *Laetiporus sulphureus* on a live chestnut, *Abortiporus biennis* on oak

stump. In many cases the wood could not be determined. All the species found on chestnut occur also on oak, both in Yugoslavia and other countries.

The find of *Scytinostroma galactinum* must be emphasized here, collected on 12 IX 1976 at Cepeliš near Petrinja in the forest Javor, by M. and S. Tortić. It grew in the injured bases of two living chestnut trees. This is the first record for Yugoslavia. The specimens are preserved at ZA.

S u m m a r y

A phytocenological analysis of the mycoflora in some chestnut forests in the vicinity of Zagreb and Petrinja, as well as on the slopes of Učka is presented in the tables. The relatively small number of observations (some localities were visited only once) does not allow as yet definite conclusions about the species characteristic of these forests. It is however clearly seen that their mycoflora is very different from that in beech forests and is rather similar to that in oak forests, with a large admixture of acidophilous species, some of which occur even in coniferous forests.

In all, 164 species were determined, 132 of them growing on soil and litter and 32 on living or dead wood.

Scytinostroma galactinum is particularly emphasized as this is its first find in Yugoslavia.

*

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S A D R Ź A J

MAKROMICETI NEKIH KESTENOVIH ŠUMA U OKOLICI ZAGREBA

Milica Tortić i Maria Lisiewska

(Botanički zavod Prirodoslovno-matematičkog fakulteta Sveučilišta u Zagrebu i Institut Biologii, Uniwersytet A. Mickiewicz, Poznań)

Vrste prikazane u ovom radu najvećim su dijelom već objavljene u florističkim listama (Tortić 1964, 1968), ali su tamo uglavnom navedena samo nalazišta, rijetko i tipovi šuma. Na osnovi tih podataka, koji su revidirani i dopunjeni, analizirana je sada mikoflora nekih kestenovih šuma kraj Zagreba i Petrinje koje pripadaju asocijaciji *Quercus-Castanetum croaticum* Horvat. Sabrano je jednom nešto materijala i u *Quercus-Castanetum submediterraneum* Anić.

Ukupno su ustanovljene 164 vrste, od kojih 132 na tlu i stelji i 32 na živom ili mrtvom drvu, pa su poredane prema tim staništima na dvije tabele. Označene su: r — rijetke, n — brojne i a — obilate, a broj prije slova pokazuje koliko je puta vrsta nađena na nekom lokalitetu.

Zasad se još ne može definitivno zaključiti koje bi vrste viših gljiva bile karakteristične za naše kestenove šume, pa je samo uspoređena njihova mikoflora s onom srodnih šuma u Jugoslaviji i nekim drugim zemljama.

U Evropi su gljive u kestenovim šumama istraživali, koliko nam je poznato, samo Bohus i Babos (1967). Njihovi su podaci samo informativni, jer su u Mađarskoj kestenici rijetki. Na njihovom je području bio vrlo obilato zastupan *Tylopilus felleus*, koji je inače mikorizna gljiva četinjača, pa smatraju da je karakterističan i za kestenove šume. Na našim tabelama je ta vrsta navedena s dva lokaliteta; svagdje je nađen po jedan primjerak pri bazi živog kestena. Ostale vrste koje mađarski autori spominju kao karakteristične za njihove kestenove šume, a nađene su i u našima, jesu *Lactarius camphoratus*, *Cantharellus tubaeformis*, *Phellodon confluens*. Za *Lactarius chrysorrheus*, koji je ovdje ustanovljen u velikom mnoštvu na svim istraživanim lokalitetima, kažu da je karakterističan za kalcifobne hrastove šume, ali da je isto toliko čest u kestenovim. Prva autorica ga je uistinu nalazila često i u različitim hrastovim šumama.

Neke su od navedenih vrsta karakteristične za cijeli red Fagetalia (Lisiewska 1974), kao *Lactarius vellereus*, *L. subdulcis*, *Russula cyanoxantha*, *R. lepida*, *R. nigricans*, *Oudemansiella platyphylla*, *Ou. radicata*, *Craterellus cornucopioides* i dr. Pojedine su prilice bukve (koja je često prisutna u kestenovoj šumi), kao *Lactarius blennius*, *L. pallidus*, *Russula mairei* i dr., ili rastu tipično na drvu bukve, kao *Inonotus nodulosus*.

Inače, kako se vidi iz tabela, mikoflora kestenovih šuma se vrlo razlikuje od one u bukovim šumama i vrlo je bliska onoj hrastovih šuma. To se moglo i očekivati, jer je hrast kitnjak glavna vrsta drveta u istraživanoj asocijaciji. Mikocenološke analize hrastovih šuma nisu provedene na području Jugoslavije, pa su za usporedbu upotrijebljene publicirane liste iz nizinskih hrastovih šuma (Jelić i Tortić 1973, Hočevar i Tortić 1975, 1976) i terenske bilješke prve autorice, a također neke mikocenološke publikacije iz Poljske (Lisiewska 1965, Ławrynowicz 1973).

Osim već spomenutog *Lactarius chrysorrheus*, ustanovljen je cio niz vrsta koje su bile zabilježene u nas i u hrastovim i u kestenovim šumama, a rijetko ili nikad u ostalima. Takve su npr. *Lactarius decipiens*, *Tricholoma acerbum*, *T. sejunctum*, *Boletus queletii*, *B. rhodoxanthus*, razni hidnumi kao *Hydnellum spongiosipes*, *H. compactum*, *Phellodon confluens*, *Sarcodon scabrosus*. Neke vrste dolaze često npr. u šumama hrasta i graba u Poljskoj kao *Amanita phalloides*, *Russula delica*, *R. virescens*, *Leccinum griseum*, *Lepista nuda* itd. (Lisiewska 1965, 1974, Ławrynowicz 1973).

Od acidofilnih vrsta, koje dolaze u acidofilnim bukovim i hrastovim šumama, a također i u šumama četinjača, možemo spomenuti *Tylophorus felleus*, *Amanita fulva*, *A. citrina*, *A. muscaria*, *Russula adusta*, *R. alutacea*, *R. xerampelina*, *Lactarius camphoratus*, *Coltricia perennis* i dr.

U istraživanim šumama nađeno je relativno malo lignikolnih vrsta. Ovdje navodimo najinteresantnije: *Omphalotus olearius* na panju graba ispod Medvedgrada i prilično brojna kod Cepeliša, vjerojatno u vezi s korijenjem kestena, *Fistulina hepatica* na živim stablima i panjevima kestena, *Collybia fusipes* na panjevima i pri bazi živih stabala kestena, *Hymenochaete rubiginosa* na panjevima kestena i hrasta, *Phellinus torulosus* na panju kestena, *Laetiporus sulphureus* na živom kestenu, *Abortiporus biennis* na panju hrasta. Sve vrste nađene na kestenu dolaze u Jugoslaviji, i drugdje, i na hrastu.

Posebno treba istaknuti nalaz *Scytinostroma galactinum* u šumi Javor kod Cepeliša kraj Petrinje, koji je tamo rasao na bazi dva oštećena živa stabla *Castanea* i sabran je 12. IX 1976. Ovo je prvi nalaz u Jugoslaviji.

Dr. Milica Tortić
Botanički zavod PMF
Rooseveltov trg 6
41000 Zagreb
(Jugoslavija)

Dr. Maria Lisiewska
Zakład ekologii roślin i
ochrony środowiska UAM
Ul. Stalingradzka 14
61-713 Poznań
(Polska)