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CONTRIBUTION TO THE LICHEN FLORA OF ISTRIA, YUGOSLAVIA

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Sixty-nine taxa are reported from Istria, one of which is new to Yugoslavia, viz.: *Collema furfureolum* Müll. Arg. and four are new to Croatia, viz.: *Cetrelia olivetorum* (Nyl.) Culb. et C. Culb., *Lecanora chlarotera* Nyl., *Physconia perisidiosa* (Erichs.) Moberg, and *Xanthoria fallax* (Hepp) Arn. Thirty-one taxa are new to Istria. Epiphytic lichen communities are shortly discussed.

Introduction

The study of the Yugoslavian lichen flora has a long history (see the references in Kušan 1953 and Christensen 1987). Especially the islands and the coastal areas of the Adriatic Sea have been visited by collectors. It seems, however, that most attention has been paid to the epilithic flora, and that the epiphytic flora has been less studied.

This paper presents some floristic results of a short trip to the peninsula of Istria (Istra, Fig. 1).

Materials

Taxa not reported in Kušan (1953) or in Christensen (1987) and the literature cited there in are regarded as new to the area in question.

Some of the specimens were analysed by thin layer chromatography (TLC) using the same procedure as in Christensen (1987).

The specimens are deposited at the Botanical Museum, Copenhagen (C), and in the author's private herbarium.

Climate

All the localities lie within the same climatic zone (Walter & Lieth 1960). The climate diagram of Pazin is shown in Fig. 2. The climate is rather humid with high precipitation in fall and spring and a relatively dry period in mid summer. The summer is relatively warm and the winters are cool to relatively cold with periods of frost (sub-mediterranean to subatlantic climate).

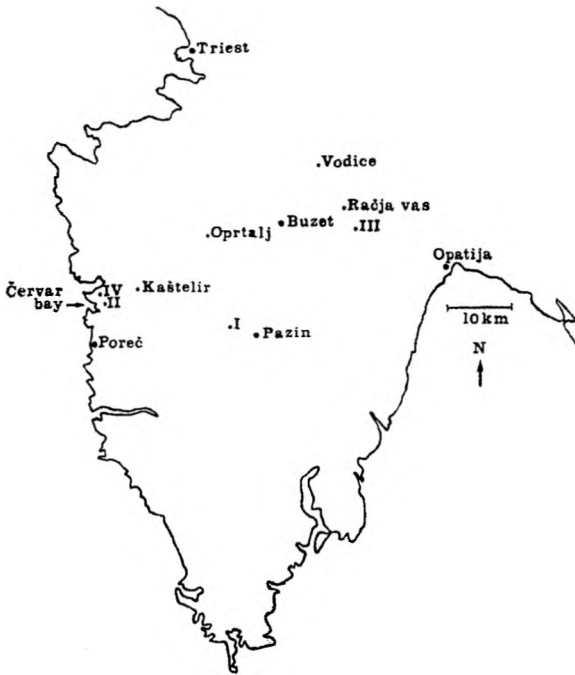


Fig. 1. The peninsula of Istria, North West Yugoslavia. Selected towns and villages are indicated and the main localities are represented by Roman numerals (see the paragraph »The localities« in the text).

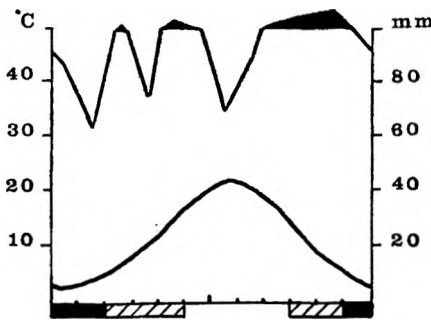


Fig. 2. Climate diagram of Pazin. The town is situated 275 m a. s. l. The mean yearly precipitation is 1267 mm and the mean yearly temperature is 11.7°C. Mean daily minimum is -2.1°C and the absolute daily minimum is -19.1°C. The black bar represents months with mean daily mean temperature under 0°C and the oblique hatched bar absolute daily temperature below 0°C. The lower graph is mean monthly temperature and the upper is the mean monthly precipitation, with black »hats« representing a ten times lowering of the scale. From Walter & Lieth (1960), redrawn.

The localities

The position of the localities is shown in Fig. 1.

I: Ca 7 km W of Pazin, ca 1 km N of Tinjan.

S-faced slope of Limska draga with *Quercus pubescens* forest with *Acer campestre*, *Fraxinus* a. o. and *Quercus* trees along the road Pazin—Poreč. Limestone. Alt.: ca 300 m.

01. 05. 1985.

II: Ca 5 km N of Poreč, ca 1 1/2 km S of the village Vabriga.

Dry hay meadow with scattered *Olea* and *Corylus avellana*. Limestone. Alt.: ca 75 m.

25. 06. 1985.

III: Ca 15 km WNW of Opatija, ca 1/2 km S of Lanišće.

Dry meadow. Limestone. On free standing *Tilia*. Alt.: ca 550 m.

30. 06. 1985.

IV: Ca 7 km N of Poreč, ca 3 1/2 km W of the village Tar.

Dry meadow with scattered *Olea*. Limestone. On *Olea* and on *Ulmus procera* in hedge. Alt.: 20—30 m.

28. 06. 1985.

Results

The collected taxa of the four main localities are presented in Table 1.

Additional records

Aspicilia hoffmannii (Ach.) Flag.

Ca. 7 km N of Poreč, N coast of Červar bay. Alt. ca. 5 m.

Stones and shallow soil on limestone outcrop in maquis. No. 2430. New to Istria.

Cladonia firma (Nyl.) Nyl.

Same loc. as above. No 2431.

New to Istria.

Cladonia pocillum (Ach.) O. J. Rich.

Ca. 10 km WNW of Opatija, along the road from Račja Vas to Opatija, S of the range Kastavska Šuma. Alt. ca. 1000 m.

On limestone fence around dolina in *Fagus* forest, shaded. No. 2646. TLC: Fumarprotocetraric acid. New to Istria.

Cladonia symphycarpa (Ach.) Fr.

1) Along the road from Račja Vas to Opatija, S of the range Kastavska Šuma. Alt. ca. 1000 m.

On SW faced, exposed limestone rock. No. 2637.

2) Ca. 1 km NW of the village of Vodice. Alt. ca. 650 m. On soil among stones in dry meadow on SW slope with scattered limestone outcrops. No 2720.

These two specimens and that of loc. II (no. 2512) all contain atranorin and norstictic acid (TLC). New to Istria.

Table 1. LIST OF SPECIES COLLECTED

The Roman numerals correspond to the headings in the paragraph »The localities«. A = *Acer campestre*, l = limestone fence, O = *Olea*, Q = *Quercus*, in most cases *Q. pubescens*, s = soil, T = *Tilia*, U = *Ulmus procera*, * = new to Istria, and ** = new to Croatia.

	I	II	III	IV
* <i>Bacidia rubella</i> (Hoffm.) Massal.	Q			
<i>Anapychia ciliaris</i> (L.) Körb.	QQ			
* <i>Caloplaca</i> cfr. <i>herbidella</i> (Nyl.) H. Magn.	Q			
<i>C. pollinii</i> (Massal.) Jatta		O		
<i>Candelaria concolor</i> (Dicks.) Stein		O		
<i>Candelariella vitellina</i> (Ehrh.) Müll. Arg.	Q			
* <i>C. xanthostigma</i> (Ach.) Lettau	Q		T	
<i>Catapyrenium squamulosum</i> (Ach.) Breuss		s		
** <i>Cetrelia olivetorum</i> (Nyl.) Culb. et C. Culb.	Q			
<i>Cladonia chlorophaea</i> (Flk. ex Sommerf.) Sprengel s. str.	Q			
<i>C. convoluta</i> (Lam.) P. Cout.		s		
<i>C. furcata</i> (Huds.) Schrad. ssp. <i>furcata</i>		s		
<i>C. rangiformis</i> Hoffm. v. <i>rangiformis</i>		s		
* <i>C. rei</i> Schaer.		s		
* <i>C. symphycarpa</i> (Ach.) Fr.		s		
<i>Collema conglomeratum</i> Hoffm.	Q			
<i>C. furfuraceum</i> (Arn.) DR.	Q			
* <i>C. subflaccidum</i> Degel.	Q			
<i>C. subnigrescens</i> Degel.	Q			
<i>Evernia prunastri</i> (L.) Ach.	Q		T	
<i>Hypogymnia physodes</i> (L.) Nyl.	Q			
* <i>Lecanora argentata</i> (Ach.) Malmé		O		
* <i>L. carpinea</i> (L.) Vain.			T	
** <i>L. chlarotera</i> Nyl.		O	T	
* <i>Lecidella achristotera</i> (Nyl.) H. Hertel et Leuckert	AQ	O	T	
<i>L. elaeochroma</i> (Ach.) Choisy	A	O		
* <i>L. euphorea</i> (Flörke) H. Hertel			T	
* <i>Lepraria incana</i> (L.) Ach.	Q			
<i>Leptogium saturninum</i> (Dicks.) Nyl.	Q			
<i>Micobilimbia sabuletorum</i> (Schreber) Hafellner		l		
* <i>Normandina pulchella</i> (Borr.) Nyl.	Q			
<i>Parmelia acetabulum</i> (Neck.) Duby	AQ			
* <i>P. borrieri</i> (Sm.) Turn.	Q	O	T	O
<i>P. caperata</i> (L.) Ach.	AQ	O	T	O
* <i>P. glabra</i> (Schaer.) Nyl.			T	
* <i>P. glabratula</i> (Lamy) Nyl.		O	T	
* <i>P. pastillifera</i> (Harm.) Schub. et Klem.	Q		T	
* <i>P. perlata</i> Ach.	AQ			
<i>P. quercina</i> (Willd.) Vain.	Q			O
<i>P. subaurifera</i> Nyl.	A		T	
* <i>P. subrudecta</i> Nyl.	A			
* <i>P. sulcata</i> Th. Tayl.	A	O	T	
* <i>P. tiliacea</i> (Hoffm.) Ach.	AQ			
<i>Pertusaria albescens</i> (Huds.) Choisy et Werner v. <i>albescens</i>	AQ			
* <i>Phaeophyscia ciliata</i> (Hoffm.) Moberg	Q			
* <i>P. hirsuta</i> (Mereschk.) Moberg	Q			U
* <i>P. orbicularis</i> (Neck.) Moberg		O		U
* <i>Phlyctis argena</i> (Spreng.) Flot.	Q			

	I	II	III	IV
<i>Physcia adscendens</i> (Fr.) Oliv.	Q	O	T	
<i>P. aipolia</i> (Ehrh.) Hampe	Q	O	T	
<i>P. semipinnata</i> (Gmelin) Moberg	Q			
** <i>Physconia perisidiosa</i> (Erichs.) Moberg	Q			
<i>P. pulverulacea</i> Moberg	Q		T	
<i>Ramalina farinacea</i> (L.) Ach.	Q	O		
<i>R. cfr. fastigiata</i> (Pers.) Ach. (juv.)		O		
* <i>R. fraxinea</i> (L.) Ach.				
v. <i>caliciformis</i> (Nyl.) Hue	Q			
<i>Teloschistes chrysophthalmus</i> (L.) Th. Fr.	Q			
<i>Usnea</i> sp. (juvenile)	Q			
** <i>Xanthoria fallax</i> (Hepp) Arn.		O		
<i>X. parietina</i> (L.) Th. Fr.	Q	O	T	

Collema furfureaceum (Arn.) Du Rietz

Ca. 25 km NE of Poreč, ca 1 km S of the village of Oprtalj. Alt. ca. 350 m.

On *Morus* road tree along gravel paved road in arable land. Limestone. No. 2704.

Not included in Kušan (1953) but reported from Istria in Degelius (1954).

Collema furfureolum Müll. Arg.

Ca. 7 km N of Poreč, between Červar bay and the village of Vabriga. Alt. ca. 30 m.

On collapsed limestone fence in maquis, partly under *Cornus* and *Paliurus*. Nos. 2444 & 2447. Both inmixed with *Leptogium plicatile* (Ach.) Leight.

C. furfureolum was recently reported from Italy and Greece as new to Europe (Degelius 1986).

New to Yugoslavia.

Collema tuniforme (Ach.) Ach.

1) Ca. 25 km NE of Poreč, ca. 1 km S of the village of Oprtalj. Alt. ca. 350 m. On limestone fence along road.

No. 2706.

2) Ca. 2 1/2 km ENE of Buzet, just E of the Railway st. of Buzet. Alt. ca. 250 m.

S slope with forest of *Quercus*, *Fraxinus* a. o. Limestone. On stones in scree. Nos 2587, 2588. Not included in Kušan (1953), but reported from Istria in Degelius (1954) (cfr. Christensen 1987).

Leptogium plicatile (Ach.) Leight.

Cum *Collema furfureolum* nos. 2444 & 2447, quod vide.

New to Istria.

Mycobilimbia sabuletorum (Schreb.) Hafellner

(*Bacidia sabuletorum* (Schreb.) Lettau)

Loc. II, nos. 2521, 2522. Both on mosses on limestone fence.

(One specimen, no. 1019, collected in Slovenia, at Mt. Turen Skednju (loc. 24 of Christensen 1987) is here reported new to Slovenia).

Parmelia borrieri (Sm.) Turn.

Ca. 8 km NE of Poreč, ca. 1/2 km SW of the village Kaštelir. Alt. ca. 200 m.

Open *Quercus pubescens* forest on S slope. Limestone. On *Q. pubescens*. No 2410. New to Istria.

Parmelia glabra (Schaer.) Nyl.

Ca. 2 1/2 km ENE of Buzet, just E of the Railway st. of Buzet. Mixed forest of *Quercus*, *Fraxinus*, a. o. on S slope. Limestone. Alt. ca. 250 m.

On *Quercus* cfr. *pubescens*. No. 2589. New to Istria.

Parmelia glabratula (Lamy) Nyl.

Cum priore. New to Istria.

Parmelia perlata Ach.

Ca. 7 km N of Poreč, N coast of Červar bay. Alt. ca 5 m. Pinus forest with underwood of *Carpinus*, *Rubus* a. o. Limestone. On *Pinus*. No. 2548. Contain atranorin, stictic and constictic acids (TLC). New to Istria.

Parmelia tiliacea (Hoffm.) Ach.

Ca. 2 km S of the Poreč harbour. Alt. ca. 10 m.

On free standing *Quercus pubescens* in park.

No. 2579. New to Istria.

Phaeophyscia ciliata (Hoffm.) Moberg

Outskirts of the village of Lanišće, Alt. 550 m. On *Populus tremula* along road in arable land. No. 2622, New to Istria.

Phaeophyscia hirsuta (Mereschk.) Moberg

Ca. 7 km N of Poreč, the village of Vabriga. Alt. ca 75 m. On *Ficus carica* in the village. Limestone. No. 2458. New to Istria (cfr. Christensen 1987).

Physcia biziana (Massal.) Zahlbr.

Ca. 7 km N of Poreč, the village of Tar. Alt. ca 100 m. On N side of trunk of *Aesculus hippocastanum* along road. Limestone.

No. 2466. New to Istria.

Physconia grisea (Lam.) Poelt ssp. *grisea*

Locality and habitat as above. Nos 2464, 2465. New to Istria.

Psora albilabra (Duf. in Fr.) Körber

Along the road from Račja Vas to Opatija, S of the range Kastavska Šuma. Alt. ca. 1000 m.

On NW faced vertical face of limestone outcrop.

No. 2639. New to Istria.

Notes on selected specimens

Cladonia rei Schaer.

Loc. II, no. 2511. Contain homosekikaic and fumarprotocetraric acids (TLC) and has UV + medulla.

Lecidella achristotera (Nyl.) H. Hertel et Leuckert

Loc. I, no. 2670.

Loc. II, nos. 2487, 2491.

Loc. III, nos. 2602, 2609, 2616.

The specimens are in accordance with the description in Poelt & Vězda (1981) having C⁺ orange thallus and the hymenia with

varying amount of oil droplets. The species was recently reported new to Yugoslavia (Christensen 1987).
See the discussion under *L. euphorea*.

Lecidella elaeochroma (Ach.) Choisy v. *elaeochroma*

Loc. I, no. 2679.

Loc. II, no. 2502.

See discussion under *L. euphorea*.

Lecidella euphorea (Flörke) H. Hertel

Loc. III, no. 2610.

From these and other, as yet unpublished, specimens it is apparent that there is great variation in the amount of oil droplets (inspersion) in the hymenia and of the C-reaction, and there seem to be no correlation between them, so the taxa *L. achristotera*, *L. elaeochroma*, and *L. euphorea* seems to me to represent endpoints in the variation of one large taxon, at least it seems so on the Balkan Peninsula.

Physconia perisidiosa (Erichs.) Moberg

Loc. I, no. 2703.

The taxon is not included in Kušan (1953), but is reported from Serbia and Bosnia—Hercegovina by Nádvořník (1948, as *Physcia farrea* (Ach.) Vain.). New to Croatia.

Discussion

The floristic composition on *Quercus* at loc. I contains elements of two communities of the *Xanthorion parietinae*-alliance, viz.: *Parmelietum carporrhizantis* Crespo and *Physcietum ascendentis* Frey & Och-sner (James et al. 1977, Nimis & De Faveri 1981), and elements of *Parmelion perlatae* James, Hawksworth & Rose 1977, a community which demands high atmospheric humidity and more or less closed stands of rough barked trees (Nimis 1982). The three last mentioned Collema species in Table 1 also have oceanic tendencies (Degelius 1956). *Parmelietum carporrhizantis* requires low rainfall and high sunshine and somewhat nutrient-rich sites, and has many features in common with *Parmelion perlatae* (James et al. 1977).

Rose (1985) noted a mixture of *Xanthorion* and *Lobarion* communities from higher elevations in the Apennine Mts. He suggests that the long, dry, dusty summers favour the species of *Xanthorion*, while the *Lobarion* species can thrive in the humid period of the winter rain. Although loc. I is situated at a lower altitude than those discussed by Rose (1985) the presence of the river Cipri below the slope or the position of the locality at the edge of the Limska Draga gorge seems to give the present locality the same ecological conditions.

In more dry conditions, which are the mostly prevalent, the *Quercus* trees of Istria harbours *Parmelia quercina*, *P. borrieri*, *P. tiliacea* and/or *P. pastillifera* as the most frequent, indicating a *Parmelietum carporrhizantis* community.

The vegetation on Olive trees in the area (f. example at loc. II and IV) belongs to *Physcietum ascendentis* Frey et Och-sner (Nimis & De Faveri 1981). It is a »photo-, xero-, neutro- bis schwach basiphil« community that »bevorzugt windoffene Standorte« (Klement 1955).

The lichen flora on loc. III, collected from a single tree, is not easily referred to any particular sociological unit. It could be a depauperate *Parmelietum carporrhizantis*, talbeit with some elements of *Physcietum ascendentis*. This would be in accordance with the ecological conditions on the locality: Sun lit, rather dry, windy and nutrient enriched.

★

Acknowledgements. G. Degelius has kindly checked the *Collemataceae*, O. Breuss the *Catapyrenium* and U. Söchting read the manuscript.

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SAŽETAK

PRIOLOG FLORI LIŠAJA ISTRE, JUGOSLAVIJA

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Autor priopćuje nalaze 69 svojti lišaja iz Istre, od kojih je vrsta *Collema furfureolum* Müll. Arg. nova za Jugoslaviju, 4 vrste nove su za Hrvatsku: *Cetrelia olivetorum* (Nyl.) Culb. et C. Culb., *Lecanora chlarotera* Nyl., *Physconia perisidiosa* (Erichs.) Moberg i *Xanthoria fallax* (Hepp) Arn., dok je 31 svojta nova za Istru.

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