

LICHENOLOGICAL STUDIES IN NE - ITALY. V: NEW RECORDS FROM FRIULI - VENEZIA GIULIA

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Abstract: this paper reports ca. 800 lichen records from Friuli - Venezia Giulia. 8 species (*Cladonia diversa*, *Fellhanera subtilis*, *Lecanora cinereofusca*, *L. impudens*, *Poeltinula cacuminum*, *Polyblastia helvetica*, *Scoliciosporum pruinosum* and *Trapelia placodioides*) are new to Italy. 211 species are reported for the first time from Friuli, and 48 from the Karst. The samples are preserved in the TSB herbarium.

Introduction

Friuli -Venezia Giulia region was for a long time the lichenologically least known region of northern Italy. The first important lichenological collection was that of B. Biasoletto (1793-1858), a pharmacist who collected phanerogams, algae, mosses and lichens mainly in the Karst region and in Istria, and who was in contact with the most eminent botanists of his time; his important collections are now preserved in the Civic Museum of Natural History of Trieste (TSM) and were never published. Some years later M. De Tommasini (1794-1879) formed a larger herbarium of cryptogams and phanerogams with the assistance of several collectors; the lichens (many collected in areas presently in Slovenian territory) were identified by J. Glowacki (1846-1915), who, in 1874, published the main lichenological contribution for this area in the previous century, where more than 200 taxa are cited. The lichen herbarium of De Tommasini is divided between TSM and the Natural History Museum of Graz (GJU). At the end of the century some lichen collections from the Trieste territory were assembled by J. Schuler (1853-1945), a teacher of natural sciences first at Trieste and later, for a long time, at Fiume; Schuler (1893) published a short note listing 39 species from the surroundings of Trieste; the material was partly identified by A. Zahlbruckner. A few further records from the Karst are included in his interesting Lichen Flora of Fiume (Schuler 1902), a town presently in Croatian territory. The herbarium of Schuler is preserved at the University of Padova (PAD, see Caniglia & Andreose 1990). The lichenological exploration of the Trieste territory ceased almost completely in the first half of this century. A few

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records are contained into monographs of different genera, and mostly refer to duplicates of the herbarium Glowacki, preserved in Uppsala.

The first lichen records from Friuli were given by Suffren (1902), who listed only a few, rather uninteresting species. Further additions are found in scarce records scattered in the papers of A. Massalongo, and in a few specimens distributed by V. Trevisan in his "*Lichenotheca Veneta*". In the second half of the last century some small lichen collections, now preserved in MFU, were assembled by G. A. Pirona (1822-1895) and A. Morassi (1809-1863); a small lichen herbarium by G. Fornaciari (1907-1991) is also deposited at MFU. Most of these collections have been never published (see Tretiach 1990). In the first half of this century Friuli remained virtually unexplored by lichenologists, with the exception of a few, rather unrelevant records contained in the flora of Jatta (1909-11) and in some papers of Cengia-Sambo.

A more systematic study of the lichen flora of the whole region started in the last ten years, mostly by researchers of the University of Trieste. Several lichenological papers have been published, among which the floristic lists of Nimis & Loi (1982, 1983, 1984) Clerc (1983), Castello & al. (1991), the vegetational studies by Nimis & De Faveri (1981) and Nimis (1981, 1982b), a phytogeographical study on the lichens of the Karst (Nimis & Losi, 1984) and two papers on the epiphytic lichens of the towns of Trieste (Nimis 1985a) and Udine (Nimis 1986). A few lichens are also reported by Codogno & al. (1985) from the Julian Alps. Finally, Tretiach & Nimis (1988) studied the distribution of *Normandina pulchella* within the Region (with a distribution map).

During numerous field studies carried out in the Friuli-Venezia Giulia region, the researchers of the University of Trieste collected several thousands specimens, now preserved in the Herbarium Universitatis Tergestinae (TSB, Herb. P.L. Nimis). Many of these specimens belong to species not previously reported from this region. The most interesting records are listed in this work, as a further contribution to the knowledge of the lichen floristics of the region.

Survey area

The survey area corresponds with the administrative region of Friuli - Venezia Giulia, and to the orographic left bank of the Piave Valley. This area has been divided in six geographically homogeneous districts: Carnic Alps, Julian Alps, Carnic pre-Alps, Julian pre-Alps, Friulian Plain and Karst (Fig. 1). In the following, a brief description of their main features are given.

Carnic Alps: The main substrata are calcareous and dolomitic rocks, with the exception of the inner Carnic Alps, where a wide variety of siliceous rocks occurs. The elevation ranges from ca. 300 to 2780 m (M. Coglians); the vegetation varies from broad-leaved woods to alpine meadows, particularly well-developed on acid soils; natural spruce stands are rare due to the suboceanic climate.

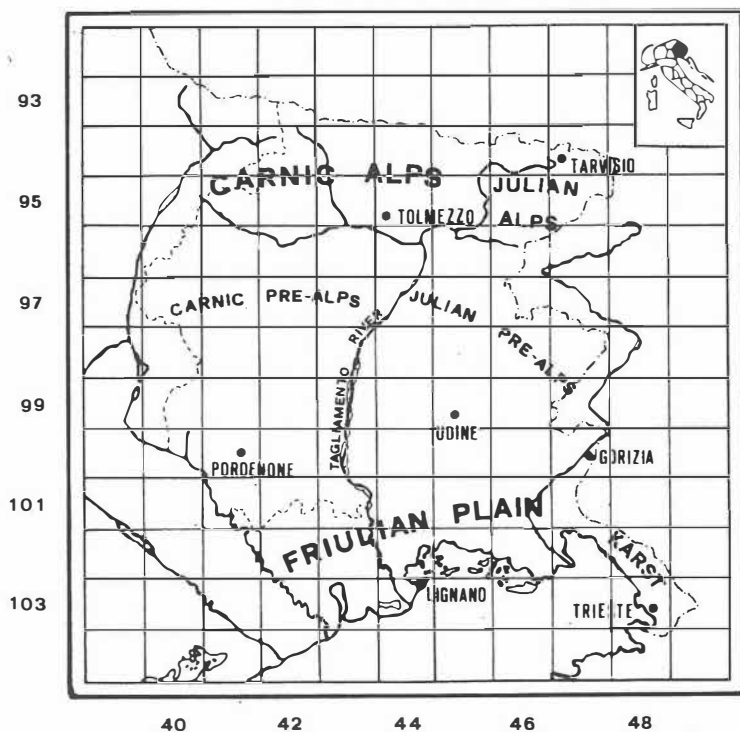


Fig. 1.- Map of the Friuli - Venezia Giulia region, with the subdivision in basic areas according to the Project of Floristic Cartography of Central Europe.

Carnic pre-Alps: this district is formed by calcareous mountains (max. elevation: 2703 m, Cima dei Preti), which host extensive beech woods; in the inner district, open *Pinus sylvestris* stands are frequent on the dry, south exposed sides of the valleys. The human impact in this district is very low.

Friulian plain: this is the largest district of the region and hosts more than 60 % of the total population. The climax vegetation, formed by *Carpinus* and *Quercus* woodlands, has been almost completely destroyed, and survives only in small fragments in protected areas. Agriculture is particularly well-developed, and industrial areas are scattered throughout the district.

Julian Alps: The main substrata are calcareous rocks, except in the area of M. Mangart (dolomitic rocks), and small outcrops of porphyric rocks. The elevation ranges from 300 to 2753 m (Jôf di Montasio). The vegetation of this district is similar to that of the Carnic Alps, but in the area of the Fusine Lakes, characterized by a rather continental climate, well-developed, typical spruce forests are present.

Julian pre-Alps: also this district is mainly occupied by calcareous mountains (max. elevation: 1959 m, M. Pláuris), and by eocenic hills, consisting of more or less calciferous sandstone. In the Julian pre-Alps there are the highest precipitations of Italy, with an average of more than 3000 mm of rainfall per year (M. Musi, see Gentilli, 1964). The forest vegetation is formed by mixed oak woods in the lowlands, hygrophytic woods of *Fraxinus excelsior*, *Ostrya carpinifolia* and *Tilia*, and beech forest in the montane belt. The human impact is rather low.

Karst: this district has a small extension and a rather narrow altitudinal range, from sea level to ca. 450 m; it corresponds almost completely to the Province of Trieste; a small portion belongs to Slovenia and to the Province of Gorizia. The Karst Region is characterized by impressive karstic phenomena and hosts a peculiar, mainly eastern flora. Young woods of *Ostrya carpinifolia* and *Quercus pubescens* cover the Karst plateau, intermingled with *Pinus nigra* plantations; small fragments of Mediterranean maquis, with *Quercus ilex* and *Phillyrea latifolia*, are present along the calcareous coasts. A narrow, discontinuous belt of sandstone is present in the coastal area. Rainfall is around 1200 mm per year.

Data and Methods

The following floristic list is based on ca. 800 samples preserved in the Herbarium Universitatis Tergestinae (TSB), Herb. P.L. Nimis. For each species, a brief comment on its ecology, distribution and taxonomy is reported, and for each sample the locality, altitude, substratum, date of collection, collector name (abbreviations as follows: N, Nimis; T, Treiach) and data bank number are given. Different symbols are used for records new to the Karst (), to Friuli () or to Italy (). The nomenclature follows Nimis (1993).

Floristic list

Acarospora badiofusca (Nyl.) Th. Fr.

Carnic Alps: - M. Tenchia (UD), 1950 m, on siliceous rock, 26.06.1988, leg. Bersan (12813). - M. Crostis (UD), 1850 m, on sandstone, 08.1986, leg. N & T (9955). - Lateis (UD), above C.ra Novarzutta, c. 1730 m, on sandstone, 28.09.1988, leg. N & T (10944).

A widespread circumboreal species, which is known only from a few localities in the Italian Alps (South Tyrol, Lombardy), and the northern Apennines, and from Sardinia. It is fairly common in the Carnic Alps, on sandstone; some specimens can be included in the ssp. *badiorubra* Clauz. & Roux, differing in having brownish apothecia.

Acarospora fuscata (Nyl.) Arnold

Carnic Alps: - M. Tenchia (UD), 1950 m, on siliceous rock, 26.06.1989, leg. Bersan (12814).

Karst: - M. Radio, 130 m, on sandstone, 15.06.1985, leg. N (5780).

A widespread silicicolous species, which is locally common throughout Italy, but was not previously recorded from Friuli. Glowacki (1874) already reported it from the Karst area.

Acarospora gallica Magnusson

Karst: - Between S. Croce and Filtri di Aurisina (TS), on sandstone, c. 30 m, 06.1988, leg. T (10536). - Trieste, M. Valerio, on sandstone, c. 150 m, 11.11.1982, leg. N (2902).

This species has been reported from scattered localities throughout central Europe, and is also known from Macaronesia. It occurs on base-rich or calciferous siliceous rocks, often also on walls. It seems to be fairly frequent on sandstone walls near Trieste.

Acarospora macrospora (Hepp) Bagl.

Carnic Alps: - Casera Razzo (BL), 1750 m, on limestone, 06.08.1986, leg. N (7785). - Passo Pramollo, 1600 m, on limestone, 25.11.1983, leg. Palma (3831).

A species with a holarctic distribution, occurring on steeply inclined surfaces of calcareous rocks. It is known from several stations throughout Italy, but it was not previously recorded from Friuli.

Acarospora modenensis Magnusson

Karst: - Between S. Croce and Filtri di Aurisina (TS), 3 m, on sandstone, south exp., 06.1988, leg. T (10529).

The type material of this rather poorly-known, but well-distinguished species, is on sandstone. For Italy this lichen was only known from Emilia, Liguria and Sardinia. Our specimen is well-developed, and was collected on decalcified sandstone, near the seashore; it corresponds well with the description, and with several collections from Sardinia (TSB).

Acarospora murorum Massal.

Karst: - Contovello (TS), c. 180 m, on sandstone, south-east exp., near the ground, 01.01.1989, leg. T (10950).

Clauzade & Roux (1985) consider this taxon as a subspecies of *A. macrospora*; it has a mainly submediterranean distribution, and it often occurs on walls; owing to the very different ecology and distribution I prefer to maintain it at species rank. It is not common near Trieste, on sandstone walls.

Acrocordia cavata (Ach.) R.C. Harris

Julian pre-Alps: - Valli del Natisone, Stregna (UD), on *Juglans*, c. 500- 600 m, 08.1981, leg. N, rev. T (2754).

A. cavata has been certainly overlooked in the survey area, as elsewhere; for Italy it was known only from Sardinia and Calabria; it might have been confused

with the similar *A. gemmata*, differing in the larger spores and the bigger perithecia.

***Acrocordia conoidea* f. *carnea* Arnold**

Karst: - Gropada (Basovizza, TS), c. 360 m, on limestone, in a doline, 17.11.1992, leg. T (16646). - Gropada (TS), c. 380 m, on limestone, in a doline, 15.01.1993, leg. T (16652).

This form of *Acrocordia conoidea* is characterized by more or less immersed, light pink perithecia, and an endolithic, whitish thallus; these characters allow an easy distinction from *A. conoidea* s. str. (see Keissler 1937). Typical, black perithecia are intermingled with pink perithecia in a small fragment of the sample 16652. A careful anatomical examination showed that the perithecia in the f. *carnea* have the same structure of the lower part of the perithecia in the f. *typica*, suggesting that the former lacks the black pigments; moreover, the two forms cannot be distinguished on the basis of spore or ascoma dimensions. *A. conoidea* f. *carnea* has been collected only twice, on hard limestone, in exposed positions, but probably it is more frequent.

***Acrocordia gemmata* (Ach.) Massal.**

Julian Alps: - Laghi di Fusine (UD), on *Abies alba*, 960 m, 30.09.1986, leg. N (7907). *Julian pre-Alps*: - Val di Resia, Borgo Lischiazze (UD), on *Fraxinus excelsior*, 550 m, 27.09.1987, leg. N & T.

Karst: - Gropada (TS), on *Q. pubescens*, c. 400 m, 06.03.1990, leg. T (13726). - Dolina di Percedol (TS), epiphytic (*Fraxinus?*), 01.03.1983, leg. Loi & N (3260). - Aurisina (TS), on *Q. pubescens*, c. 200 m, 05.03.1987, leg. N & T (8383). - Slivia (TS), near the large dolina towards Visogliano, on *Quercus*, 06.1991, leg. T (15975).

This widespread species is rather common in the inner part of the Karst plateau, growing mainly on the bark of ancient *Quercus petraea*, and is often associated with *Bacidia rubella*. It is new to Friuli.

***Agonimia tristicula* (Nyl.) Zahlbr.**

Carnic Alps: - Casera Razzo (BL), 1700 m, on epilithic mosses, 07.08.1986, leg. N, rev. T (7820).

Karst: - Bristie (Sgonico, TS), on epilithic mosses, c. 180 m, 20.01.1989, leg. T (11310).

In Italy this species is known only from South Tyrol, Sardinia, Calabria and the Karst. It grows on plant remains and mosses over calcareous substrata, much more rarely on bark at the base of the trunks. It has been certainly overlooked in the other districts of the region; the specimen from the Karst is very poorly developed.

***Alectoria nigricans* (Ach.) Nyl.**

Carnic Alps: - Passo Volaja, 2000 m, on soil, on calcareous, wind-swept ridge, 07.08.1981, leg. De Faveri & N (1970).

A circumboreal, bipolar, arctic-alpine species which is certainly much more widespread along the Italian Alps than the few records (South Tyrol, Piedmont, Aosta Valley) might suggest. New to the Carnic Alps.

Alectoria ochroleuca (Hoffm.) Massal.

Carnic Alps: - Piz di Mede, 2000 m, on soil, on wind-swept ridge, 09.08.1986, leg. N (7726). - M. Paularo, 2000 m, on soil, on wind-swept ridge, in *Loiseleurieto- Cetrarietum*, 16.08.1981, leg. N (1711). - M. Dimon, 1900 m, on soil, on wind-swept ridge, 10.08.1983, leg. N (3377). - M. Paularo, 2040 m, on soil amongst bryophytes, 28.09.1990, leg. T & Castello (14670). *Julian Alps*: M. Canin, 2000 m, on soil, on wind-swept ridge, 07.1980, leg. De Faveri & N (1353).

This species, which ecologically resembles *A. nigricans*, is certainly much more common than the latter in the Alps, and is locally abundant on wind-exposed ridges in the inner siliceous Carnic Alps.

Amandinea punctata (Hoffm.) Coppins & Scheidegger ad int.

Karst: - Rupingrande, 400 m, on *Ulmus*, 25.10.1982, leg. N (2839).

This is a common, and probably non-homogeneous species with a broad ecological range, which was not previously reported from the survey area.

Arthonia cinereopruinosa Schaerer

Carnic Alps: - Lago di Sauris (UD), Bosco Flobia, c. 1040 m, at the base of *Abies alba*, 28.09.1988, leg. N (10863).

This epiphytic species has probably a holarctic distribution; it is not common in Europe, but it was recorded from Scandinavia to the Mediterranean mountains. Our collection is from a very humid forest. The species is new to Friuli, where it is certainly very rare.

Arthonia cinnabarina (DC.) Wallr.

Carnic pre-Alps: - Forra di Battei (PN), epiphytic, 1982, leg. Loi (3008). *Julian pre-Alps*: Debellis (UD), 350 m, on *Fraxinus excelsior*, 26.06.1985, leg. N (5867).

This epiphytic lichen has a broad total distribution. There are several records from Italy, but the species appears to be strongly declining in the north. In Friuli it is certainly very rare, and is restricted to the more humid districts of the pre-Alps, mostly in gorges and near rivers at low altitudes.

Arthonia exilis (Flörke) Anzi

Julian Alps: - Valbruna (UD), 1000 m, on bark, 20.11.1982, leg. N (2919). - Valle del Fella, near Valbruna (UD), 1000 m, on *Sambucus*, 20.11.1982, leg. N (5181).

A chiefly central European epiphytic species, also known from North America, which in Italy has been recorded from the central and eastern Alps, and from Sardinia. According to Coppins (1989) the species, as currently understood, is probably heterogeneous. Our specimens are poorly-developed, and can be attributed only to *A. exilis* s. lat.

Arthonia fuliginosa (Turner & Borrer) Flotow

Carnic Alps: - Lago di Sauris, Bosco della Stua, above Rio Storto, 1040 m, on *Abies alba*, 26.09.1990, N & T (15073).

This is a rare epiphytic lichen, reported only from a few localities in central and western Europe; for Italy it was known only from South Tyrol. From the

Carnic Alps there is a very abundant collection taken in a single locality; the site, a gorge in the north-exposed side of the Lake of Sauris, is very humid, and hosts a very interesting flora with several oceanic species.

Arthonia varians (Davies) Nyl.

Carnic Alps: - M. Tenchia (UD), 1400 m, on *Lecanora rupicola*, 12.06.1988, leg. Bersan (10452).

A parasitic species, growing in the apothecia of *Lecanora rupicola* s. lat. It is common throughout Italy, especially in the mountains, but it was never recorded from Friuli.

Arthonia vinosa Leighton

Julian Alps: - Foresta di Tarvisio, near Valbruna (UD), 950 m, on bark, 20.11.1982, leg. N, rev. T (3017).

A suboceanic species known only from Europe. For Italy it has been reported from several scattered localities, from South Tyrol to Calabria.

Arthopyrenia microspila Körber

Carnic Alps: - Clendis (Ampezzo, UD), 750 m, on *Graphis scripta*, on *Fagus*, 05.09.1985, leg. N (6442). - Passo Pura, Bosco della Stua, 1100 m, on *Graphis scripta*, on *Alnus*, 11.09.1987, leg. N & T (9739).

The systematic position of this taxon is still uncertain. According to Hawksworth (1983), it should belong to *Stigmidium*, but according to Coppins (1988) it belongs to *Arthopyrenia* s.str. The spores are colourless when young, but pale brown at maturity. Also the number of septa is variable, from 1 to 3. It is a parasitic fungus which has been certainly overlooked; in TSB I have found only two samples of *Graphis scripta* with well-developed thalli of the parasite, on a total of c. 30 samples. This is the second record from Italy.

Arthroraphis citrinella (Ach.) Poelt

Carnic Alps: - M. Tiarfin, 2200 m, on soil, 20.09.1981, leg. Loi & N (2035). - M. Tiarfin, 2100 m, on *Baeomyces*, 20.09.1981, leg. Loi & N (3036). - M. Paularo, on soil, 2040 m, 28.09.1990, leg. Castello & T, ref. W. Obermayer (15870).

A bipolar, arctic-alpine species of acid humus; it is widespread throughout the Alps, but it was not previously recorded from Friuli.

Aspicilia alphoplaca (Wahlenb.) Leuckert & Poelt

Carnic Alps: - Lateis (UD), above C.ra Novarzutta, c. 1730 m, on sandstone, 28.09.1988, leg. N & T (10856). - M. Novarza (UD), 1500 m, on sandstone, 09.1989, leg. N (14118).

A species with a very wide, disjunct distribution in several continents, occurring on base-rich siliceous rocks. It is widespread throughout the Alps and in the Mediterranean mountains. New to Friuli.

Aspicilia caesiocinerea (Nyl. ex Malbr.) Arnold

Carnic Alps: - M. Pieltinis, 1600 m, on sandstone, 08.1981, leg. N (2251). - Lateis (UD), C.ra Novarzutta, c. 1730 m, on sandstone, 28.09.1988, leg. T (10889). - M. Novarza, 1870 m, on sandstone,

11.09.1984, leg. N (4498). - Passo di M. Croce Carnico, 1300 m, on sandstone, leg. N (2879). - M. Novarza, 1700 m, on sandstone, 11.09.1984, leg. N (4555).

This species belongs to a complex of several closely related taxa, which is still in need of a revision. *A. caesiocinerea* s.lat. is common throughout Italy, both in the lowlands of the south and in the Alps; the identity of the lowland populations with the Alpine ones is uncertain.

Aspicilia intermutans (Nyl.) Arnold

Karst: - Contovello (TS), 230 m, on sandstone, 18.05.1988, leg. T (10936). - Contovello (TS), on sandstone, c. 160 m, 26.12.1988, leg. T (10967).

This is *A. intermutans* in the sense of Esnault (1985); it is common especially in Mediterranean Italy; it is very rare in the Trieste Province, where it was collected only on south-exposed sandstone rocks with a decalcified surface, near the coast.

Aspicilia moenium (Vainio) Thor et Timdal

Carnic Alps: - Passo Pura (UD), 1420 m, on cement wall, 07.1988, leg. N & Timdal (10560).

This species has been certainly overlooked due to its poorly-developed thallus; it seems to prefer cement walls, in poorly-euthrophiated sites. New to Italy.

Aspicilia parasitica B. de Lesd.

Carnic Alps: - M. Paularo, near the lake, parasitic on *Caloplaca chlorina*, on siliceous rock, c. 1900 m, 29.09.1990, leg. T (15416).

The distinction of this taxon from *A. radiosa* has been questioned by some authors (e.g. Clauzade & Roux 1985). I think that its chemistry and the parasitic habit could justify a separation at species rank. The identification is not certain, due to the small dimensions of the specimen, which, however, agrees well with abundant collections from Sardinia. New to Friuli.

Bacidia arceutina (Ach.) Arnold

Friulian Plain: - Tarcento (UD), 300 m, on *Carpinus*, 10.1978, leg. N (2900). - Tarcento (UD), 300 m, on *Fraxinus ornus*, 26.12.1982, leg. N (3101).

A central European-submediterranean, perhaps rather suboceanic species occurring on subneutral, mostly smooth bark. It is known from a few localities throughout Italy and is new to Friuli.

Bacidia bagliettoana (Massal. & de Not.) Jatta

Carnic Alps: - Passo Volaja, near the refuge, 1950 m, on mosses and plant remains, on calcareous substratum, 19.01.1990, leg. Bersan (14081). - M. Paularo (UD), 1900 m, on mosses, 10.08.1983, leg. N (3370). *Julian Alps*: - Upland between M. Cergnala and M. Lopa, c. 2100 m, on mosses, 26.09.1982, leg. Gerdol (3111).

A widespread species, from the boreal zone to the Mediterranean mountains, which is frequent in the alpine belt, on epilithic mosses and plant remains. New to Friuli.

Bacidia beckhausii Körber

Carnic Alps: - Passo Pura (UD), 1440, on *Fagus*, 09.08.1981, leg. N, rev. T (1800).

An epiphytic species occurring in humid woodlands, reported from several Italian region. New to the eastern Alps.

Bacidia friesiana (Hepp) Körber

Friulian Plain: - Tarcento (UD), 300 m, on *Sambucus*, 26.12.1982, leg. N (3093). - Faedis (UD), 200 m, on *Sambucus*, 04.1979, leg. N (3096). *Julian pre-Alps*: - Valli del Natisone, Cepletischis, 700 m, on *Sambucus*, 28.12.1982, leg. N (3053).

A species of eutrophic bark, which seems to be rather frequent in the lowlands and hills of Friuli, especially on *Sambucus*. New to the survey area.

Bacidia herbarum (Stizenb.) Arnold

Carnic Alps: - M. Tiarfin, 2100 m, on mosses, 20.09.1981, leg. Loi & N (2010).

A mainly boreal-montane species occurring also in the Mediterranean mountains, growing on plant remains. There are a few earlier records from the Italian Alps, and from Tuscany. New to Friuli.

Bacidia laurocerasi (Duby) Vainio

Carnic Alps: - Lago di Sauris (UD), Bosco della Stua, 1100 m, 15.09.1985, leg. N (6460). *Friulian Plain*: - Usago (PN), 300 m, on *Fraxinus*, 02.1985, leg. Loi (5330). - Zomeais (Tarcento, UD), on *Carpinus*, 26.12.1983, leg. N (3890). - Tarcento (UD), 300 m, on *Fraxinus ornus*, 26.12.1982, leg. N (3098).

This epiphytic species has an almost worldwide distribution in humid regions. It is certainly rare in Italy, especially in the north, and is not common in Friuli, from the hills to the montane belt. Some of our samples have a K + violet epithecium.

Bacidia naegelii (Hepp) Zahlbr.

Friulian Plain: - S. Vito al Tagliamento, 30 m, on *Populus*, 18.06.1986, leg. Loi (7535). - Udine, S. Gottardo, on *Populus*, 11.01.1983, leg. N (3079). - Feletto Umberto (UD), 120 m, on *Populus*, 11.01.1983, leg. N (3076).

A widespread species of eutrophic bark, known from several localities throughout Italy, but never previously recorded from Friuli. It is easily distinguished in the field for the lighter-coloured apothecial margin.

Bacidia subincompta (Nyl.) Arnold

Carnic Alps: Passo Pura (UD), 1400 m, on *Fagus*, 07.1981, leg. N, rev. T (2228).

A boreal-temperate species in Europe, occurring on bark in humid situations and characterized a granular thallus and bacilliform ascospores. It is certainly very rare in the survey area, where it grows on trunks of mature trees; this is the only recent record from northern Italy.

Bacidia trachona (Ach.) Lettau

Friulian Plain: - Usago (PN), 300 m, on limestone, 02.1985, leg. Loi. *Carnic pre-Alps*: - Travesio (PN), 250 m, on shaded calcareous rocks, 29.11.1984, leg. Loi (4990).

A species of calciferous rocks in shaded and humid situations; for Italy it was hitherto known from South Tyrol, the Karst (Glowacki 1874), Sardinia, Campania and Sicily. New to Friuli.

Baeomyces placophyllus Ach.

Carnic Alps: - M. Paularo (UD), terricolous, c. 1950 m, 28.09.1990, leg. T (14771).

This is a circumboreal species of acid soil, hitherto known, for Italy, only from the central Alps. In the Carnic Alps it is very rare in Alpine meadows on acidic soils, mainly occurring in small carpets of *Juncus trifidus*.

Baeomyces rufus (Hudson) Rebert.

Carnic Alps: - High Pesarina valley, near the bridge, on sandstone, 24.08.1987, leg. Bersan (9697). - Lago di Sauris, Bosco della Stua, along the road, 1250 m, 07.08.1986, leg. N (7781). - M. Tiarfin, 2100 m, on mosses and sandy soil, 09.1982, leg. N (2631). - M. Tenchia, 1800 m, on soil, 26.06.1988, leg. Bersan (10917). - M. Tiarfin, 2100 m, on soil, 20.09.1981, leg. Loi & N (2023). *Julian Alps*: - M. Florianca, 1610 m, on soil, 20.07.1991, leg. T (15240). *Julian pre-Alps*: Villanova delle Grotte, 700 m, on soil, with *Calluna*, 26.06.1985, leg. N (5861). - M. Matajur, near the Rif. Pelizzo, 1320 m, on soil, 28.12.1982, leg. N (3047). - Near Monteperta (Taipana, UD), 400 m, on soil, on acid soil, 26.06.1985, leg. N (5862).

A circumboreal species, rather common on acidic soil in the montane and subalpine belts, which grows also directly on sandstone or base-rich rocks. Many specimens have well-developed soralia and/or schizidia.

Bellemeria alpina (Sommerf.) Clauz. & Roux

Carnic Alps: - M. Crostis, 1950 m, on siliceous rock, 05.09.1982, leg. N (3586). - M. Paularo, 2000 m, on siliceous, vertical face, 10.08.1983, leg. N (3391). - M. Chiadin, 1900 m, on sandstone, 13.11.1983, leg. Palma (3804).

A species with an arctic-alpine distribution, which in Italy is restricted to the Alps. New to Friuli.

Biatora pullata Norman

Carnic Alps: - Lago di Sauris, Lateis (UD), road to C.ra Novarzutta, c. 1350 m, on *Larix*, 13.09.1991, leg. T (15374). *Julian Alps*: - M. Florianca, slope W, 1590 m, on *Larix*, 20.07.1991, leg. T (15970).

L. pullata is widespread in the boreal zone and in montane regions, growing on the bark of different conifers, but more frequently on *Larix*, in communities of the *Parmeliopsidetum ambiguae*. It has been certainly overlooked in the past, being most often sterile. This species was previously cited by Clerc (1983) from the Carnic Alps. New to the Julian Alps.

Biatorella hemisphaerica Anzi

Carnic Alps: - Passo Volaia (UD), on terricolous mosses at the base of a calcareous boulder, c. 1600 m, 28.09.1990, leg. T & Castello (14753).

A circumboreal species of calciferous substrata which, in the Alps, reaches the alpine belt. New to Friuli.

Brodoa intestiniformis (Vill.) Goward

Carnic Alps: - Piz di Mede, 1900 m, on siliceous rock, 08.1986, leg. T (9729). - Piz di Mede, 1900 m, on sandstone, 09.08.1986, leg. N (7689). - Passo Pramollo, M. Carnizza, 1620 m, on conglomeratic rock, 29.05.1989, leg. Bersan & Codogno (12337). - M. Paularo, 2000 m, on siliceous rock, 29.09.1991, leg. T (15939). - M. Paularo, 2000 m, on siliceous rock, 16.08.1981, leg. N (1714). - M. Crostis, 2000 m, on siliceous rock, 05.09.1983, leg. N (3485).

This species is rather common in the Alps, from the subalpine to the alpine belt, but was not previously reported from the study area. The specimen 15939 has an upper cortex that is green-grey, not grey as usual, but the reactions of the medulla are the same as in the other specimens.

Buellia griseovirens (Sm.) Almb.

Karst: - Basovizza, 500 m, on *Fraxinus ornus*, 09.1981, leg. N (2250).

B. griseovirens is a widespread species which prefers the smooth bark of deciduous trees; certainly overlooked in the past, being almost always sterile, it is not uncommon in the survey area.

Buellia insignis (Hepp) Th. Fr.

Carnic Alps: - M. Paularo, 1800 m, on mosses, 16.08.1981, leg. N (3598). *Julian Alps*: - M. Lopa, 2300 m, on mosses, 09.08.1983, leg. N (3397).

An arctic-alpine species which grows on plant remains and mosses. The distinction towards *B. geophila* is based on the number of spore septa. In old apothecia I observed a few triseptate, deformed spores also in *B. insignis*.

Buellia erubescens Arnold

Carnic Alps: - C.re Razzo, 1700 m, on a stump, 16.09.1985, leg. N (6491). - M. Tinisa, 1700 m, on *Larix*, 07.08.1986, leg. N (7814). - Collina di Forni Avoltri, 1500 m, on *Larix*, 08.1981, leg. N (2199).

The identity of our samples seems to be unclear: our collections seem to differ in the thallus development and pigmentation, but the anatomy of the apothecia and the spore size are the same.

Calicium lenticulare Ach.

Carnic Alps: - M. Pieltinis, on marcescent coppice, in *Abieti-Fagetum*, 20.09.1981, leg. N, rev. Puntillo (5970). - High Pesarina Valley, 1100 m, on coppice, 03.09.1983, leg. N, rev. Puntillo (3682).

A rather rare species, with a scattered distribution in Europe. It grows mainly on decaying wood of conifers. Previously cited by Clerc (1984) from the surroundings of the Sauris lake.

Caloplaca adriatica (Zahlbr.) Servit

Karst: - M. Stena, 280 m, on limestone, 28.04.1985, leg. Poelt & N (5572). - M. Lanaro, 550 m, on limestone, 09.10.1985, leg. N (6555). - Lago di Doberdò, M. Castellazzo, 150 m, on limestone, south exp., 15.02.1989, leg. T (11674).

This is a characteristic species of steeply inclined, sunny calcareous surfaces of the Mediterranean and submediterranean areas of southern Europe. From

Italy it was previously reported only from Sardinia, but in the survey area it is not uncommon.

Caloplaca ammiospila (Wahlenb.) H. Olivier

Carnic Alps: - M. Brutto Passo (UD), on plant remains on soil, 1950 m, 16.09.1985, leg. N (6470). - M. Paularo (UD), on mosses on soil, 2000 m, 16.08.1981, leg. N (1717). - Passo Volaja, on plant remains, 1850 m, 08.08.1979, leg. N (819). - M. Dimon (UD), on mosses, 1900 m, 10.08.1983, leg. N (3378). - Passo Volaja, on mosses and plant remains, 1900 m, 07.08.1981, leg. N (1882).

C. ammiospila has an arctic-alpine distribution, and was rarely reported from Italy (South Tyrol, Lombardy). In the Carnic district it is rather common on plant remains and dead mosses, mainly on acidic soils in the Alpine belt.

Caloplaca arenaria (Pers.) Müll. Arg.

Carnic Alps: - M. Novarza, c. 1400 m, on sandstone, leg. T (14177).

Karst: - M. Radio, 130 m, on sandstone, 15.06.1985, leg. N (5806). - Contovello, 180 m, on sandstone, 26.12.1988, leg. T (10947). - Near Prosecco, c. 270 m, on calciferous rocks, 03.08.1991, leg. Bolognini, Castello, N & T (15313). - Near Altura, c. 250 m, on sandstone, 02.1987, leg. Palma (8060).

According to Poelt (in litt.) *C. arenaria* s.str. is limited to upland areas, and specimens collected at lower altitudes should be segregated into a different taxon. The specimens collected in the Karst area have a well-developed thallus, and could be referred to *C. spotornensis* B. de Lesd., a very poorly-known taxon itself, whose type material I have not examined.

Caloplaca areolata (Zahlbr.) Clauz.

Karst: - Val Rosandra (TS), on limestone, 160 m, 14.12.1981, leg. Loi & N (2316). - Sistiana (TS), on limestone, 230 m, 31.05.1985, leg. N (5764). - M. Grisa (TS), on limestone, 250 m, 10.06.1985, leg. N (5741). - Conconello (TS), on limestone, 280 m, 15.10.1985, leg. N (6606). - M. Stena (TS), on limestone, c. 270 m, 08.06.1988, leg. N (10624).

This is the first report of this species from Italy; the species is frequent on the top of sunny isolated calcareous boulders, in the coastal Karst area, and is mostly parasitic on other crustose lichens, mainly *Aspicilia calcarea*.

Caloplaca aurantia (Pers.) Steiner

Friulian Plain: - Maniago (PN), 280 m, on calciferous rock, 26.06.1985, leg. Loi (5931). - Lestans, on calciferous rock, 02.1984, leg. Loi (5349).

One of the most common lichens of calcareous substrata, rarely reported from Friuli.

Caloplaca aurea (Schaerer) Zahlbr.

Carnic Alps: - M. Coglians, above Rif. Marinelli, 2200 m, on calcareous soil, 13.11.1983, leg. Palma (3826). *Julian Alps*: - M. Cacciatore, 2060 m, on calcareous soil, 02.08.1981, leg. Lausi (5087). - M. Canin, 1800 m, in fissures of calcareous rock, on soil, 10.08.1979, leg. N (798). - M. Lopa, in fissures of calcareous rock, on soil, 2000 m, 10.08.1981, leg. De Faveri & N (1784).

This terricolous species is widespread in the mountains of southern Europe, where it is confined to the Alpine belt. On the basis of some anatomical characters of the thallus, it could be referred to the genus *Fulgensia* (see also

Kärnefelt 1989), but the spore development is that typical of *Caloplaca* (Poelt 1965). New to Friuli.

***Caloplaca biatorina* (Massal.) Steiner**

Carnic Alps: - Passo Volaja (UD), 2000 m, on dolomite, 07.08.1981, leg. De Faveri & N (1960). *Julian Alps*: - Jof Fuart, 2500 m, on limestone, 21.08.1983, leg. Visintin (3425).

This species is generally calcicolous, and is widespread in upland areas of southern Europe. New to Friuli.

***Caloplaca cerina* v. *muscorum* (Massal.) Jatta**

Carnic Alps: - Piz di Mede, 1850 m, on epilithic mosses (calcareous sandstone), 09.08.1986, leg. N (7741).

This taxon is quite rare in the survey area, contrary to the v. *chloroleuca* (= *C. stillicidiorum*), which is fairly common on calcareous mosses in the montane district.

***Caloplaca chrysodeta* (Räsänen) Dombr.**

Carnic Alps: - Clendis (UD), 750 m, on limestone, in beech forest, 05.09.1985, leg. N (6447). *Julian pre-Alps*: M. Glemina, on limestone, 580 m, 25.09.1986, leg. N (7944). - Sorgenti del Torre near Musi, 500 m, on shaded calcareous rocks, 26.06.1985, leg. N (5842).

C. chrysodeta is distributed in the submediterranean areas of Europe. In Italy it has been reported only from Emilia, Latium and Calabria, but it is certainly more common. In the Karst it is frequent in many dolinas, on overhanging, shaded calcareous faces.

***Caloplaca cirrochroa* (Ach.) Th. Fr.**

Friulian Plain: - Ciseriis di Tarcento, 350 m, on limestone, 05.11.1982, leg. N (2998). - Toppo (PN), 230 m, on limestone, 28.05.1985, leg. Loi (5616). *Carnic pre-Alps*: Claut (PN), 700 m, on limestone, 05.1983, leg. Loi (3297). - Cimolais, 650 m, on limestone, 25.08.1985, leg. Loi (6409). *Julian pre-Alps*: - M. Matajur, 1300 m, on limestone, leg. Loi & N (1487). - M. Glemina, 800 m, on limestone, leg. De Faveri & N (1486). - Alta Val del Torre, Musi (UD), 630 m, on calcareous wall, leg. Castello, Gasparo & T (12964).

Karst: - Dolina near Borgo Grotta Gigante (TS), 300 m, on calcareous boulders, 18.03.1990, leg. N (13786). - Sistiana (TS), 100 m, on vertical calcareous face, 31.05.1985, leg. N (5684). - M. Radio (TS), 150 m, on limestone in shadow, 15.06.1985, leg. N (5779). - Val Rosandra, 200 m, on calcareous face, 03.04.1978, leg. N (565). - Redipuglia (GO), 40 m, on limestone, 07.07.1985, leg. N (5944).

This rather common species of submediterranean regions is found on half-shaded calcareous rocks. In Italy it is widespread, but it was not previously reported from Friuli.

***Caloplaca coccinea* (Müll. Arg.) Poelt**

Julian Alps: - M. Lopa (UD), on limestone, 2250 m, 10.08.1981, leg. De Faveri & N (1785). - M. Montasio (UD), on limestone, 2500 m, 08.1981, leg. N (2202).

This is an alpine species with a scattered distribution in the calcareous mountains of southern Europe (Carpathians, Balkan mountains, Alps). In Italy it

was previously known only from South Tyrol, Lombardy and Emilia; in the survey area it is certainly rather common, mainly in the subalpine belt.

Caloplaca crenularia (With.) Laundon

Carnic Alps: - M. Pieltinis, 1800 m, on sandstone 20.09.198, leg. Loi & N (2050). - Casera Razzo (BL), 1750 m, on schist, 13.07.1981, leg. Fragiaco & N (1678).

Karst: - Contovello (TS), 200 m, on sandstone, 04.1988, leg. T (10477). - M. Valerio, 130 m, on sandstone, 13.06.1985, leg. N (5772).

This taxon is certainly heterogeneous, and needs a revision. Our material corresponds well with samples from Mediterranean Italy.

Caloplaca ferrarii (Bagl.) Jatta

Carnic Alps: - Piz di Mede, c. 1800 m, on cement wall, 09.08.1986, leg. N (8329). - High Pesarina valley, 1650 m, on cement wall, 03.09.1983, leg. N (3576). - M. Crostis, 1800 m, on cement wall, 05.09.1983, leg. N (3532). *Julian pre-Alps*: - M. Bernadia, 500 m, on limestone, 26.06.1985, leg. N (5921). - Castelmonte (UD), 05.06.1981, leg. De Faveri & N (1514).

The delimitation of this taxon from *C. lactea* is not clear to me; the main differences are size of the apothecia and of the spores; it seems to prefer limestone and other calciferous substrata, but also *C. lactea* is often found in the same habitats, and the separation is not always easy.

Caloplaca flavovirescens (Wulfen) Dalla Torre & Sarnth.

Carnic Alps: - Ligosullo, 1000 m, on cement wall, 16.08.1981, leg. N (1853). *Friulian Plain*: - Stella (UD), 600 m, on cement wall, 26.12.1983, leg. N (3892). *Julian pre-Alps*: - Debellis (UD), 300 m, on cement wall, 26.06.1985, leg. N (5883). - Towards Castelmonte, 600 m, on sandstone, leg. De Faveri & N (1619).

Karst: Contovello (TS), 200 m, on sandstone wall, 04.1988, leg. T (10478). - Altura, c. 100 m, on sandstone, 07.03.1988, leg. N (10100). - Prebenico (TS), 210 m, on sandstone wall, 07.10.1985, leg. N (6522). - Val Rosandra (TS), 110 m, on sandstone wall, 14.12.1981, leg. Loi & N (2299). - Ceroglie (TS), 150 m, on limestone, 16.05.1984, leg. N (4142). - Between S. Croce and Filtri di Aurisina (TS), c. 120 m, on sandstone wall, south exp., 23.05.1988, leg. T (10587).

This is a fairly common species throughout the survey area, with optimum on base-rich siliceous rocks, mainly sandstone boulders; it often occurs on walls as well. The pigmentation of the thallus is quite variable, mainly depending on the exposure to sunlight.

Caloplaca inconnexa (Nyl.) Zahlbr.

Carnic Alps: - M. Tiarfin, 1400 m, on limestone, 08.1981, leg. N (2255).

Karst: - M. Stena (TS), 270 m, on *Aspicilia radiosia*, on calcareous boulders, 08.06.1988, leg. N (10630).

This is a parasitic species, growing mainly on calcicolous crustose lichens, such as *Aspicilia calcarea*. In the Karst area it is quite common in exposed situations.

Caloplaca lactea (Massal.) Zahlbr.

Carnic Alps: - M. Tiarfin, 1500 m, on limestone, 08.1981, leg. N (2253).

An early colonizer of calcareous substrata, whose delimitation from *C. ferrarii* and *C. marmorata* is not completely clear to me.

Caloplaca lithophila Magnusson

Friulian Plain: - Tarcento (UD), 290 m, on cement wall, 12.01.1983, leg. N (3154).

Karst: - M. Valerio (TS), 110 m, on calcareous wall, 01.05.1981, leg. N (1659). - Costa dei Barbari (TS), 4 m, on calcareous boulder near the coast, 13.03.1988, leg. N & T (10127). - Monrupino (TS), 418 m, on cement wall, 26.06.1981, leg. Loi & N (1621).

This rather poorly-known species is frequent in the Karst area, mainly on eutrophiated calcareous surfaces, even on cement walls.

Caloplaca lucifuga Thor

Karst: - Precenico (Duino-Aurisina, TS), 120 m, on *Quercus* sp., 13.03.1988, leg. N & T (10143).

The scanty material was compared with more abundant collections from Sardinia and Calabria, and seems to fit well also with the original description of this recently described epiphytic species of old boles.

Caloplaca oasis (Massal.) Szat.

Karst: - Dolina di Percedol, c. 300 m, on *Verrucaria* sp., on limestone, 16.06.1992, leg. N & T (16399). - Gropada (TS), c. 380 m, on *Verrucaria* sp., on limestone, 25.12.1992, leg. T (16669).

Rather widespread in areas with a submediterranean climate, *C. oasis* forms characteristic, roundish spots on the thalli of endolithic, calcicolous *Verrucarias*. Certainly overlooked, it is new to the region.

Caloplaca ochracea (Schaerer) Flagey

Carnic pre-Alps: - Battei (PN), on limestone, 11.1981, leg. Loi (2197). *Friulian Plain*: - Paludea (PN), on limestone, 13.03.1985, leg. Loi (5448). *Julian pre-Alps*: - M. Glemina, 600 m, on limestone, 08.06.1981, leg. De Faveri & N (4195). - M. Bernadia, 550 m, on limestone, 26.06.1985, leg. N (5874).

This is a common species of submediterranean areas, which grows on limestone. Not previously reported from Friuli, where it is locally common.

Caloplaca pollinii (Massal.) Jatta

Friulian Plain: - Plessiva (GO), on *Robinia pseudacacia*, 27.12.1982, leg. N (3020).

This is a Mediterranean species which in Italy has been rarely collected in recent years. In Friuli it is not rare on isolated trees in the hills.

Caloplaca polycarpa (Massal.) Zahlbr.

Julian pre-Alps: - M. Bernadia (UD), 550 m, on limestone, 26.06.1985, leg. N (5873).

Karst: - M. Stena, 300 m, on limestone, 28.04.1985, leg. Poelt & N (5571). - M. Grisa (TS), 250 m, on *Verrucaria*, on limestone, 10.06.1985, leg. N (5742). - M. Lanaro, 550 m, on limestone, 09.10.1985, leg. N (6561).

A parasitic species, growing mainly on endolithic species of *Verrucaria*, distributed in areas with a submediterranean climate. It is common in the Karst

area, mostly within open woodlands. It was currently cited as *C. tenuatula* (Nyl.) Zahlbr.

Caloplaca sarcopidioides auct.

Eriulian Plain: - Lestans, on *Populus*, 02.1985, leg. Loi, rev. T (5353). - Bueris (UD), 250 m, on *Populus*, 10.11.1993, leg. N, rev. T (4014).

Karst: - Cernizza (Duino - Aurisina, TS), c. 10 m, on *Q. pubescens*, opening of Mediterranean maquis, 08.07.1990, leg. T (14269).

An epiphytic species which has been certainly overlooked in the past. In Italy it was previously known only from Sardinia. Sorediate specimens with the same anatomical characters of the apothecia are referred to *C. obscurella*, which has been recently collected in the Emilian Apennines (TSB).

Caloplaca saxifragarum Poelt

Carnic Alps: - Piz di Mede (UD), on *Saxifraga*, 2000 m, 09.08.1986, leg. N (7717). - Piz di Mede (UD), on *Saxifraga*, 2000 m, 09.08.1986, leg. N, rev. T (7718).

An arctic-alpine species, growing on plant remains on calciferous substrata; probably rather common, but previously cited for Italy only from Lombardy and South Tyrol.

Caloplaca sinapisperma (Lam. & DC.) Maheu & Gillet

Carnic Alps: - Piz di Mede, on epilithic mosses, on sandstone, 09.08.1986, leg. N (7742). *Julian Alps*: - M. Lopa, 2050 m, on plant remains on soil, 09.08.1983, leg. N (3375). - M. Canin, 1800 m, on mosses, 10.08.1979, leg. N (821). - M. Montasio, 2300 m, on plant remains, on limestone, 08.1981, leg. N (2203). - Altopiano del Montasio, near La Casera, 1520 m, on plant remains, on calcareous substratum, 22.07.1989, leg. Bersan (12880).

This species has an arctic-alpine distribution and grows on plant remains on more or less calcareous substrata. In Italy it is confined to the Alps; it was not previously reported from the survey area.

Caloplaca subpallida Magnusson

Carnic Alps, Passo M. Croce Carnico, 1250 m, on *Aspicilia*, on sandstone, 28.10.1982, leg. N (2875).

C. subpallida is a rarely-collected and rather poorly-understood species, with probable optimum on base-rich siliceous rocks. The specimen cited here fits well with the description given by Clauzade & Roux (1985).

Caloplaca tetraspora (Nyl.) H. Olivier

Carnic Alps: - Lateis (UD), Forcella di M. Novarza, on plant remains on soil, c. 1870 m, 28.09.1988, leg. L. Quaranta (10866).

This mainly Arctic species is rather rare in the Alps compared with the similar *C. sinapisperma*, and for Italy it was known only from South Tyrol.

Caloplaca tiroliensis Zahlbr.

Carnic Alps: - M. Tinisa (UD), on plant remains on soil, 1840 m, 02.09.1988, leg. T (10756). - Passo Volaja (UD), on plant remains, 1850 m, 08.08.1979, leg. N (819).

The distribution of this arctic-alpine species extends to the Mediterranean mountains; it is a rarely collected lichen, which is similar to *C. saxifragarum*.

Caloplaca viperae (Zahlbr.) H. Olivier

Friulian Plain: - Mariano del Friuli (UD), on *Populus*, 27.12.1982, leg. N (3108).

Karst: - Opicina (TS), epiphytic, 17.02.1980, leg. De Faveri & N, det. N (975). - Opicina (TS), epiphytic, 300 m, 01.12.1980, leg. N, rev. Poelt (2490). - Opicina (TS), epiphytic, 12.12.1980, leg. De Faveri & N (1096).

In Italy this species is known only from the survey area, where it is not common. It is characterized by a green-grey, sorediate thallus, and bright orange, biatorine apothecia. Its ecology and distribution are very poorly-known (Poelt, 1969).

Caloplaca xantholyta (Nyl.) Jatta

Carnic pre-Alps: - Meduno (PN), on limestone, 02.1985, leg. Loi (4966). - Pradis di Sotto (PN), on limestone in shaded gorge, 28.05.1985, leg. Loi (5613).

Karst: - Gropada (TS), on limestone in a dolina, 25.08.1988, leg. Bersan (10029). - Val Rosandra (TS), 120 m, calcareous rock, north exp., 19.07.1979, leg. N (760). - Dolina near Malchina, 180 m, on limestone, in a niche, north exp., 10.02.1984, leg. N (3987). - Costa dei Barbari (TS), 20 m, on limestone, in vertical face in shadow, 2.10.1984, leg. N (4586). - Sales (TS), in a dolina, on limestone, 17.09.1983, leg. N (3616). - Sgonico (TS), on limestone, in a dolina, 25.01.1988, leg. Bersan (10030). - Monrupino (TS), 400 m, on limestone, in shadow, 28.06.1981, leg. Loi & N (1603).

A species preferring underhanging surfaces in rather humid areas. It is widespread throughout Italy, and in the survey area is particularly frequent in the Karst region.

Candelariella coralliza (Nyl.) Magnusson

Carnic Alps: - M. Tenchia, above C.re Zouplfan, 1750 m, on acid rocks, 29.05.1989, leg. Bersan & Codogno (13889).

The distinction of this species from certain forms of *C. vitellina* is not always easy. It is certainly more frequent in the alpine belt, mainly on acidic substrata.

Candelariella lutella (Vain.) Räsänen

Carnic Alps: - Passo Pura, 1440 m, on lignum, 04.09.1986, leg. Nimis (TSB 7836).

C. lutella was rarely reported from Italy; it was previously known only from Veneto, Emilia-Romagna and South Tyrol. It belongs to the *C. vitellina*-complex, grows on the bark of broad-leaved trees (*Juglans*, *Alnus*, *Fraxinus*) and is characterized by an endophloedic or very poor-developed thallus.

Candelariella subdeflexa (Nyl.) Lettau

Karst: - S. Antonio in Bosco, c. 150 m, on *Populus*, along the road, 25.03.1992, leg. N (16259).

This species is characterized by the biatorine, vivid yellow apothecia and grows on eutrophic bark, mainly *Populus* and *Ulmus*, with a strong accumulation of calcareous dusts.

Carbonea vitellinaria (Nyl.) Hertel

Carnic Alps: - M. Tenchia (Cercivento, UD), 1400 m, on siliceous rock, 12.06.1988, leg. Bersan (10450).

A parasitic lichenicolous fungus, growing mainly on *Candelariella vitellina*; in Italy it is most common in the montane belt; new to the survey area.

Carbonea vorticosa (Flörke) Hertel

Carnic Alps: - M. Novarza (UD), 1400 - 1600 m, on sandstone, 09.1989, leg. N (14120).

This is an arctic-alpine, bipolar species, preferring vertical faces of decalcified sandstone and metamorphic rocks. The species was reported from several localities in the Alps, but it is new to the survey area.

Catapyrenium imbricatum (Nyl.) Clauz. & Roux

Karst: - Cernizza (Duino - Aurisina, TS), above the ILVA quarry, c. 15 m, on calcareous boulders, 23.03.1992, leg. T (15974).

This species is relatively frequent in the coastal, calcareous area of the Trieste Province with Mediterranean vegetation, but is not common in Italy. The identification was checked against a recent, abundant collection from Sardinia.

Catillaria minuta (Schaerer) Lettau

Carnic Alps: - Passo Rest, 1100 m, on limestone, in beech forest, 14.10.1983, leg. N (3663). - Passo Pura (UD), 1440 m, on limestone, in beech forest, 07.08.1985, leg. N (7814). *Friulian Plain*: - Meduno (PN), 300 m, on limestone, 02.1985, leg. E. Loi (4979). - Lestans (PN), on limestone, 02.1985, leg. E. Loi (5350). *Julian Alps*: - Laghi di Fusine, 1700 m, on limestone, 06.11.1983, leg. Palma (3752). *Julian pre-Alps*: - Val del Torre, near Crosis (UD), 350 m, on calcareous face, north exp., 05.12.1982, leg. N (3001).

This lichen, which was rarely collected in Italy, is very frequent in the region, mainly on calcareous outcrops or vertical rock faces in beech forests.

Cetraria ericetorum Opiz

Carnic Alps: - M. Paularo (UD), 1950 m, on wind-swept ridge, 16.08.1981, leg. N (1708). - Piz di Mede (UD), 2000 m, on soil, on wind-swept ridge, 09.08.1986, leg. N (7682). - M. Dimon (UD), 1900 m, on wind-swept ridge, 08.1983, leg. N (3381). - M. Paularo (UD), 2000 m, on soil, 29.09.1990, leg. Castello & T (14756). - Passo Volaia, 1950 m, on soil, on wind-swept ridge, in *Thamnotietum*, 07.08.1981, leg. De Faveri & N (1973). *Julian Alps*: - M. Zabus (UD), 2200 m, on soil, in a ridge, 02.08.1979, leg. N (918). - M. Canin (UD), 2000 m, on soil, on wind-swept ridge, 07.1980, leg. De Faveri & N (1354).

This species is rather frequent in alpine, siliceous districts of the survey area, mainly in wind-swept ridges. It is widespread throughout Italy, but it seems to be very rare along the Apennines.

Cetraria hepatizon (Ach.) Vainio

Carnic Alps: - M. Paularo (UD), 2000 m, on siliceous rock, 16.08.1981, leg. N, rev. T (1709). - M. Paularo (UD), 2000 m, on siliceous rock, 16.08.1981, leg. N, rev. T (1698). - M. Crostis, 2000 m, on sandstone, on a ridge, 05.09.1983, leg. N, rev. T (3495). - M. Paularo (UD), 2000 m, on siliceous rock, 16.08.1981, leg. N, rev. T (1710). - Piz di Mede (UD), on siliceous rock, on a ridge, 09.08.1986, leg. N (7729).

Cetraria hepatizon is rather common on wind-exposed siliceous rocks in the Alpine belt. In our region the closely related *C. commixta* has never been found.

Cetraria oakesiana Tuck.

Carnic Alps: - Passo Pura (UD), Bosco della Stua, 1100 m, on *Abies alba*, 11.09.1987, leg. N & T (9727). - Lago di Sauris (UD), bosco della Stua, 1000 m, on *Abies alba*, 15.09.1986, leg. N (6454).

A circumboreal species, which has been rarely cited from Italy. It grows on acid bark, mainly at the base of the trunks, in humid situations with stagnation of cold air. It is very rare in the Carnic Alps. New to Friuli.

Chaenothecopsis debilis (Sm.) Tibell

Carnic Alps: - Arta Terme (UD), gorge E of the village, on *Larix*, with *Chrysothrix candelaris*, 30.07.1988, leg. Bersan, det. D. Puntillo (10670).

This species is widespread in the cold-temperate and temperate areas of the world; it grows on dry lignum in open situations. New to the survey area.

Chromatochlamys muscorum (Fr.) H. Mayrh. & Poelt

Julian Alps: - Laghi di Fusine, 1450 m, on mosses, 23.07.1984, leg. N (4347).

C. muscorum grows on mosses in rather humid situations, and is not uncommon throughout Italy, but in the past it was certainly overlooked. New to Friuli.

Cladonia bellidiflora (Ach.) Schaerer

Carnic Alps: - Passo Pramollo, 1600 m, on a marcescent stump, 10.05.1981, leg. De Faveri & N (1368).

This is an arctic-alpine species of raw humus and mossy rocks in humid situations, occurring above the lower montane belt. New to Friuli, where it is not frequent.

Cladonia botrytes (Hagen) Willd.

Julian Alps: - Foresta di Tarvisio, above Valbruna, 1200 m, on a stump of *Picea*, 20.11.1982, leg. N (2947).

A nice *Cladonia* growing on relatively recently cut conifer stumps and wood in boreal environments. It is easily distinguished for its small size, yellow-green podetia and pale brown, pinkish apothecia. For the region, there was only an old, dubious citation by Jatta (1909-1911) from the surroundings of Cividale.

Cladonia caespiticia (Pers.) Flörke

Karst: - Dolina di Percedol, on an old *Quercus*, 25.07.1991, leg. N (15239).

A suboceanic lichen, which in the survey area was collected only once, in a large dolina. It usually grows on mineral acid soil in the montane belt, and is rather uncommon.

Cladonia carneola (Fr.) Fr.

Carnic Alps: - M. Brutto Passo, 1750 m, on decaying stump, 16.09.1985, leg. N (6501). - M. Cason di Lanza, 1550 m, on a stump, 23.07.1984, leg. N (4379). - Piz di Mede, 1950 m, on acid soil, in *Rhodoretum*, 09.08.1986, leg. N (7701).

C. carneola seems to be more frequent in the region than the few citation might suggest. It grows on raw humus and decaying wood in boreal-arctic habitats, and might have been confused with similar species. New to Friuli.

Cladonia coccifera (L.) Willd.

Carnic Alps: - M. Lagna, 1900 m, on soil, in *Rhodoro-Vaccinietum*, 10.09.1984, leg. N (4564). - Above Passo Pramasio, 2080 m, on acid soil, 02.08.1985, leg. Vidali (6308).

This species is rather frequent on raw humus in the subalpine-alpine belts, mainly in stands with *Rhododendron* and *Vaccinium*. In the survey area it is apparently present only in the inner Carnic Alps, where it is locally frequent.

Cladonia convoluta (Lam.) Anders

Friulian Plain: - Grado, dunes near P.ta Spina, 5 m, 18.03.1967, leg. Pignatti (12820). *Julian pre-Alps*: - M. Glemina, on soil, 850 m, 08.06.1981, leg. De Faveri & N (1479).

Karst: - Gropada, in a dolina, 25.01.1988, leg. Bersan, 10027.

This *Cladonia* has a submediterranean distribution, occurring in dry, warm limestone areas of southern and southern-central Europe. In the Karst it is very common, mainly in open grassland vegetation, while in Friuli it is restricted to the outer pre-Alps and to the "magredi", which are para-steppic environments developed on gravel deposits in the upper plains.

Cladonia crispata (Ach.) Flotow

Carnic Alps: Casera Razzo (BL), 1800 m, on acid soil, with *Sphagnum*, 16.09.1985, leg. N (6495).

C. crispata is a circumboreal lichen growing on acid soil or on lignum, with optimum in the subalpine belt. In the survey area it has been collected only once.

Cladonia deformis (L.) Hoffm.

Carnic Alps: - High Pesarina valley, 1300 m, on a bole, 03.09.1983, leg. N (3698). - M. Brutto Passo, 1700 m, on a bole, 21.08.1983, leg. N (3423).

A very variable species, which, according to several authors, could be split into two different taxa, *C. deformis* s.str. and *C. sulphurina*; many populations show intermediate characters.

Cladonia diversa Asperges

Carnic Alps: - Casera Razzo (BL), 1800 m, on acid soil, 04.09.1986, leg. N, det. T. Ahti (7825).

This species was recently distinguished from *C. coccifera* and *C. pleurota* on the basis of its chemistry, but the relations among these taxa are still unclear. New to Italy.

Cladonia ecmocyna Leighton

Carnic Alps: - M. Crostis, 1800 m, on soil, 05.09.1983, leg. N (3491).

C. ecmocyna seems to be rather rare in Italy, being previously known only from a few, old records from Veneto, South Tyrol and Lombardy. It grows on raw humus developed on acid rocks in the subalpine-alpine belts and has a circumpolar distribution. New to the region.

Cladonia subrangiformis Sandst.

Karst: - Val Rosandra, 14.12.1981, leg. Loi & N (2433). - Basovizza, 400 m, 20.01.1982, leg. N (2440).

This lichen grows on more or less calcareous soils and its distribution is centered on southern and central Europe. In the survey area it is not common.

Cladonia gracilis (L.) Willd.

Carnic Alps: - M. Tenchia, 1800 m, on soil, 26.06.1988, leg. Bersan (10664). - M. Novarza, 1800 m, on soil, 11.09.1984, leg. N (4487). - M. Crostis, 2000 m, on soil, 05.09.1983, leg. N (3531).

This is a very variable species which has a broad distribution, extending to both Hemispheres. The identification of some specimens is doubtful, and could be referred to the following species. New to the region.

Cladonia macroceras (Delise) Havaas

Carnic Alps: - M. Coglians, above Rif. Marinelli, 2100 m, 09.1982, leg. N (2715). - Passo Pura, 1250 - 1400 m, on soil, 10.09.1986, leg. T (11471). - M. Lagna, 1800 m, in *Rhodoro-Vaccinietum*, 10.09.1984, leg. N (4561). - Passo Pramollo, 1600 m, on soil (protoranker), 10.05.1981, leg. De Faveri & N (1369). - M. Chiadenis, 1400 m, on soil, 25.09.1983, leg. Palma (3643). - M. Paularo, 2000 m, on soil (ranker), 16.08.1981, leg. N (1718). - M. Tenchia, Cercivento (UD), on soil, 1800 m, 26.06.1988, leg. Bersan (10659). - M. Tiarfin, 1850 m, on soil, on calcareous substratum, 08.09.1984, leg. N (4474). - M. Tiarfin, 2100 m, on soil, on acid substratum, 09.1982, leg. N (2627). - Casera Razzo (BL), 1750 m, on soil, in *Rhododendretum*, 13.07.1981, leg. Fragiaco & N (1760). *Julian Alps*: M. Canin, 1950 m, on soil, 08.1981, leg. N (2216).

This species is very abundant in the subalpine heathlands with *Rhododendron* and *Vaccinium* species. It has a holarctic distribution and is frequent in the survey area.

Cladonia macrophyllodes Nyl.

Carnic Alps: - Casera Razzo (BL), 1850 m, on soil, 04.09.1986, leg. N (7828). - M. Tiarfin, 2200 m, 09.1982, leg. N (2632). *Julian Alps*: - M. Canin, 2000 m, on soil, 28.07.1983, leg. Zuccarello (3351).

In Italy this arctic-alpine species is known only from a few, scattered stations. It grows mainly on acid soil, in open, dry grassland vegetation in the alpine belt.

Cladonia parasitica (Hoffm.) Hoffm.

Carnic pre-Alps: - Bacino del Prescudin, 750 m, at the base of *Fagus*, 29.08.1985, leg. Loi (6379). *Friulian Plain*: - Tarcento, 250 m, 19.04.1981, leg. N (1320). *Julian pre-Alps*: - Sedilis (Tarcento, UD), 450 m, on decaying stump of *Castanea*, in open woodland, 10.11.1984, leg. N (4619).

C. parasitica grows on decaying lignum of *Castanea* and *Quercus*, in the lower montane belt. It is not very frequent in the survey area, but it may be easily overlooked. New to the region.

Cladonia pleurota (Flörke) Schaerer

Carnic Alps: - Passo Pramollo, 1800 m, on soil, on mosses, 05.08.1981, leg. N (1890). - F.lla Tragonia, 1900 m, on acid soil, 08.1981, leg. N (5719). - M. Novarza, 1850 m, on soil, on sandstone, in *Rhodoro- Vaccinietum*, 11.09.1984, leg. N (4495). - M. Tiarfin, 1900 m, on soil, 20.09.1981, leg. Loi & N (2007). - M. Lagna, 1980 m, on soil, on acid substratum, in *Rhodoro- Vaccinietum*, 10.09.1984, leg. N (4560). - Casera Razzo (BL), 1750 m, on soil, 11.08.1981, leg. N (1985). - M. Paularo, 1950 m, on soil, on siliceous substratum, 16.08.1984, leg. N (4458). - M. Crostis, 1900 m, on soil, on a ridge, 05.09.1983, leg. N (3530). Lago di Sauris, Bosco Flobia, c. 1040 m, on soil, 28.09.1988, leg. T.

This sorediate species is quite common in the subalpine-alpine belts of the region, where it grows on wood or acid raw humus.

Cladonia rei Schaerer

Friulian Plain: - Meduno (PN), 300 m, on soil, 02.1985, leg. Loi (4982). *Julian pre-Alps*: - Villanova delle Grotte (Tarcento, UD), 700 m, on soil, 26.06.1985, leg. N (5923).

Karst: - S. Martino del Carso (GO), 60 m, on soil, in dry meadow, leg. N (378). - Basovizza (TS), 400 m, on soil, 09.1982, leg. Loi (2705). - Basovizza (TS), 400 m, on soil near a trail, in *Seslerio-Quercetum petraeae*, 09.1981, leg. N (2465). - Aurisina (TS), 110 m, near the coast, near the evergreen forest, on red soil, 24.03.1979, leg. Marson (554). - Aurisina (TS), in a *Quercetum ilicis* stand, on soil, 24.03.1979, leg. Marson (553).

C. rei grows on calcareous soil, in the submediterranean zone, in grassland vegetation. In the region it is not uncommon, mainly in the Karst area, on soils developed on calcareous sandstone.

Cladonia symphyarpa (Flörke) Fr.

Carnic Alps: - M. Zoufplan, 1999 m, on bare soil, 19.02.1989, leg. Bersan. - Between Timau and Passo M. Croce Carnico, 1100 m, on soil, 28.10.1982, leg. N (2870). - Passo del Pura, 1440 m, on soil, on limestone, 04.09.1986, leg. N (7841). *Carnic pre-Alps*: - Claut, on soil, in dry grassland on calcareous substratum, 15.05.1983, leg. Loi (3406).

Karst: - Val Rosandra, M. Stena, 320 m, on calcareous soil, 03.09.1986, leg. N (7483). - M. Grisa, 180 m, on calcareous soil, 10.09.1985, leg. N (5758).

C. symphyarpa grows on mineral calcareous soil, often directly on gravel, and is rather frequent from Arctic to Central Europe. New to the region.

Cladonia uncialis (L.) Wigg.

Carnic Alps: - M. Paularo, 2000 m, on soil, 16.08.1981, leg. N (1701). - M. Dimon, 1900 m, 10.08.1983, leg. N (3376). - Piz di Mede, 2000 m, on terricolous mosses, 09.08.1986, leg. N (7697). - M. Crostis, 2000 m, on soil, on wind-swept ridge, 05.09.1983, leg. N (3488).

A circumboreal species of acid soils known from several localities in Italy. In the survey area it is not uncommon in wind-exposed sites of the subalpine belt.

Coelocaulon aculeatum (Schreber) Link

Carnic Alps: - M. Paularo, 1950 m, on soil, 28.09.1990, leg. Castello & T (14760). M. Paularo, 2000 m, on soil, 16.08.1981, leg. N (1696). - M. Crostis, 2000 m, on soil, 04.09.1983, leg. N (3482).

In the survey area this species is linked to wind-swept ridges with siliceous substrata in the alpine belt. *C. aculeatum* is closely related to *C. muricatum*, a species which has never been found in our region. The two species have a similar ecology and world distribution, but they seem to differ in the anatomy of the thallus.

Collema subnigrescens Degel.

Carnic Alps: - Ligosullo (UD), 1000 m, on *Pyrus malus*, 08.1981, leg. N (2257).

Karst: -Rupinpiccolo, 289 m, on *Tilia*, 10.10.1985, leg. Nimis (6535). - Basovizza, 450 m, on *Q. pubescens*, 23.03.1981, leg. N (1127). -

A suboceanic, epiphytic species, most frequent in areas with a rather humid climate. New to Friuli.

Collema undulatum Flotow

Julian pre-Alps: - Passo di Tanamea, 700 m, on limestone, 27.09.1987, leg. N & T (9829).

This species is widely distributed in the calcareous areas of Europe, growing directly on stones. New to Friuli.

Cornicularia normoerica (Gunn.) Du Rietz.

Carnic Alps: - M. Crostis, c. 2200 m, on the top of a siliceous boulder on a ridge, 05.09.1983, leg. N (3500). - M. Paularo, 2000 m, on siliceous rock, 16.08.1981, leg. N (1695). - M. Paularo, 2000 m, on siliceous rock, 16.08.1981, leg. N (1693). - M. Carnizza, near Passo Pramollo, 1600 m, on acid rock, 29.05.1989, leg. Bersan & Codogno. - Piz di Mede, 2000 m, on sandstone, on a ridge, 09.08.1986, leg. N (7681).

An arctic-alpine species, extending to the high Mediterranean mountains and to the Caucasus, growing on siliceous rocks in wind-swept ridges. Rather frequent in the Carnic Alps; new to Friuli.

Dactylina madreporiformis (Ach.) Tuck.

Julian Alps: - M. Montasio (UD), 1700 m, on soil, 23.08.1981, leg. Visintin (1834). - M. Canin, F.chia di Terra Rossa, 2137 m, on soil (*Firmetum*), 26.08.1978, leg. Lausi (289). - M. Lopa (UD), 2250 m, on soil, 10.08.1981, leg. De Faveri & N (1778).

This circumarctic-alpine species of calcareous mineral soil was already reported from our region by Glowacki (1874). Also recently, this species has been collected only in the Julian Alps, but it could occur also in the Carnic Alps as well.

Degelia atlantica (Degel.) P.M. Jörg. & P. James

Karst: - Ceroglie, 150 m, on *Q. pubescens*, north exp., 15.05.1984, leg. Nimis, rev. P. James (4141).

In Europe this species has a mediterranean-atlantic distribution, and it should be a little more hygrophytic than *D. plumbea*, which was never found in the Karst. New to the survey area.

Dimelaena oreina (Ach.) Norman

Carnic Alps: - M. Nieddis (UD), 1750 m, on siliceous rock, in an underhang, 06.01.1990, leg. Bersan (13600).

This species, which is rather frequent in the central and western Alps, is very rare in the survey area, probably due to the prevailing suboceanic climate conditions; it has been collected only once, in the inner Carnic Alps.

Dimerella lutea (Dickson) Trevisan

Karst: - Aurisina (TS), in a doline, on *Q. petraea*, 11.03.1986, leg. N & T (8349). - Borgo Grotta (TS), in a large dolina, 230 m c., on *Q. petraea*, 03.09.1991, leg. T (15354).

This suboceanic-pantropical species is very rare in the Karst area, and it is limited to warm-humid situations in large dolinas; the apothecia are rare and not well-developed, but the identification is certain.

Dimerella pineti (Ach.) Vezda

Karst: Basovizza, 450 m, on *Pinus nigra*, 12.03.1988, leg. Castello (10136). - Cernizza (Duino-Aurisina), 10 m, on *Pinus halepensis*, leg. T (14681). - Slovenia, between Lokev and Divaca, Risnik dolina, c. 330 m, on *Tilia*, 21.05.1990, leg. T (14073).

This mainly epiphytic species is rather frequent in the Karst area with *Pinus* plantations, and it seems to prefer acidic substrata. New to the Karst.

Diploicia canescens (Dickson) Massal.

Karst: - Contovello (TS), c. 200 m, on sandstone, 04.1988, leg. T (10482). - Contovello (TS), c. 160 m, on sandstone, 26.12.1988, leg. T (10954). - Contovello (TS), 230 m, on sandstone, 13.05.1988, leg. T (11464). - Lago di Doberdò, M. Castellazzo, 150 m, on calcareous rocks, 15.02.1991, leg. T (11665).

D. canescens has a wide range in subatlantic districts of Europe, and has a broad total distribution. It is very common on the small Italian islands, and along the Thyrrenian coasts. In the survey area it is restricted to coastal sites; at Doberdò, the species is not rare in small crevices of south-facing, overhanging calcareous faces on the top of the hills surrounding the lake. New to the region.

Diploschistes actinostomus (Ach.) Zahlbr.

Karst: - Contovello (TS), on sandstone, ca. 180 m, 01.01.1988, leg. T (10966).

This is a subcosmopolitan species, occurring below the montane belt, mainly on base-rich siliceous rocks. It is very rare in the coastal area of the Trieste Province, on decalcified sandstone. New to the region.

Diploschistes gypsaceus (Ach.) Zahlbr.

Carnic Alps: - M. Novarza, 1850 m, on calcareous sandstone, 11.09.1984, leg. N (4451). - M. Tinisa, 1550 m, on limestone, in shadow, 09.08.1981, leg. De Faveri & N (1812). - Casera Razzo (BL), 1700 m, on limestone in shadow, north exp., 13.07.1981, leg. Fragiaco & N, (1667). - M. Chiadenis, 2400 m, on limestone, 25.09.1983, leg. Palma (3647). *Julian pre-Alps*: - M. Matajur, 1300 m, on limestone, 05.06.1981, leg. Loi & N (1494).

This species of shaded calcareous rocks, often occurring in fissures, is frequent throughout Italy but it was not previously known from Friuli.

Diploschistes muscorum (Scop.) R. Sant.

Carnic Alps: - M. Novarza, 1650 m, on epilithic mosses, 11.09.1984, leg. N (4496). - Piz di Mede, 1850 m, on epigaeic mosses, 09.08.1986, leg. N (7721).

One of the most common *Diploschistes* species, growing on mosses, or parasitically on other terricolous lichens when young. New to Friuli.

Dirina massiliensis f. **sorediata** (Müll. Arg.) Tehler

Karst: - S. Caterina Cave (S. Pelagio), c. 190 m, on limestone, 08.02.1989, leg. T (11678).

In the survey area, this species is limited to shaded sites near caves or gorges, but it is absent along the coast. New to the survey area.

Encephalographa elisae Massal.

Karst: - Dolina di Percedol, c. 300 m, on limestone, in a niche, 16.06.1992, leg. N & T (16398).

This species has a Mediterranean distribution, and occurs on shaded, humid calcareous rocks. In our region it is also present in the outer pre-Alps, in narrow, humid gorges which host other interesting lichens. New to the Karst.

Epilichen scabrosus (Ach.) Clemens

Carnic Alps: - M. Paularo, 1950 m, on *Baeomyces placophyllus*, 10.08.1983, leg. N, ref. W. Obermayer (3357).

This is a parasite on the thalli of different species of the genus *Baeomyces*. It is not frequent in the Alps, but has been certainly overlooked. New to Friuli.

Fellhanera subtilis (Vezda) Diederich & Serusiaux

Julian Alps: - M. Florianca, 1600 m, on *Vaccinium myrtillus*, in a *Sphagnum* bog, 20.07.1991, leg. T (15273).

This species grows on living twigs of *Vaccinium myrtillus* in humid, rather cold situations, mainly in bogs or *Calluna*-stands and it is characterized by triseptate spores and a true exciple of broad ellipsoid to globose cells. *F. subtilis* is new to Italy, but it should be certainly much more common in the Alps, being easily overlooked.

Fulgensia australis (Arnold) Poelt

Carnic Alps: - M. Coglians, above rif. Marinelli, 2100 m, on limestone, 13.11.1983, leg. Palma (3818). - Passo Volaia, near the Austrian border, c. 2000 m, calcareous faces, 28.09.1990, leg. T (15903).

In the field this species can be easily mistaken for a lobate *Caloplaca*. It grows on calcareous rocks, in the subalpine and alpine belts of the southern European mountains, and it is characterized by falcate, uniseptate (more rarely triseptate) spores. For Italy it was known only from South Tyrol, and from the Julian Alps (Glowacki 1874). New to the Carnic Alps.

Fuscidea cyathoides (Ach.) V. Wirth & Vezda

Carnic Alps: - Conca of Sauris (UD), beech wood above Lateis, 1200 m, on *Fagus*, 07.08.1986, leg. N (7782). - Surroundings of Passo Pura, 1250- 1400 m, on *Fagus*, 10.09.1986, leg. T (11462). - Lago di Sauris, Bosco della Stua, 1150 m, on *Fagus* in *Abieti-Fagetum*, 13.09.1984, leg. N (4486). *Friulian Plain*: -

Usago (PN), 300 m, on *Carpinus*, north exp., 02.1985, leg. Loi (5332). *Julian Alps*: - Valbruna, Malga Saisera, 1080 m, on *Fagus*, leg. N (7892).

This lichen grows both on siliceous rocks and on bark. In the survey area it has been collected only on *Fagus*, and it is rather common in humid montane woods, much rarer at low altitudes.

Gyalecta geoica (Wahlenb.) Ach.

Carnic Alps: - M. Tiarfin, 2200 m, on terricolous mosses, 09.1982, leg. N.

This species has been rarely collected in Italy, with a single old record from Lombardy, and a recent one from the Carnic Alps (Clerc 1984).

Gyalecta leucaspis (Massal.) Zahlbr.

Julian pre-Alps: - Above Ucea (Resia, UD), 700 m, on limestone, 26.06.1985, leg. N (5892). - High Torre valley, Passo di Tanamea (UD), 700 m, on limestone, 27.09.1987, leg. N & T (9824).

G. leucaspis grows on vertical, shaded faces of calciferous rocks in rather humid situations; in Italy it has a scattered distribution along the Alpine chain. It is rather frequent in the Torre Valley, an area with very high precipitations.

Gyalecta subclausa Anzi

Julian Alps: - Laghi di Fusine, c. 1700 m, on limestone, 06.11.1983, leg. Palma (3754). - Laghi di Fusine, c. 1700 m, on limestone, 06.11.1983, leg. Palma (3743).

This species was previously reported only by Anzi (1866) from a Swiss locality near the Italian border. It is an inconspicuous lichen which grows on calciferous rocks on steeply inclined, north-exposed faces in humid situations. New to Italy.

Gyalecta truncigena (Ach.) Hepp

Karst: - Costa dei Barbari (Duino-Aurisina, TS), 40 m, on *Q. ilex* in shadow, leg. T (15257). - Gropada (Basovizza, TS), 360 m, on *Quercus*, near a dolina, 17.11.1992, leg. T (16644).

This is a widespread, but rather rare species, growing on old trees, in areas with a more or less suboceanic climate. From the Karst it was previously cited only by Schuler (1893).

Heppia lutosa (Ach.) Nyl.

Carnic Alps: - Lateis, below F.la Novarza, c. 1650 m, on mosses and plant debris, 12.09.1991, leg. Castello & T (15363).

The only recent report of *H. lutosa* for Italy was that of Egea (1989) from Liguria. *H. lutosa* is a terricolous lichen which grows on calcareous soil. In Europe it is limited to the southern and central region of the continent.

Heterodermia speciosa (Wulfen) Trevisan

Carnic Alps: - Lago di Sauris, Bosco della Stua, 1000 m, on *Salix*, 04.09.1986, leg. N (7829). - High Pesarina valley, 1100 m, on *Fagus*, 03.09.1983, leg. N (3511).

This epiphytic species is bound to suboceanic climate conditions, and is quite rare in Italy; probably it was more frequent in the past, due to lower air

pollution. In the Carnic Alps it is present only in very humid montane woods, and is rare. New to Friuli.

Hypocenomyce scalaris (Liljeblad) M. Choisy

Carnic Alps: - Casera Razzo (BL), 1800 m, on *Larix*, 20.09.1981, leg. Loi & N (2008). - M. Novarza, 1850 m, on *Larix*, 11.09.1984, leg. N (4611). - From Rif. Tolazzi towards Passo Volaiia, c. 1470 m, on decorticated lignum of conifer, 28.09.1990, leg. T (15105). *Julian Alps*: - Foresta di Tarvisio, above Valbruna, 1200 m, on *Larix*, 20.11.1982, leg. N (2948). - Valbruna, Rif. Grego, 1400 m, on *Larix*, 20.11.1982, leg. N (5261). - Valbruna, Rif. Grego, 1400 m, on *Larix*, 20.11.1982, leg. N (2973). - Laghi di Fusine, 1450 m, on *Larix*, 23.07.1984, leg. N (4327).

Karst: - Basovizza (TS), 420 m, on *Pinus*, 11.02.1988, leg. Castello (10093).

This is the most common species of the genus, distributed throughout the boreal and temperate zones. It grows on lignum and conifer bark, occasionally also on charred wood. In the Karst area it is not common.

Icmadophila ericetorum (L.) Zahlbr.

Carnic Alps: - Passo Pura (UD), 1600 m, on a stump of *Picea*, 08.08.1979, leg. N (768). - Between Forni di Sopra and Passo della Mauria, 1100 m, on decaying wood, 09.1982, leg. N (2636). - Casera Razzo (BL), 1750 m, on a stump of *Larix*, 13.07.1981, leg. Fragiaco & N (1652). - M. Brutto Passo (UD), 1700 m, on a stump, 21.08.1983, leg. N (3415). - High Pesarina valley, 1500 m, on decaying stump, 03.09.1983, leg. N (3541). - Lago di Sauris, 1000 m, on a stump, 09.08.1981, leg. De Faveri & N (1804). - Casera Razzo (BL), 1800 m, on acid soil, 16.09.1985, leg. N (6496). - M. Lagna, 1990 m, on soil, in *Rhodoro- Vaccinietum*, 10.09.1984, leg. N (4559). - Forni di Sopra, towards Rif. Pacherini, on a stump of *Picea*, 30.12.1984, leg. Geatti (4856). - M. Tiarfin, 2000 m, on a stump in shadow, 20.09.1981, leg. Loi & N (2027). *Julian Alps*: - Above Valbruna, 1440 m, on a stump, 08.1981, leg. N (1823). - Laghi di Fusine, 1700 m, on decaying stump, 06.11.1983, leg. M. Palma (3734). - Sella Nevea, 1750 m, on a stump of *Larix*, 10.08.1981, leg. De Faveri & N (1767).

A common species with a circumboreal-montane distribution, growing on raw humus, decaying wood, and *Sphagnum*-carpets. It is very frequent in the Alps, while it is rather rare along the Apennines.

Ionaspis epulotica (Ach.) Arnold

Carnic Alps: - Passo Pura (UD), 1450 m, on shaded calcareous rocks, 07.08.1986, leg. N (11305). - Passo Pura, 1440 m, on limestone, in beech forest, 07.08.1986, leg. N, rev. T (7770). *Carnic pre-Alps*: - Passo Rest (UD), 1100 m, on limestone, in beech forest, 14.10.1983, leg. N (3677). *Julian Alps*: - Laghi di Fusine (UD), 1700 m, on limestone, 06.11.1983, leg. Palma (3752). - M. Canin, 2000 m, on limestone, 10.08.1983, leg. N (4023). Jof Fuart, 2500 m, on limestone, 21.08.1983, leg. Visintin (3435).

This species is rather frequent in the alpine districts of the region, on calcareous rocks in shaded, humid situations, but there are few citations from Italy.

Ionaspis melanocarpa (Krempelh.) Arnold

Julian Alps: - Jof Fuart (UD), 1900 m, on limestone, 07.11.1983, leg. Visintin (4021). - Jof Fuart (UD), 2500 m, on limestone, 21.08.1983, leg. Visintin (3434).

In Italy this species seems to be restricted to the Alps, where it was rarely collected. It has an arctic-alpine distribution, extending to the mountains of the Balkan Peninsula. New to the region.

Lecanactis abietina (Ach.) Körber

Carnic Alps: - Lago di Sauris, Bosco della Stua, c. 1040 m, on *Abies alba*, 26.09.1990, leg. N & T (15075). - Lago di Sauris, Bosco Flobia, c. 1100, on *Picea*, 15.09.1991, leg. Bolognini, N & T (15356).

This lichen has been rarely collected in Italy, and is new to the survey area. It is rather common in the more humid sites of the Sauris Lake area, on the bark of conifers; the collections include both pycnidiate and fruiting specimens.

Lecania cuprea (Massal.) v.d. Boom & Aptroot

Karst: - Cernizza, Duino-Aurisina, on calcareous stones, 23.02.1992, leg. T., det. A. Vezda (16179).

This species, which has a rather southern and western distribution in Europe, grows on calciferous rocks in humid, rather shaded situations. According to Van den Boom (1992) it belongs to the genus *Lecania*. The cited specimen was collected in a very shaded site, in a well-developed mediterranean maquis. I observed that the apothecia appear in early spring. Apparently *Lecania cuprea* is not frequent in Italy, being known from scattered localities in the north and from only two stations in Latium and Calabria. New to the survey area.

Lecanora agardhiana Ach.

Carnic Alps: - M. Lagna, 1950 m, on limestone, 10.09.1984, leg. N (4592). *Julian pre-Alps*: - Valli del Natisone, Cepletischis, 750 m, on limestone, 28.12.1982, leg. N (3037). - M. Matajur, 1300 m, 05.06.1981, leg. Loi & N (1577). M. Glemina, 800 m, on limestone, 08.06.1981, leg. N (1499):

An endolithic lichen, growing on hard calciferous rocks, mainly from the montane to the alpine belt. It was already reported from the Karst by Glowacki (1974) and Nimis & Loi (1982). New to Friuli.

Lecanora cinereofusca Magnusson

Carnic Alps: - Lago di Sauris, Bosco della Stua, 1200 m, on *Fagus*, 11.09.1987, leg. N & T, rev. T (9742).

The identification of this specimen is almost certain, and is based on the peculiar epihymenial reaction (PD+ orange, with the formation of clusters of short crystals) and the morphology of the apothecial margins, which are verrucose or discontinuous. Unfortunately, in our collection the apothecia have no spores, and the attribution to *L. cinereofusca*, and not to the closely related *L. insignis* is based on their different ecology: the latter occurs only on conifer bark, while *L. cinereofusca* grows mainly on *Fagus*, in humid montane woods. The species is known from Europe and eastern North America. New to Italy.

Lecanora dispersoareolata (Schaerer) Lamy

Carnic Alps: - Piz di Mede, 2000 m, on schist, 09.08.1986, leg. N (7690). - M. Crostis, 1950 m, on sandstone, 05.09.1983, leg. N (3579). M. Pietinis, 2000 m, on sandstone and schist, 08.1981, leg. N (2767). - M. Paularo, c. 2000 m, on exposed siliceous rock, 29.09.1990, leg. T (15968).

A rather frequent species of intermediate substrata, distributed in the montane and alpine belts of the European mountains, not previously reported from the Carnic Alps, where it is not uncommon.

Lecanora impudens Degel.

Carnic Alps: - Passo Pura (UD), 1440 m, on *Fagus*, 07.08.1986, leg. N (7769).

A rare species of montane woods, growing on bark in humid situations and distributed mainly in central Europe. New to Italy. The specimen has no apothecia.

Lecanora muralis v. **dubyi** (Müll. Arg.) Poelt

Carnic Alps: - Piz di Mede, 2000 m, on calcareous sandstone, 09.08.1986, leg. N (7730).

This taxon is characterized by the almost foliose thallus with broad convex lobes. It was rarely cited in the old literature, and is new to the southern Alps, where it is rather frequent, especially on intermediate substrata.

Lecanora polytropa (Hoffm.) Rabenh.

Carnic Alps: - M. Chiadin, 1800 m, on sandstone, 13.11.1983, leg. Palma (3791). M. Chiadenis, 2400 m, on siliceous rock, 25.09.1983, leg. Palma (3642). *Julian Alps*: - M. Florianca, c. 1550 m, near Malga Lussari, on porfiric rocks, 20.07.1991, leg. T (15251).

L. polytropa is one of the most polymorphic species in the genus; several infraspecific taxa have been described, but the whole complex is still in need of a revision. It grows on siliceous rocks, in very different habitats and is common in upland areas of Italy with siliceous substrata. New to Friuli.

Lecanora pruinosa Chaub.

Friulian Plain: - Colle di Cormons, 200 m, on limestone, 27.12.1982, leg. N (3024). *Julian pre-Alps*: - M. Matajur, 1300 m, on limestone in shadow, 05.06.1981, leg. De Faveri & N (1473).

Karst: - Lago di Doberdò (GO), c. 150 m, M. Castellazzo, in vertical niches, south exp., 15.02.1989, leg. T (11663). - Sistiana (Duino- Aurisina, TS), 70 m, vertical calcareous face, 31.05.1985, leg. N (5685).

A southern European species, more frequent on calcareous rocks, with a subatlantic tendency. In the Karst area it is rather common, mainly on south-exposed, vertical faces. The specimen from M. Matajur has a very weak reaction to C.

Lecanora rupicola (L.) Zahlbr.

Carnic Alps: - M. Paularo, 1990 m, vertical, north-exposed face, 10.08.1983, leg. N, rev. T (3362). - Piz di Mede, c. 2000 m, on siliceous rocks, 09.08.1986, leg. N (8330). - M. Tenchia (Cercivento, UD), 1400 m, on siliceous rocks, 12.06.1988, leg. Bersan (10451).

This species is very common on a wide variety of siliceous rocks, from the lowlands to the alpine belt; in Friuli it is limited to the inner Carnic Alps. New to the survey area.

Lecanora subaurea Zahlbr.

Carnic Alps: - M. Zoufplan (Cercivento, UD), 1900 m, on siliceous rock, 19.02.1989, leg. Bersan, rev. T (12802).

The thallus of this rare lichen is formed by small, convex areolae with peripheral, lemon-yellow soralia, reacting P+ orange. It grows on steep to

overhanging faces of metal-rich siliceous rocks, in the alpine belt. For Italy there is only a rather dubious record from Sicily by Poli et al. (1990).

Lecanora subintricata (Nyl.) Th. Fr.

Carnic Alps: - M. Brutto Passo, 1750 m, on *Larix*, 21.08.1983, leg. N (3411). *Julian Alps*: - Foresta di Tarvisio, Valbruna (UD), 1100 m, 20.11.1982, leg. N (2958).

This species is distributed from the boreal zone to upland areas of central Europe, and mainly grows on the bark and lignum of conifers. It was rarely cited from Italy (South Tyrol, Lombardy, Piedmont), but it has been probably overlooked. New to the region.

Lecanora umbrosa Degel.

Carnic Alps: - M. Novarza (UD), 1700 m, on sandstone, 11.09.1984, leg. N (4469). - M. Pieltinis (UD), 1900 m, on Werfen sandstone, 20.09.1981, leg. Loi & N (2033). - Lago di Sauris, Lateis (UD), below F.la Novarza, c. 1650 m, on calcareous sandstone, 12.09.1991, leg. T (15384),

For Italy this species has been previously reported only from Sardinia; it is rather frequent in the subalpine belt of the Carnic Alps where sandstone or other base-rich siliceous rocks occur. The specimens are richly fruiting.

Lecidea alpestris Sommerf.

Carnic Alps: - M. Crostis, 2000 m, on soil, 05.09.1984, leg. N (3514).

This species has an arctic-alpine distribution and grows on plant remains and raw humic soils, mainly on acid substrata. For Italy it was known only from old collections of the previous century. New to the survey area.

Lecidella carpathica Körber

Carnic Alps: - M. Pieltinis, 1800 m, on sandstone, 20.09.1981, leg. Loi & N (2044). - M. Novarza, 1650 m, on sandstone, 11.09.1984, leg. N (4498). - Lateis, above C.ra Novarzutta, 1730 m, on sandstone, 28.09.1988, leg. N & T (10860).

This is a common species of base-rich siliceous substrata, not previously reported from Friuli.

Lecidella euphorea (Flörke) Hertel

Carnic Alps: - Between Timau and M. Croce Carnico, 1100 m, on *Fagus*, 28.10.1982, leg. N (2862). - Stregna, 600 m, on *Juglans*, 08.1981, leg. Nimis (2758).

L. euphorea is an epiphytic lichen whose distinction from the more common *L. elaeochroma* is mainly based on the non-inspersed hymenium and the absence of a C+ reaction of the thallus. In the region it is rather frequent, especially in the *Fagus* belt.

Lecidella scabra (Taylor) Hertel & Leuckert

Karst: - Contovello, 200 m, on sandstone wall, 04.1988, leg. T (10486).

The specimen is sterile, but corresponds well with abundant collections from the Tyrrhenian region. *L. scabra* has a rather suboceanic distribution in Europe,

and is more frequent in the Mediterranean and Submediterranean zones. New to the region.

Lecidella stigmatea (Ach.) Hertel & Leuckert

Carnic Alps: - M. Novarza, 1870 m, on sandstone, 11.09.1984, leg. Nimis (4474). - M. Lagna, 1700 m, on sandstone, 09.10.1984, leg. N (4606). *Carnic pre-Alps*: - Tarcento, 350 m, on sandstone, 26.12.1982, leg. N (3097). *Friulian Plain*: - Faedis, 160 m, on sandstone, 04.1979, leg. N (3106). - Spilimbergo, 130 m, on limestone, 02.1985, leg. Loi (5348).

Lecidella stigmatea is a common species, growing on walls, also inside urban areas. In the survey area it is rather frequent on sandstone, in the *Quercus*-belt.

Lecidella wulfenii (Hepp) Körber

Carnic Alps: - Piz di Mede (UD), 1950 m, on mosses on a ridge, 09.08.1986, leg. N (7712). - M. Tinisa (UD), 1850 m, on plant remains on soil, on a ridge, 02.09.1988, leg. T (10753).

This species is distributed in arctic and alpine regions of Europe, extending southwards to the Balkan Peninsula. It grows on plant remains and raw soil on calcareous substrata. It is very common in the alpine belt of the Carnic and Julian Alps, but was little collected. New to the survey area.

Lecidoma demissum (Rutström) G. Schneider & Hertel

Carnic Alps: - Ridge between M. Auernig and M. Carnizza, 1900 m, on acid soil and plant debris, 04.06.1989, leg. Bersan (13895). - Piz Chiadin, 2100 m, on acid soil, 13.11.1983, leg. Palma (3825). - M. Zoufplan, 1950 m, on soil, with *Cetraria*, 19.02.1989, leg. Bersan (12272). - M. Paularo, c. 1950 m, on acid soil, 29.09.1990, leg. T (15431).

This species, which is rather common on peaty, acidic soils in the alpine belt, has never been reported from the survey area.

Leprocaulon microscopicum (Vill.) D. Hawksw.

Karst: Contovello (TS), c. 160 m, in fissure in a sandstone wall, on soil, south exp., 26.12.1988, leg. T (10808).

L. microscopicum is distributed in warm regions of the Northern Hemisphere, with a frequency maximum in Mediterranean and Submediterranean areas with a suboceanic climate. It is usually terricolous, being found in niches or protected parts of sandstone, or base-rich siliceous rocks, but it occurs also on the bark of different phorophytes (*Olea*, *Quercus ilex*, *Q. petraea*) in areas with a suboceanic climate. In the survey area it is restricted to the warmer parts of the coastal region, and is rare. New to the region.

Leptogium cyanescens (Rabenh.) Körber

Carnic Alps: - High Pesarina valley, 1300 m, on mosses, near a creek, 03.09.1983, leg. N (3539). - Above Paularo, 800 m, on mosses at the base of *Fagus*, 10.08.1983, leg. N (3373). - Lago di Sauris, Bosco della Stua, 1100 m, on mosses at the base of *Fagus*, 07.09.1983, leg. N (3558). *Carnic pre-Alps*: - Val Cellina, Lesis (Claut, PN), c. 700 m, on mosses, 07.10.1986, leg. N (9717).

In Italy this suboceanic species is present along the whole Peninsula, but nowadays it is not frequent; it grows on epiphytic mosses in rather humid sites.

Leptogium diffractum Krempelh. ex Körber

Friulian Plain: - Paludea (PN), on limestone, 13.03.1985, leg. Loi (5463).

Karst: - Val Rosandra (TS), 200 m, on limestone, vertical face, 01.1984, leg. N (5537). - M. Radio (TS), 150 m, on limestone in shadow, 15.06.1985, leg. N (5789).

This *Leptogium* is a calcicolous crustose lichen, rather frequent in the Karst, on rocks with periodical water seepage.

Leptogium gelatinosum (With.) Laundon

Carnic Alps: - M. Tiarfin, 1900 m, on soil, 09.1982, leg. N (2634). - M. Lagna, 1800 m, on epilithic mosses, 10.09.1984, leg. N (4594). - C.re Razzo, 1750 m, on mosses, 07.08.1986, leg. N (7819).

L. gelatinosum is rather frequent in the alpine belt of the region, on mosses or plant remains, on calcareous substrata including limestone.

Leptogium plicatile (Ach.) Leighton

Karst: Val Rosandra, 200 m, on periodically wetted, vertical limestone face, 09.1982, leg. N (5800). - M. Radio, 150 m, on limestone in shadow, 15.06.1985, leg. N (5792).

A widespread species of calcareous rocks, rather common in the Karst area.

Leptogium schraderi (Ach.) Nyl.

Carnic pre-Alps: - Claut (PN), 700 m, on mosses, 15.05.1983, leg. Loi (3298). *Julian pre-Alps*: - M. Bernadia (UD), 600 m, on calcareous soil, 16.09.1983, leg. N (3593).

Karst: - M. Grisa (TS), 250 m, on limestone, subvertical face, 10.06.1985, leg. N (5749). - Cernizza (Duino- Aurisina, TS), near the ILVA quarry, 2 m, in a fissure of the rock, limestone, 05.02.1991, leg. T (15072). - Val Rosandra, c. 150 m, on calcareous stone in shadow, 14.12.1981, leg. Loi & N, rev. T (2304).

L. schraderi is a small, fruticose lichen growing on calcareous rocks with some soil cover; when young it is often found on epilithic mosses. It was previously cited from the Karst area by Nimis & Loi (1982, 1984), and is new to Friuli; the sample 2304 was erroneously identified by the latter authors as *Placynthium filiforme*, a species that has never been collected in the Karst.

Leptogium tenuissimum (Dickson) Körber

Julian Alps: - Foresta di Tarvisio, above Valbruna, 1100 m, on a bole, 20.11.1982, leg. N (3070).

This species can be easily mistaken for small, strongly fimbriate specimens of *L. lichenoides*. The specimen from the Julian Alps has, however, very narrow, cylindrical, rather branched laciniae; in my opinion it can be correctly named *L. tenuissimum*.

Lobaria pulmonaria (L.) Hoffm.

Karst: - Gropada, on *Q. petraea*, in a dolina, 03.1989, leg. Bersan (11650). - Slovenia, between Lokev and Divaca, c. 360 m, on *C. betulus*, 14.04.1990, leg. T (13952)

Some specimens of *L. pulmonaria*, preserved in the herbb. Biasoletto (TSM) and Schuler (PAD), were collected in the previous century in the surroundings of Trieste (Aurisina, Draga, Val Rosandra), where apparently this species was

more common. Nowadays it is very rare in the Karst area, being restricted to the largest dolinas.

Lobaria scrobiculata (Scop.) DC.

Carnic Alps: - Lago di Sauris, Bosco della Stua, 1020 m, on *Fagus*, 15.09.1985, leg. N (6455). *Julian pre-Alps*: - M. Jonaz, above Montefosca (Pulfero, UD), 820 m, on *Fraxinus excelsior*, 02.08.1985, leg. N (6298).

This is a widespread species, with suboceanic affinities, growing on bark or siliceous rocks, mainly on mosses. In the survey area it is very rare, being restricted to humid, undisturbed forests. In Italy this species was more frequent in the past, due to its sensitivity to air pollution.

Loxospora cismonica (Beltram.) Haf.

Carnic Alps: - Passo Pura (UD), Bosco della Stua, 1150 m, on *Abies*, 11.09.1987, leg. N & T.

This species was previously known only from a few collections of the last century in Veneto. It is a rare lichen of the central European mountains, growing in humid sites on the bark of old trees, mainly *Abies*.

Loxospora elatina (Ach.) Massal.

Carnic Alps: - Lago di Sauris (UD), Bosco della Stua, 1100 m, on *Abies* and *Fagus*, 15.09.1985, leg. N (6457).

L. elatina is widespread in the boreal zone, on the bark of conifers in humid situations. This species, which in Italy was collected only by Massalongo in Veneto, was already reported from the Carnic Alps by Clerc (1984). Third record for Italy.

Maronea costans (Nyl.) Hepp

Karst: - Road between Ferneti and Zolla (TS), c. 330 m, on *Q. pubescens*, 18.02.1992, leg. Castello & Campagnolo (15972).

M. constans was known for Italy only from old collections of the last century. It is a rather nitrophytic, epiphytic lichen, rather sensitive to air pollution, which in the field can be easily mistaken for a *Rinodina*. New to the survey area.

Melaspilea cfr. leciographoides Vouaux

Karst: - Between Gropada and Basovizza (TS), c. 380 m, parasite on *Petractis clausa*, on limestone, in a doline, 25.12.1992, leg. t (16653).

The identification of this taxon is not certain. *M. leciographoides* has been collected only on *Verrucaria* species (Hawksworth, 1983; Clauzade et al., 1989), while our specimen is parasitic on a well-developed, fruiting thallus of *Petractis clausa*. The anatomical characters of this specimen fit well with the description of the species.

Melaspilea proximella Norrlin

Carnic Alps: - Ampezzo (UD), 500 m s.l.m., on *Quercus*, 26.09.1986, leg. N, rev. T (7939). *Carnic pre-Alps*: - Tramonti di Sotto (PN), 600 m, on *Fraxinus ornus*, 14.10.1983, leg. N, rev. T (3657).

This species is rather rare in the Italian territory and seems to prefer the bark of deciduous trees.

Melaspilea urceolata (Fr.) Almb.

Friulian Plain: - Feletto Umberto, UD, on *Morus*, 130 m, 11.01.1983, leg. N (3104). - Colle di Cormons (GO), on *Quercus*, 27.12.1982, leg. N (3022). - Torrate (PN), 24 m, on *Morus*, 24.10.1985, leg. Loi (6592).

This lichen seems to have a rather suboceanic distribution in Europe, and prefers the bark of deciduous trees. I observed it mainly in open, mixed deciduous, submediterranean woods. New to Friuli.

Micarea lignaria (Ach.) Hedl.

Carnic Alps: - Lateis (UD), M. Novarza, c. 1870 m, on plant remains on soil, 28.09.1988, leg. N

This is said to be one of the most common species of the genus, but in the survey area it was collected only once, on plant remains on soil. It is easily distinguished by the bright orange reaction to P. New to Friuli.

Micarea misella (Nyl.) Hedl.

Carnic Alps: - Passo Pura, 1400 m, on lignum, in *Abieti - Fagetum*, 07.1981, leg. N (2225). - Cansiglio (UD), 900 m, on lignum, 09.1981, leg. De Faveri & N (2214). - Towards Passo Volajaia, c. 1600 m, on decorticated lignum of a stump, 28.09.1990, leg. T (15941).

A widespread species, growing on lignum in areas with a humid climate, in Italy it is known only from the north. New to the survey area.

Microcalicium disseminatum (Ach.) Vainio

Julian Alps: - M. Florianca, near the creek Lussari, c. 1550 m, on *Picea excelsa*, 20.07.1991, leg. T, det. D. Puntillo (15352).

This species is known for Italy from a few, old collections in the Alps; it grows as a parasite on other species of *Caliciales* or as saprophyte on bark. New to the region.

Miriquidica garovaglii (Schaerer) Hertel & Rambold

Carnic Alps: - M. Paularo, 2000 m, on siliceous rocks, 16.08.1981, leg. N (1726). - M. Crostis, 2000 m, on siliceous, vertical face, 05.09.1983, leg. N (3497). - M. Paularo, c. 2050 m, on siliceous rock, 29.11.1990, leg. T (15077).

M. garovaglii seems to prefer mineral-rich siliceous rocks, and grows on wind-exposed situations in the alpine belt. It is not uncommon in the inner Carnic Alps.

Mycobilimbia lobulata (Sommerf.) Haf.

Carnic Alps: - M. Tiarfin, 2200 m, alpine meadow, on limestone, 09.1982, leg. N (2719). - Passo Pramollo, 1600 m, on calcareous soil, 25.11.1983, leg. Palma (3832). - M. Lagna, 1900 m, on mosses, on

calcareous substratum, 10.09.1984, leg. N (4600). - Passo Volaja, 2000 m, on soil, 07.09.1981, leg. N (3721). - Passo Volaja, c. 2000 m, on soil in rock fissures (limestone), 28.09.1990, leg. T. *Julian Alps*: - M. Canin, Sella Prevala, 2100 m, on calcareous soil, on wind-swept ridge, 07.1981, leg. N (2455).

M. lobulata is an arctic-alpine species, extending southwards into the highest Mediterranean mountains; it grows on calcareous soil or on terricolous mosses. It is common in the eastern calcareous Alps. New to Friuli.

***Mycocalicium subtile* (Pers.) Szat.**

Julian Alps: - M. Florianca, slope W, 1590 m, on a dry stump of *Picea*, 20.07.1991, leg. T (15353).

A widely distributed species, occurring on dry lignum in open situations and characterized by a dark greenish to brownish stalk tissue; probably overlooked in the Italian Peninsula (Puntillo, in litt.). New to Friuli.

***Nephroma bellum* (Sprengel) Tuck.**

Carnic Alps: - Passo Pura (UD), 1440 m, on *Fagus*, 07.08.1986, leg. N (7764). *Julian Alps*: - Malga Saisera, 1080 m, on *Fagus*, 29.09.1986, leg. N (7895).

N. bellum has a circumboreal-temperate, suboceanic distribution and is quite rare in the survey area. It grows on mossy bark in humid woods of the montane belt.

***Nephroma parile* (Ach.) Ach.**

Carnic Alps: - Above the Lago di Sauris, 1100 m, on *Fagus*, 09.08.1981, leg. De Faveri & N (1754). - M. Brutto Passo (UD), 1700 m, on mosses at the base of *Fagus*, 21.08.1983, leg. N (3409). - Above Lago di Sauris (UD), 1000 m, on *Fagus*, 15.09.1985, leg. N (6458). *Julian Alps*: - Laghi di Fusine (UD), 1450 m, at the base of *Fagus*, on mosses, 23.07.1984, leg. N (4313).

Karst: - Dolina near Rupingrande, 300 m, 02.1980, leg. Gerdol, rev. T (963). - Slivia (Duino-Aurisina, TS), near a doline, c. 200 m, on epiphytic mosses (*Q. petraea*), 28.04.1991, leg. T (15969).

This species is rather common in the beech belt of the region, on the mossy bark of different phorophytes. It has a large distribution extending to both Hemispheres. Only poorly-developed thalli have been found in the Karst, in the largest dolinas; their identification is not easy, but the species has been reported also by Glowacki (1874) from the same area.

***Ochrolechia alboflavescens* (Wulfen) Zahlbr.**

Carnic Alps: - M. Brutto Passo, 1750 m, on *Larix*, 21.08.1983, leg. N (3416). M. Coglians, road towards Rif. Marinelli, 1700 m, on *Larix*, 08.1981, leg. N (2761). - Casera Razzo (BL), 1750 m, on *Larix*, 19.09.1981, leg. N (1980). - Passo Pura, 1500 m, on *Larix*, 09.08.1981, leg. De Faveri & N (1824). - Above Collina (Forni Avoltri, UD), 1700 m, on *Larix*, 07.1981, leg. N (2048). *Julian Alps*: - Rif. Grego, 1400 m, on *Fagus*, 20.11.1982, leg. N (2971). - Rif. Grego, 1400 m, on bark of *Fagus*, 20.11.1982, leg. N (4195).

This species, growing on the acid bark of conifers, has a circumboreal-montane distribution. Well-developed thalli are usually found on *Larix* in the subalpine belt. All specimens have the typical yellow-orange reaction to KC.

Ochrolechia parella (L.) Massal.

Karst: - M. Valerio (TS), 120 m, on sandstone, in a wood of *Q. petraea*, 10.05.1985, leg. N (5794). - M. Radio, 110 m, on sandstone, in a wood, 15.06.1985, leg. N (5778). - Conconello (TS), on sandstone wall, strongly nutrient- enriched, 20.12.1978, leg. N (445). - Contovello (TS), slope S, 250 m, on sandstone wall, exp., 18.05.1988, leg. T (10965).

O. parella has a very wide distribution, extending to the Southern Hemisphere. In Italy it is very common on siliceous rocks, in areas with a suboceanic climate, below the montane belt. In the survey area it occurs only on sandstone outcrops in the warmer districts near the coast, and was previously reported by Glowacki (1874). Many specimens are badly developed.

Ochrolechia szatalaensis Vers.

Julian Alps: - Foresta di Tarvisio, Valbruna (UD), 1100 m, on *Picea* twigs, 20.11.1982, leg. N (2922).

This species grows mainly on the bark of conifers, and seems to be rather rare in the Italian Peninsula, being known only from South Tyrol and Calabria. It might have been confused by earlier authors with the more common *O. pallascens*, distinguished by the absence of gyrophoric acid in the apothecia.

Ochrolechia upsaliensis (L.) Massal.

Julian Alps: - M. Canin, 1500 m, on mosses on soil, 10.07.1977, leg. N, det. Poelt (447).

O. upsaliensis has a broad, arctic-alpine distribution and grows on plant remains and raw humus. In Italy it is present only in the Alps. New to Friuli.

Ophioparma ventosa (L.) Norman

Carnic Alps: - M. Paularo, 2000 m, on siliceous rock, north exp., vertical, 16.08.1981, leg. N (1715).

This species grows on hard siliceous rocks in exposed situations and has an arctic-alpine distribution. In the Carnic Alps it is not common.

Orphniospora mosigii (Körber) Hertel & Rambold

Carnic Alps: - M. Crostis, 1950 m, on sandstone wall, north exp., 07.1983, leg. N, det. Poelt (4223). - M. Crostis, 2000 m, on siliceous rock, vertical face, north exp., 05.09.1983, leg. N, rev. T (3599)

This species seems to prefer base-rich siliceous rocks; it is certainly not common in the survey area.

Pannaria conoplea (Ach.) Bory

Carnic Alps: - Lago di Sauris, Bosco Flobia, above Rio Storto, 1150 m. on epiphytic mosses (*Fagus*), 12.09.1991, leg. N & T (15380). - Passo Pura (UD), Bosco della Stua, along the lake road, c. 1100 m, on *Picea*, 11.09.1987, leg. N & T (9730). - Bosco della Stua, above the lake of Sauris, 970 m, on mosses on bark of *Fagus*, 07.09.1983, leg. N (3557). *Julian Alps*: - Malga Saisera (Valbruna, UD), 1080 m, on *Fagus*, 29.09.1986, leg. N (7898). - Foresta di Tarvisio, above Valbruna, 1100 m, on *Fagus*, 20.11.1982, leg. N (2964).

P. conoplea has a wide range, extending to America, Africa and Asia. It prefers suboceanic conditions, and in Italy is rather frequent in *Lobarion*-communities, in montane forests, usually over epiphytic mosses. It was previously reported from the Carnic Alps by Degelius (1935) and Clerc (1983).

Pannaria pezizoides (G.H. Weber) Trevisan

Carnic Alps: - Passo Volaja, near the border, c. 2000 m, on plant debris, 28.09.1990, leg. T (15938). - M. Paularo, c. 1950 m, on acid soil, among the mosses, 29.09.1990, leg. T (15428). - Lateis, F.la di M. Novarza, c. 1870 m, on acid soil, N exp., 28.09.1988, leg. T & N (11260). - M. Pieltinis, 1450 m, on acid rocks, in *Abieti-Fagetum*, 20.09.1981, leg. Loi & N, rev. P. James (1987). - M. Tiarfin, 2200 m, on soil, 20.09.1981, leg. Loi & Nimis (2026). - M. Novarza, 1870 m, on mosses and sandy soil, 11.09.1984, leg. N (4480). *Julian Alps*: - Laghi di Fusine, on epigaeic mosses, 1450 m, 23.07.1984, leg. N (4310). - M. Lopa, 1300 m, 09.08.1983, leg. N (3377).

A very common species, which grows on raw humus and plant remains, forming large crustose thalli characterized by the numerous crowded apothecia with a granular thalline margin. In Italy it is frequent in the subalpine and alpine belts, from the Alps to the Calabrian Apennines.

Pannaria praetermissa Nyl.

Carnic Alps: - Passo Volaja, on terricolous mosses, c. 1950 m, 28.09.1990, leg. T (15417).

P. praetermissa is an arctic-alpine species, present also in the southern European mountains, on mosses and soil on calcareous substrata.

Paranectria oropensis (Ces.) D. Hawksw. & Pir.

Karst: - Precenico (Duino- Aurisina, TS), on *Quercus* sp., 120 m, 13.03.1988, leg. N & T (10143). - Precenico (Duino- Aurisina, TS), on *Q. petraea*, c. 200 m, 16.03.1991, leg. T (15109). - Borgo Grotta (TS), in a large dolina, c. 230 m, on epilithic mosses, 03.09.1991, leg. T (15355).

This non-lichenized fungus is rather frequent in the submediterranean woods of the Karst during spring; it grows on different lichen species, mainly *Parmelias* and epiphytic *Cladonias*. We also have some collections from Istria.

Parmelia acetabulum (Necker) Duby

Carnic pre-Alps: - Cimolais, 650 m, on *Tilia*, 03.06.1988, leg. T (10535).

This species is very common throughout the region, but it was not recorded previously. It is absent from the more humid parts of the survey area, being more common in the inner dry valleys and in the Karst area.

Parmelia carporrhizans Taylor

Carnic Alps: - Collina (Forni Avoltri, UD), 1200 m, on *Sorbus*, 07.08.1981, leg. N (1964). - Villa Santina (UD), 400 m, on *Juglans*, 22.05.1987, leg. N (8024). - Ampezzo Carnico (UD), 650 m, on *Alnus*, 30.12.1984, leg. Geatti (4859). - From Ravescletto, 4 km before Comeglians, c. 750 m, on *Juglans*, 26.05.1988, leg. T (10557).

This species is widespread in the Mediterranean and submediterranean parts of Europe, but in the survey area is present only in its inner districts, being absent from the Karst and the pre-Alps. Its Italian distribution is still not clear, its clarification requiring a revision of the group of *P. carporrhizans*-*P. quercina* in Italy.

Parmelia conspersa (Ach.) Ach.

Carnic Alps: - M. Paularo, 1900 m, on siliceous outcrops and on mosses, 10.08.1983, leg. N (3367).
- Piz di Mede, 1800 m, on sandstone, 09.08.1986, leg. N (7716). *Friulian Plain*: - Near Bueris, on sandstone, 10.11.1983, leg. N (3766).

Karst: - Contovello, 150 m, on sandstone, 18.05.1988, leg. T (10958).

This is the commonest *Xanthoparmelia* of the survey area, distributed from sea level to the alpine belt. It grows mainly on siliceous rocks, but in the Karst area it is rather common also on sandstone.

Parmelia flaventior Stirton

Karst: - Duino, Cernizza, between the ILVA quarry and Villaggio del Pescatore, c. 15 m, on *Prunus mahaleb*, 21.10.1991, leg. T & Bolognini (15851).

This lichen was said to prefer continental climatic conditions, but our collections are from rather humid sites (M. Musi, see Castello & al. 1990) or just near the coast, as the cited one, which is the first known from the Karst area. In my opinion, *P. flaventior* might be more common than normally assumed, and with a larger distribution range. In the Cernizza area *P. flaventior* occurs together with the similar *P. caperata* and *P. soredians* (see later). Probably the apparent rarity of this lichen is mainly due to confusion with the very common *P. caperata*.

Parmelia loxodes Nyl.

Karst: - Altura (TS), c. 100 m, on sandstone, in open woodland of *Q. petraea*, 07.03.1988, leg. N (10101). - Contovello (TS), south slope, c. 250 m, on sandstone, 18.05.1988, leg. T (10941).

This species is distinguished from the very similar *P. verruculifera* by the presence of glomelliferic and perlatolic acid, and by the larger, more convex lobes. In the region it is restricted to the warmer sites of the coast, on decalcified sandstones. New to the survey area.

Parmelia omphalodes (L.) Ach.

Carnic Alps, M. Paularo, 2000 m, on siliceous rocks and epilithic mosses, 16.08.1981, leg. N (1706).

P. omphalodes grows on mosses and acid siliceous rocks in the alpine belt, and is morphologically variable. It was collected only once, and it is not common in the survey area, due to the scarcity of siliceous substrata.

Parmelia revoluta Flörke

Friulian Plain: - Usago (PN), 300 m, on *Prunus avium*, 02.1985, leg. Loi (5323).

Karst: - Precenico (Duino- Aurisina, TS), 120 m, on *Q. petraea*, 13.03.1988, leg. N & T (10112).

P. revoluta is an epiphytic species, which is frequent in areas with a suboceanic climate, below the montane belt. In the Julian pre-Alps it is very frequent in the *Aceri-Fraxinetum* community, while in the Karst it is very rare, occurring only in large dolinas or in areas open to humid air from the sea.

***Parmelia sinuosa* (Sm.) Ach.**

Carnic Alps: - Lago di Sauris (UD), 970 m, on *Salix*, 09.08.1981, leg. De Faveri & N (1744).

Collected only once in the survey area, in a very humid site. This species, new to Friuli, is a true oceanic lichen, and seems to be very rare in Italy.

***Parmelia somloensis* Gyelnik**

Carnic Alps: - Between Ravaschetto and Tualis (UD), 850 m, on soil (sandstone), 19.02.1989, leg. Bersan (12808).

Karst: - Contovello (TS), c. 180 m, on acid sandstone, south exp., 28.11.1988, leg. T (10846).

P. somloensis is a very variable species with a broad ecological amplitude, growing on rather acid substrata (rock and soil). I have observed populations with a completely white lower cortex, and others which are dark brown, or black; also the morphology is somewhat different; they perhaps belong to different taxa. New to the survey area.

***Parmelia soledians* Nyl.**

Julian pre-Alps: - Gradischiutta (UD), c. 370 m, on *Prunus avium*, 04.11.1990, leg. Carpanelli (14749). - Campeglio (UD), c. 170 m, on *Q. petraea*, 18.07.1990, leg. T (14505). *Friulian Plain*: - Bellazioia (Povoletto, UD), 140 m, on *Robinia pseudacacia*, 23.07.1990, leg. Carpanelli (14579).

Karst: - Basovizza, 300 m, on *Tilia*, leg. T (13235). - Duino, Cernizza, c. 25 m, on lignum, 21.12.1990, leg. T (14772). - Contovello, c. 200 m, on sandstone, 07.08.1991, leg. T (15463). - Sorgenti di Aurisina, c. 80 m, on *Pistacia terebinthus*, 23.01.1988, leg. T (11259).

This species, not previously reported from the region, has a broad pantemperate distribution, and grows both on bark and siliceous rocks. In the Karst area it is more frequent along the coast, and seems to be damaged by winter frost: In Friuli it is rather common in the narrow hill area on south-exposed slopes with a warm-temperate climate. This lichen can be easily mistaken for *P. caperata*, which differs in the laminal (not orbicular) soralia and the larger lobes not closely adpressed to the substratum.

***Parmelia subargentifera* Nyl.**

Carnic Alps: - Forni di Sopra (UD), 900 m, on *Pyrus*, 02.12.1980, leg. De Faveri (2209). - Ligosullo, 1100 m, on *Prunus*, 16.08.1981, leg. N (1858). - Ampezzo Carnico, 560 m, on *Juglans*, 07.08.1986, leg. N (7779). - Da Ravaschetto, 4 km before Comeglians, c. 750 m, on *Juglans isolato*, 26.05.1988, leg. T (10569). - Ampezzo Carnico (UD), 560 m, on *Tilia*, 08.08.1986, leg. N (7746). *Julian pre-Alps*: - Val di Resia, Prato di Resia (UD), 480 m, on *Fraxinus* and *Acer*, 27.09.1987, leg. N & T (9812).

Karst: - Basovizza (TS), 400 m, on *Q. pubescens*, 08.1981, leg. Loi (2221). - Basovizza (TS), 380 m, on *Tilia*, 17.03.1989, leg. T (12223). - Gropada (TS), c. 400 m, on old *Q. pubescens*, 06.03.1990, leg. T (13723).

This species, distributed from the submediterranean to the subarctic zone, grows on the bark of isolated trees. Its distribution in Italy, extending to the eastern site of the peninsula and to the inner dry Alpine valleys, seems to suggest that the species is relatively xerophytic.

Parmelia submontana Hale

Carnic Alps: - Pierabech (Forni Avoltri, UD), 970 m, on *Abies alba*, 30.09.1986, leg. N (7881). *Julian Alps*: - Rif. Grego, 1400 m, on bark of *Fagus*, 20.11.1982, leg. N (2977).

P. submontana is widespread in the central and southern European mountains, in areas with a suboceanic climate. It grows on the bark of deciduous trees, mainly *Fagus*, being locally common, as in beech forests of the Calabrian Apennines. This species has been previously reported by Clerc (1983) from the Carnic Alps. New to the Julian Alps.

Parmelia subrudecta f. marginata Hillmann

Julian pre-Alps: Montaperta (UD), on *Prunus avium*, c. 620 m, leg. Carpanelli, det. Codogno & T, conf. Poelt (15418).

Typical *P. subrudecta* is a common species of *Parmelion* and *Xanthorion* communities, with an optimum in the submediterranean zone, below the montane belt. The f. *marginata*, not previously reported from Italy, is characterized by laminar soralia and very poorly-developed pseudocyphellae.

Parmelia verruculifera Nyl.

Karst: - Between S. Croce and Filtri di Aurisina, c. 10 m, south exp., on sandstone, 06.1988, leg. T, rev. T (10530).

This species can be distinguished from the similar *P. loxodes* on the basis of the lobe shape, which are somewhat more convex and narrow, and, more easily, by the different chemistry. *P. verruculifera* reacts C+ red, while *P. loxodes* reacts C+ pale yellow.

Parmeliella triptophylla (Ach.) Müll. Arg.

Carnic Alps: - Bosco della Stua, above the lake of Sauris, 1000 m, on *Fagus*, 04.09.1986, leg. N (7831). - Lateis (UD), 1150 m, on *Fagus*, in *Abieti- Fagetum*, 12.09.1984, leg. N (4484). - M. Novarza, 1650 m, on mosses on soil, on sandstone, 11.09.1984, leg. N, rev. Codogno & T (4459). - M. Tenchia (Cercivento, UD), 1400 m, on epigeaic mosses, 12.06.1988, leg. Bersan, rev. Codogno & T (10453). *Julian Alps*: - Malga Saisera (Valbruna, UD), 1080 m, on an old *Fagus*, 29.09.1986, leg. N (7897).

This is a holarctic species, with a broad ecological amplitude, growing on bark, siliceous rocks and epigeaic mosses. The specimens from the lake of Sauris are richly fruiting.

Parmotrema crinitum (Ach.) M. Choisy

Carnic Alps: - Cercivento (UD), 700 m, spruce wood, on humid soil, on mosses, 17.02.1989, leg. Pitt (11329). - Passo Pura (UD), Bosco della Stua, 1150 m, on *Picea*, 11.09.1987, leg. N & T (9732). - Bosco della Stua, above the lake of Sauris (UD), 1200 m, on *Abies alba*, in *Abieti- Fagetum*, 13.09.1984, leg. N (4481). - Pierabech (UD), 970 m, on *Abies alba*, 30.09.1986, leg. N (7884). - Lake of Sauris, Bosco della Stua, c. 1040 m, on *Abies*, 26.11.1990, leg. T (15080). - Lago di Sauris, Bosco della Stua, c. 1100 m, on *Fagus*, 09.1990, leg. Bolognini & N (14729).

This is a widespread suboceanic species of bark and epilithic mosses, occurring in humid situations. In Italy it is present only in the pre-Alps and in

the Ligurian Apennines, where it is locally abundant (Coassini et al. 1987). In the survey area it is frequent only in the surroundings of the lake of Sauris.

Peccania coralloides (Massal.) Massal.

Julian pre-Alps: - Ciseriis (Tarcento, UD), 350 m, on limestone, 05.11.1982, leg. N (2999).

Karst: - Val Rosandra, calciferous, vertical face, 14.01.1981, leg. Loi & N (2288). - Val Rosandra, 160 m, on limestone, 27.12.1981, leg. Loi & N (2392).

This species seems to be rather frequent throughout Italy, but has been rarely collected. It grows on steeply inclined, sunny faces, on calcareous substrata.

Peltigera collina (Ach.) Schrader

Carnic Alps: - Passo Pura, Bosco della Stua, road near the lake, 1100 m, on *Salix appendiculata*, 11.09.1987, leg. N & T (9735). - Lago di Sauris, 1000 m, on mosses at the base of *Fagus*, in *Lobarietum pulmonariae*, 09.08.1981, leg. De Faveri & N, conf. O. Vitikainen (1742). *Julian Alps*: - Foresta di Tarvisio, near Valbruna, 1100 m, on epiphytic mosses (*Fagus*), 20.11.1982, leg. N (2929).

P. collina is a suboceanic species, which is frequent in *Lobarion*-communities, on mossy bark. In the survey area it is frequent in the *Fagus*-belt. Previously reported by Clerc (1983) and Nimis (1981) from the Carnic Alps.

Peltigera didactyla (With.) Laundon

Carnic Alps: - Passo Cason di Lanza, 1550 m, on soil, on siliceous substratum, 23.07.1984, leg. N (4370). - Casera Razzo (BL), 1730 m, on soil, 13.07.1981, leg. Fragiaco & N, conf. O. Vitikainen (1642).

A characteristic, ephemeral pioneer lichen, which grows on sandy soils or burned humus, in disturbed sites. It is known from both Hemispheres, and occurs throughout Italy. It is new to Friuli.

Peltigera lactucifolia (With.) Laudon

Julian pre-Alps: - High Torre valley, Passo of Tanamea, 700 m, on epilithic mosses, 27.09.1987, leg. N & T (9830).

This species was rarely collected in Italy, where it seems to be restricted to the Alpine regions. New to the survey area.

Peltigera lepidophora (Nyl.) Bitter

Carnic Alps: - Piz di Mede, 2000 m, on soil on acid substratum, 09.08.1986, leg. N (7728). - Road between Tualis and Ravaschetto (UD), 850 m, on soil (silice), 19.02.1989, leg. Bersan (12807).

This is a very nice species, characterized by flat isidia irregularly distributed on the small thallus, which is covered by tomentum along the margins. It has a circumboreal range, and is rather rare in the Alps. For Italy it was previously known only from South Tyrol. New to Friuli.

Peltigera malacea (Ach.) Funck

Carnic Alps: - M. Chiadin, 1900 m, on acid soil, 13.11.1983, leg. Palma (3796).

P. malacea grows on mosses and plant remains on siliceous soils in the Alpine belt, and has a circumpolar-alpine distribution. In the Carnic Alps it is rare.

Peltigera neckeri Müll. Arg.

Carnic Alps: - M. Tinisa, 1700 m, on soil, 08.1982, leg. Loi (2702). - M. Brutto Passo, 1800 m, on soil, on sandstone, with *Calluna*, 16.09.1985, leg. N (6478). *Julian Alps*: - Foresta di Tarvisio, near Valbruna (UD), 1200 m, on soil on mosses, 20.11.1982, leg. N (2960).

This species is widespread from Scandinavia to the Mediterranean mountains and grows on base-rich soil. It belongs to the *P. polydactyla* group and its status has been recognized only by recent authors, so that its Italian distribution is still poorly understood.

Peltigera ponojensis Gyelnik

Carnic Alps: - Piz di Mede, 2000 m, on soil, on wind-swept ridge, 09.08.1986, leg. N (7686).

The Italian distribution of this species is badly-known. It has been reported only from Veneto, South Tyrol, but probably it could have been confused with the closely related *P. rufescens*.

Peltigera venosa (L.) Hoffm.

Carnic Alps: - Piz di Mede, 2000 m, on soil, in subvertical sandstone face, north exp., 09.08.1986, leg. N (7680). - M. Paularo, 1900 m, on soil, 10.08.1983, leg. N (3354). - M. Novarza, 1870 m, on mosses, in subvertical sandstone face, north exp., 11.09.1984, leg. N (4494). - Passo Volaiia, near the lake, c. 2000 m, on mosses among the rocks, 29.09.1990, leg. T (14669).

P. venosa is a circumpolar-alpine species, of acid soil and mosses in humid sites. It is rather frequent in the Alps, but is also present, with isolated stations, along the Apennines .

Pertusaria coccodes (Ach.) Nyl.

Carnic Alps: - Passo Pura, 1050 m, near the road towards Sauris, 07.1979, leg. N, rev. T (1562).

Karst: - Lipica (Slovenia), 400 m, on *Quercus cerris*, 04.08.1989, leg. T & Castello (13299).

In the survey area this species is rather rare, and seems to be bound to more or less suboceanic climate conditions. The sample from Lipica, just a few kilometers from the Italian border, fits well with the description of the f. *phymatodes* (Ach.) Erichsen.

Pertusaria coronata (Ach.) Th. Fr.

Carnic Alps: - Passo Volaiia, road from the Rif. Tolazzi, c. 1470 m, on bark of conifer, 28.09.1990, leg. T (15091). - Lago di Sauris, Bosco della Stua, c. 1050 m, on *Abies*, 26.09.1990, leg. N & T (15083). - Passo Pura, 1480 m, on *Fagus*, 09.08.1981, leg. De Faveri & N (1979). - Conca di Sauris, forests above Lateis, 1400 m, on *Fagus*, 07.08.1986, leg. N (7763). *Julian Alps*: - Rif. Grego, 1400 m, on *Fagus*, 20.11.1982, leg. N (2976).

P. coronata seems to be limited to Europe where it grows on broad-leaved trees, in wayside and woodland sites. In Friuli it is more frequent than *P. coccodes*, which is morphologically very similar, but has more regular, clavate isidia and a different chemistry. New to the Julian Alps.

***Pertusaria flavida* (DC.) Laundon**

Carnic pre-Alps: Bosco del Cansiglio, 1050 m, on *Fagus*, 13.04.1981, leg. de Faveri (1135).

Karst: - Ferneti, in a large dolina, 400 m, on *Quercus cerris*, 09.1983, leg. N, rev. T (3650). - Lipica (Slovenia), on *Quercus cerris*, 400 m, 04.08.1989, leg. T & Castello (13300). - Between Lokev and Divaca (Slovenija), c. 360 m, on *Quercus cerris*, in a large dolina, 14.04.1990, leg. T (13995).

P. flavida is widespread in warm-temperate areas of Europe and North Africa. In the Karst it is more common in the interior, on the bark of old, isolated *Quercus* trees. Along the Italian Peninsula it is rather common on old *Castanea* trees.

***Pertusaria leucostoma* (Bernh.) Massal.**

Julian Alps: - Laghi di Fusine, 1450 m, on *Fagus*, 23.07.1984, leg. N (4350). - Rif. Greco, 1400 m, on *Fagus*, 20.11.1982, leg. N (2982). *Julian pre-Alps*: - M. Matajur, near the Rif. Pelizzo, 1400 m, at the base of *Fagus*, 28.12.1982, leg. N (3046).

P. leucostoma has a wide pantemperate distribution in the Northern Hemisphere. It is common throughout Friuli, with a frequency maximum in the beech belt.

***Pertusaria pustulata* (Ach.) Duby**

Karst: - Aurisina, 170 m, on *Quercus petraea*, 05.03.1987, leg. N & T (8386).

This is an epiphytic species, occurring mainly in the deciduous forest belt. In Europe it has a subatlantic-mediterranean range, being absent from East Europe. New to the Karst area.

***Phaeocalicium compressulum* (Vainio) A. Schmidt**

Carnic Alps: - M. Brutto Passo, 1700 m, on twigs of *Alnus viridis*, 21.08.1983, leg. N (3413). - Passo Pura, 1440 m, on twigs of *Alnus viridis*, 08.1981, leg. N (3090). - Casera Razzo (BL), 1850 m, on *Alnus viridis*, 07.08.1986, leg. N (7756). - M. Crostis, 1700 m, on twigs of *Alnus viridis*, 05.09.1983, leg. N (3550). *Julian Alps*: - Foresta di Tarvisio, Valbruna, 1200 m, on twigs of *Alnus*, 20.11.1982, leg. N (3068). *Julian pre-Alps*: - M. Joanaz, 900 m, on *Alnus*, 11.09.1983, leg. N (3554).

This species grows on the young twigs of *Alnus viridis* in the upper montane-subalpine belts of the Alps. It is common, but has been certainly overlooked. Cited from the Carnic Alps by Clerc (1983).

***Phaeophyscia cernohorskyi* (Nád.v.) Essl.**

Karst: - Val Rosandra, 200 m, on vertical calcareous faces, 27.12.1981, leg. Loi & N (2381). - Contovello, c. 180 m, on epilithic mosses (sandstone), 01.01.1989, leg. T (10932). - Near the S. Croce railway station, c. 120 m, on a sandstone wall, 23.03.1992, leg. T (16016).

P. cernohorskyi is a submediterranean species which is rather frequent, in the survey area, along the coast, on sandstone, where it forms large colonies.

***Phaeophyscia endococcina* (Körber) Moberg**

Carnic Alps: - M. Neddís (Paularo, UD), 1600 m, on siliceous rock, 06.01.1990, leg. Bersan (14069). - Casera Razzo (BL), 1730 m, on scists, 13.07.1981, leg. Fragiaco & N (1633).

P. endococcina grows on siliceous stones and epilithic mosses in the subalpine-alpine belts; it is distributed in the subboreal to cold-temperate zones of the

Northern Hemisphere. In our region this species is limited to the inner Carnic Alps, in rather dry, sunny situations. Schuler (1893) reported it from the Karst, but the specimens collected by him, and preserved in PAD, are epilithic forms of the sorediate *P. endophaenicea*.

Phaeophyscia endophaenicea (Harm.) Moberg

Karst: - Slivia (TS), near a large dolina along the road towards Visogliano, on epiphytic mosses (*Quercus*), 06.1991, leg. T (15976). - Malchina (TS), c. 200 m, on *Quercus*, 05.1988, leg. Castello (10594).

This lichen is distributed in southern and central Europe; it grows mainly on bark and mosses. The specimens from the Karst are usually very poorly-developed, and the species is certainly not common.

Phaeophyscia opuntiella (Poelt) Clauz. & Roux

Karst: - M. Grisa (TS), c. 150 m, on epilithic mosses (limestone), 06.1989, leg. N (15971).

This is a very inconspicuous lichen, which grows on epilithic mosses, other lichens and soil, in rather sunny sites. For Italy it was reported only from South Tyrol. New to the Karst.

Phaeophyscia sciastra (Ach.) Moberg

Carnic Alps: - Passo di M. Croce Carnico, 1300 m, on calcareous rock, 28.10.1982, leg. N (2883). - Piz di Mede, 2000 m, on mosses on sandstone, 09.08.1986, leg. N (7715). - Passo Volaja, 2000 m, on limestone, 07.08.1981, leg. De Faveri & N (1962).

Karst: - Bivio di Aurisina, near the railway station, 135 m, on cement wall, 01.06.1985, leg. N (5698).

P. sciastra is a nitrophytic lichen growing on a wide variety of substrata, which is rather common in the alpine belt. New to the region.

Phaeorrhiza nimbose (Fr.) H. Mayrh. & Poelt

Carnic Alps: - Malpasso del Tinisa (Passo Pura, UD), c. 2000 m, on plant remains on soil, in fissure, 17.08.1988, leg. T (10893). *Julian Alps*: - M. Lopa, 2250 m, on calcareous soil, 10.08.1981, leg. de Faveri & N, conf. H. Mayrh. (1775). - M. Lagna, 2000 m, on a calcareous ridge, 10.09.1984, leg. N (4565).

This species grows on plant remains and raw humus in the alpine belt, often also on calcareous soil. It has a broad, circumboreal-alpine distribution and is known also from the Southern Hemisphere.

Phlyctis agelaea (Ach.) Flotow

Carnic pre-Alps: - Bosco del Cansiglio, 650 m, on *Fagus*, 09.1981, leg. De Faveri & N (2802).

This epiphytic species is rather frequent in humid deciduous and evergreen forests of warm-suboceanic regions; in the survey area it is evidently rare, and has been collected only once. The small rounded apothecia covered by powder may resemble soralia, the absence of which separate this species from the more common *Ph. argena*.

Physcia biziana (Massal.) Zahlbr.

Friulian Plain: - Grado, 5 m, 09.05.1981, leg. De Faveri & Nimis (1404). - Mariano del Friuli, 34 m, on *Populus*, 20.06.1985, leg. N (5822).

P. biziana includes a series of different, closely related taxa, whose taxonomic position need a clarification. The species is very frequent in the Karst area, but in Friuli it is known only from the two localities reported above. Probably it is also present in submediterranean areas of the outer pre-Alps.

Physconia enteroxantha (Nyl.) Poelt

Karst: Doberdò del Lago, on *Ulmus*, 07.05.1988, leg. Castello (10592).

P. enteroxantha is a rather nitrophytic lichen of bark and siliceous rocks in rather humid sites. The specimen cited here is not well-developed, but has the typical yellow reaction of the medulla to K. New to the Karst.

Physconia muscigena (Ach.) Poelt

Carnic Alps: - Passo Volaja, near the Austrian refuge, 1950 m, on mosses on wind-swept ridge, 21.01.1989, leg. Bersan (14068). - Piz di Mede, 2000 m, on mosses on wind-swept ridge, 09.08.1986, leg. N (7711). - Passo Volaja, c. 2000 m, on west-exposed face, on mosses, 28.09.1990, leg. T (14676).

P. muscigena grows on plant remains and mosses in the alpine belt of the Alps, mainly on calcareous substrata. It is rather polymorphic and has an arctic-alpine, circumboreal range. It is common in the mountains of the survey area.

Physconia servitii (Nádv.) Poelt

Karst: - Basovizza, 450 m, on *Quercus*, 12.03.1988, leg. Castello (10138). - Gropada (Basovizza, TS), c. 360 m, on *Quercus*, near a dolina, 17.11.1992, leg. T (16645).

This species has a mediterranean-submediterranean distribution, and in Italy it is not uncommon below the montane belt. New to the region.

Physma omphalarioides (Anzi) Arnold

Karst: - Gropada (TS), c. 400 m, on an isolated, old *Q. pubescens*, 06.03.1990, leg. T (13725).

P. omphalarioides has a mediterranean-submediterranean distribution, but surprisingly it occurs also in the southern Scandinavia. Its spores have a well-developed episporium, similar to that of *Pannaria pezizoides* or *Psoroma hypnorum*. In the Karst it is very rare, but in PAD there are several specimens collected in Istria by Schuler.

Placynthium filiforme (Garov.) M. Choisy

Carnic Alps: - Between Timau and Passo di M. Croce Carnico, 1100 m, on limestone, vertical face south exp., 28.10.1982, leg. N (2866). *Friulian Plain*: - Bocche di Crosis (Tarcento, UD), 260 m, on limestone, 25.06.1985, leg. N (5906). *Julian pre-Alps*: - Above Ucea (Resia, UD), 700 m, on vertical calcareous face, 25.06.1985, leg. N (5905).

P. filiforme grows on calcareous faces, mainly in the montane belt, and is distributed from the Mediterranean to the central European regions. It was

erroneously reported by Nimis & Loi (1982, 1984) from the Karst area, where it is apparently absent.

Placynthium hungaricum Gyeln.

Carnic pre-Alps: - Claut (PN), 600 m, on limestone, 15.05.1983, leg. Loi (3318). *Julian pre-Alps*: - M. Glemina (Gemona, UD), 650 m, limestone, south exp., 08.06.1981, leg. De Faveri & N (1622).

Karst: - Val Rosandra, 150 m, on calcareous faces verticali, south exp., 27.02.1983, leg. N (3277). - Val Rosandra, 170 m, on calcareous face vertical, 02.02.1983, leg. N (3157).

This rather poorly-known species, characterized by the pruinose, lobate thallus, seems to be not uncommon on calcareous faces with periodical water seepage, especially in the Carnic and Julian pre-Alps.

Poeltinula cacuminum (Asta, Clauz. & Roux) Clauz. & Roux

Carnic Alps: - Passo Volaiia, on limestone, c. 1950 m, 28.09.1990, leg. T (15413).

This rarely collected lichen grows on hard calcareous- dolomitic rocks in the alpine belt of the Alps. It is known from several localities in the Alps, but was not previously known from Italy. All characters fit well with the description; the species differs from the similar *P. cerebrina* in the spore pigmentation, and in the development of excipulum and paraphyses.

Polyblastia ardesiaca (Bagl. & Car.) Zsch.

Julian Alps: - Laghi di Fusine, 1700 m, on calcareous outcrops, 06.11.1983, leg. Palma (3747).

This lichen was rarely collected, and until now it is known only from a few localities in the Alps, on hard calcareous rocks in very humid sites.

Polyblastia cupularis Massal.

Carnic Alps: - M. Brutto Passo, 1950 m, on calcareous sandstone, 16.09.1985, leg. N (6471). *Julian Alps*: - Jof Fuart, 1900 m, on limestone, 07.11.1983, leg. Visintin (4022).

P. cupularis grows on rather shaded surfaces of limestone or calcareous sandstone, above the montane belt. Previously reported from the Julian Alps by Clerc (1984), it is new to the Carnic Alps.

Polyblastia helvetica Th. Fr.

Carnic Alps: - M. Novarza, c. 1870 m, on soil and mosses, 29.09.1990, leg. N & T (11315).

The identification of this sample is not certain. According to the description, the peritecia should be completely brown, while this sample, on the contrary, has colourless peritecia in the lower part. *P. helvetica* is hitherto known from the British isles, Scandinavia and the Alps, but it was not previously reported from Italy. The material was compared with an abundant collection from Greenland, preserved in GZU (Disko: Hänge unmittelbar N Godhavn, 20-50 m, gneiss, 07.1983, leg. J. Poelt & Ullrich).

Polyblastia ventosa Arnold

Carnic Alps: - M. Lagna, 1950 m, on limestone, 10.09.1984, leg. N (4593).

This species has been rarely collected, but it is not uncommon on calcareous rocks in exposed situations above tree limit. New to the region.

Polysporina simplex (Davies) Vezda

Carnic Alps: - Piz di Mede, 1600 m, on metamorphic sandstones, 08.08.1986, leg. N (7816).

Karst: - Contovello (TS), c. 160 m, sandstone, 26.12.1988, leg. T (10948).

P. simplex is a pioneer lichen of siliceous rocks or decalcified sandstone; its distribution encompasses both Hemispheres. It was previously reported from the Karst area by Schuler (1893).

Porina aenea (Wallr.) Zahlbr.

Friulian Plain: - Tarcento (UD), 350 m, on *Carpinus*, 10.1978, leg. N (2899). - Borgo Meduno (PN), 06.12.1982, leg. Loi (3164). *Julian pre-Alps*: - Tramonti di Sotto, on *Fraxinus ornus*, 14.10.1983, leg. N (3660).

This species has a more or less holarctic distribution in the Northern Hemisphere, and grows mainly on the smooth bark of deciduous trees, such as *Carpinus*, *Fraxinus* and *Fagus*.

Porina chlorotica (Ach.) Müll. Arg.

Carnic Alps: - M. Crostis, c. 1900 m, on siliceous rock (schist), in shadow, 08.1986, leg. N (11689).

This cosmopolitan lichen grows on siliceous rocks in shaded and humid situations, and is not common. New to the region.

Porina mammillosa (Th. Fr.) Zahlbr.

Carnic Alps: - M. Paularo, on epigea mosses, on acid soil, c. 1950 m, 29.09.1990, leg. T, rev. J. Poelt (16654).

P. mammillosa grows on mosses and plant remains, on acid soil, and in Europe has a boreal-montane distribution. For Italy there was only a single record from Piedmont of the previous century. New to the region.

Porpidia crustulata (Ach.) Hertel & Knoph

Carnic Alps: - M. Chiadin, 1800 m, on small siliceous pebbles on the soil, 13.11.1983, leg. M. Palma, rev. T (3809).

This is a pioneer lichen which grows mainly on small siliceous pebbles. It is rather frequent in the Alps, but it was not previously reported from Friuli.

Protoblastenia terricola (Anzi) Lyngé

Carnic Alps: - Passo Pura, Malpasso del Tinisa (UD), on calcareous soil and plant remains, c. 2000 m, 12.08.1988, leg. T (10894). - Passo Volaia (UD), on calcareous soil and mosses, c. 1950 m, 28.09.1990, leg. T (15414).

This lichen grows on soil, on weakly calcareous parent material, in the alpine belt, and has an arctic-alpine distribution. New to the region.

Protoparmelia badia (Hoffm.) Haf.

Carnic Alps: - M. Novarza, c. 1900 m, on sandstone, 30.09.1988, leg. Castello, rev. T (12221).

This is a rather common lichen of base-rich siliceous rocks, with a wide altitudinal range. New to the region, where it is not rare in the inner Carnic Alps.

Protoparmelia badia v. cinereobadia (Harm.) Clauz. & Roux

Carnic Alps: - M. Paularo, 1950 m, on siliceous rocks, 29.09.1990, leg. T (15100).

This variety is quite rare; it was collected only once, together with specimens of *P. badia* s. str. It is new to Italy.

Pseudephebe pubescens(L.) M. Choisy

Carnic Alps: - M. Crostis, 2000 m, on siliceous rock, on wind-swept ridge, 05.09.1983, leg. N (3494). - Piz di Mede, 2000 m, on sandstone, on a ridge, 09.08.1986, leg. N (7683).

This species has a bipolar distribution, and grows on siliceous rocks, often on pure quartz, in wind-swept ridges. New to the region.

Psora decipiens (Hedw.) Hoffm.

Carnic Alps: - M. Coglians, above the rif. Marinelli, 1300 m, on soil, 13.11.1983, leg. Palma (3797). - M. Chiadenis, 2400 m, on soil, 25.09.1983, leg. Palma (3640). - M. Paularo, c. 1950 m, on acid soil, 29.09.1990, leg. T (15434). *Julian Alps*: - M. Canin, 1820, on soil, 21.09.1978, leg. Lausi, det. N (290).

This is a very common species, which grows directly on soil and plant remains, from the alpine to the mediterranean belts, mainly on calcareous substrata.

Psoroma hypnorum (Vahl) Gray

Carnic Alps: - Passo Volaja (UD), on terricolous mosses, c. 2000 m, 28.09.1990, leg. T (14750). - Piz di Mede, 2000 m, on epilithic mosses (sandstone), 09.08.1986, leg. N (7719). *Julian Alps*: - M. Canin, 2000 m, on mosses, 28.07.1983, leg. Zuccarello, rev. T (3350).

This species grows on soil and mosses in humid habitats, on both calcareous and siliceous rocks. It has a wide, holarctic and bipolar distribution. In the region it is not frequent.

Pycnothelia papillaria Dufour

Carnic Alps: - M. Tenchia (Cercivento, UD), 1800 m, on soil, 26.06.1988, leg. Bersan (10658). - M. Paularo, 2000 m, on ranker, 16.08.1981, leg. N (1703). - M. Zoufplan, 1950 m, on soil, 19.02.1989, leg. Bersan (12273). - M. Chiadin, 1900 m, on soil, 13.11.1983, leg. Palma (3795). - Piz di Mede, 2000 m, on soil, 09.08.1986, leg. N (7677). - M. Crostis, 1900 m, on soil, 05.09.1983, leg. N (3504).

P. papillaria grows on soil deriving from acid substrata and is widespread, but not common throughout Italy. In the survey area it is particularly common in *Calluna*-stands, also in the Julian pre-Alps with siliceous substrata (sandstone), where the species was observed several times, but never collected. New to the region.

Pyrenula nitida (Weigel) Ach.

Carnic Alps: - Lateis (UD), 1150 m, on *Fagus*, at the base of the trunk, in *Abieti - Fagetum*, 12.09.1984, leg. N (4485). - Lago di Sauris, Bosco Flobia, above Rio Storto, c. 1150 m, on *Fagus*, 13.09.1991, leg. T (15378). - Passo Pura, 1440 m, at the base of *Fagus*, 08.1982, leg. N (3044). *Julian Alps*: - Laghi di Fusine, 1450 m, on *Abies*, 23.07.1984, leg. N (4346). *Julian pre-Alps*: - M. Matajur, 1300 m, at the base of *Fagus*, 28.12.1982, leg. N (3042).

Pyrenula nitida, which grows on smooth bark (mostly *Fagus*) in rather shaded situations, is restricted to Europe. It is not common in the beech forests of the eastern Alps.

Ramalina obtusata (Arnold) Bitter

Carnic Alps: - Pierabech (Forni Avoltri, UD), 970 m, on *Abies alba*, 30.09.1986, leg. N (7885). - Lago di Sauris, 970 m, on *Salix*, 08.08.1981, leg. De Faveri & N 1739).

This species is quite rare in the survey area. It has an eastern, boreal range, and grows on twigs of *Picea* and *Abies* in moist montane and subalpine forests.

Ramalina pollinaria (Westr.) Ach.

Carnic Alps: - Passo Pura, Bosco della Stua, 1100 m, on *Fagus*, 11.09.1987, leg. N & T.

Very polymorphic, *R. pollinaria* grows both on bark and on rocks, also on limestone. It is rare in the survey area.

Ramalina thrausta (Ach.) Nyl.

Carnic Alps: - Between the lake of Sauris and Passo Pura, 1200 m, on *Fagus*, *Abies* and *Picea*, 09.08.1981, leg. De Faveri & N (1757). - Passo Pura, 1440 m, on *Larix*, 18.08.1979, leg. N (769). - Above Lateis (UD), 1350 m, on *Abies*, 08.08.1986, leg. N (7808).

This is an epiphytic species which grows in montane, humid woods. In the survey area it is restricted to *Abieti-Fagetum* forests, and is rather rare.

Rhizocarpon badioatrum (Sprengel) Th. Fr.

Carnic Alps: M. Paularo, above the lake, c. 1900 m, on siliceous rock, 29.09.1990, leg. T (15097).

Rh. badioatrum is an arctic-alpine to boreal-montane species of siliceous rocks. The specimen from M. Paularo has a well-developed, squamulose thallus. New to the region.

Rhizocarpon carpaticum Runem.

Carnic Alps: - M. Crostis, 1900 m, on schists in a niche, 08.1986, leg. N (11690).

This species was previously known only from two other Italian localities, in South Tyrol and Veneto. It grows on underhanging surfaces of siliceous rocks in wind-exposed sites, in the alpine belt.

Rhizocarpon geminatum Körber

Carnic Alps: - M. Neddís (Paularo, UD), 1800 m, on siliceous rock, 02.1990, leg. Bersan (13637).

Rh. geminatum grows mainly on base-rich siliceous rocks, and has a holarctic distribution. In Italy it is known from many localities in the Alps, and from Sardinia. In the Carnic Alps it is not common.

Rhizocarpon hochstetteri (Körber) Vainio

Carnic Alps: - M. Neddiss (Paularo, UD), 1600 m, on siliceous rock, 06.01.1990, leg. Bersan (14082).

There are only a few records of *R. hochstetteri* from Italy (Sardinia and Sicily), but the species should be more common in the Italian Alps. It has a boreal-montane distribution and it grows on base-rich siliceous substrata.

Rhizocarpon lecanorinum Anders

Karst: - Conconello, 150 m, on sandstone wall, on an horizontal face, 12.12.1979, leg. N (886). - Contovello, near the cemetery, 250 m, on sandstone, north exp., 28.11.1988, leg. T (16792).

This silicicolous and rather nitrophytic species occurs below the subalpine belt and has a boreal-temperate distribution in the Northern Hemisphere. It is not uncommon in the Mediterranean mountains, and is apparently rather rare in the survey area.

Rhizocarpon obscuratum (Ach.) Massal.

Carnic Alps: - M. Lagna, 1850 m, on sandstone, 10.09.1984, leg. N (4578). - M. Crostis, 1800 m, on sandstone, 05.09.1983, leg. N (3538). - Pic Chiadin, 1950 m, on siliceous rock, 13.11.1983, leg. Palma (3817). - M. Dimon, 1900 m, on sandstone, 10.09.1983, leg. N (3684). - Passo Pramollo, 1600 m, on small pebbles on soil, 25.11.1983, leg. Palma (3837). - M. Zoufplan, 1900 m, on siliceous rock, 19.02.1989, leg. Bersan (12806). - Timau, 830 m, on siliceous rock, 27.07.1988, leg. Bersan (10762).

This is a rather variable, cosmopolitan lichen of siliceous rocks near the soil surface. It is frequent in the subalpine belt of the Carnic Alps. The distinction from *Rh. lavatum* is not clear to me.

Rhizocarpon oederi (Weber) Körber

Carnic Alps: - Passo Cason of Lanza, 1550 m, on siliceous rock, 23.07.1984, leg. N (4366).

This species is quite rare throughout its range, and grows on metal-rich siliceous rocks in humid situations. The specimen cited here fits well with other samples preserved in TSB, but it is sporeless and not well-developed.

Rhizocarpon petraeum (Wulfen) Massal.

Carnic Alps: - High Pesarina valley, 1400 m, on sandstone, 03.09.1983, leg. N (3517).

This lichen grows on rather calcareous substrata such as Fylsch and sandstone, or on base-rich siliceous rocks. In northern Italy it is rather common, but it was not previously reported from Friuli.

Rhizocarpon polycarpum (Hepp) Th. Fr.

Carnic Alps: - M. Crostis, 1850 m, on sandstone, 05.09.1983, leg. N (3508). - Passo Pramollo, 1600 m, on small, siliceous pebbles on soil, 25.11.1983, leg. Palma (3836). - M. Tenchia, 1850 m, on siliceous rock, 26.06.1988, leg. Bersan (12812). - M. Novarza, 1870 m, on sandstone, 11.19.1984, leg. N (4499).

Rh. polycarpum has a boreal-montane range and is known from many localities of the Alps. New to Friuli, where it is not uncommon in upland areas.

Rhizocarpon ridescens (Nyl.) Zahlbr.

Carnic Alps: - Passo Pramollo, M. Carnizza, c. 1620 m, on roccia conglomeratica quarzifera, 29.05.1989, leg. Bersan & Codogno (12311).

This sorediate species has a scattered distribution in Europe. For Italy it was previously known only from a single locality in South Tyrol.

Rhizocarpon umbilicatum (Ramond) Flagey

Carnic Alps: - M. Novarza, 1870 m, vertical face arenacea, north exp., 11.08.1984, leg. N (4473). - M. Tinisa, 1600 m, on limestone, 08.1981, leg. N (2722). - Passo di M. Croce Carnico, 1300 m, on sandstone, 28.10.1982, leg. N (2872). - Lateis (UD), above C.ra Novarzutta, 1730 m, on sandstones, 28.09.1988, leg. T (10892). *Julian Alps*: - M. Lopa, 2250 m, on limestone, 10.08.1981, leg. De Faveri & N (1766).

Rh. umbilicatum is the only member of the genus growing on calciferous rocks, from the montane to the subalpine belt. It has a wide distribution in the Northern Hemisphere, and is rather common in the Alps and the Mediterranean mountains.

Sacomorpha uliginosa (Schrader) Haf.

Carnic Alps: - M. Paularo, 1950 m, on windy ridge, on soil, 29.09.1990, leg. T (15095). - Piz di Mede, 2000 m, on lignum on soil, 09.08.1986, leg. N (7727).

This is a common species which grows on raw humus on acid soil; in Italy it seems to be restricted to the north and the central part of the Peninsula.

Sagiolechia protuberans (Ach.) Massal.

Carnic Alps: - Passo Pura, 1400 m, on shaded calcareous rocks, 05.09.1983, leg. N (3479). *Julian Alps*: - Foresta di Tarvisio, above Valbruna, 1300 m, on calcareous boulder in a beech forest, 20.11.1982, leg. N (2961).

This species grows on calcareous rocks in shaded situations, and is rather rare. New to the region.

Sarea resinae (Fr.) Kuntze

Carnic Alps: - Lateis (Sauris, UD), road towards C.ra Novarzutta, c. 1350 m, on *Larix decidua*, 12.09.1991, leg. T & N (15373).

This is a non-lichenized fungus growing on the resin of conifers, mainly *Larix*; it has probably a boreal-montane distribution. For Italy there were only old records from South Tyrol, Piedmont, Lombardy and Tuscany. New to Friuli.

Scoliciosporum pruinosum (P. James) Vezda

Karst: - Between Basovizza and the Italian border, c. 380 m, on *Q. cerris*, in the bark fissures, 29.03.1992, leg. T (16017).

This is an apparently rare *Scoliciosporum* which is characterized by a pulverulent, whitish-green thallus, and by pale apothecia with well-developed crystals in the epithecium. The same species was also collected in Slovenia, in a large dolina between Lokev and Divaca (13994), near the border. New to Italy.

Solorina bispora Nyl.

Carnic Alps: - Piz di Mede, 2000 m, 09.08.1986, leg. N (7740). - Passo Pura, on soil, c. 1800 m, 12.08.1988, leg. T (10852). - Val Cimoliana, Cimolais, 650 m, on calcareous soil, 25.08.1985, leg. Loi (6403). - M. Brutto Passo, 1700 m, on soil, on a crust of *Gloeocapsa*, 21.08.1983, leg. N (3418). - M. Chiadenis, 2400 m, on soil, 25.09.1983, leg. Palma (3644). - M. Tiarfin, 2200 m, on calcareous soil, 20.09.1981, leg. Loi & N (2021). - Rivoli Bianchi of Tolmezzo, 600 m, on limestone, 08.06.1981, leg. N & De Faveri (1569). - M. Paularo, 2000 m, on ranker, 16.08.1981, leg. N (1730). *Julian Alps*: - M. Montasio, 1500 m, on soil, 07.1979, leg. De Faveri & N (1351). - M. Canin, above Sella Nevea, 1850 m, on soil in seslerieto, 07.1980, leg. De Faveri & N (1226). - Jof Fuart, 2300 m, on calcareous rocks, 04.09.1981, leg. Lausi & Moschitz (2810). - M. Lopa, 2250 m, on calcareous soil, 10.08.1981, leg. De Faveri & N (1774).

This is a common macrolichen of calciferous substrata, which is particularly frequent in the subalpine-alpine belts. The closely related *S. spongiosa*, with 4-spored asci, contains both green algae and cynaobacteria. Also the specimens 1774 and 7740 are photosymbiodemes, but the asci are bisporid.

Solorina crocea (L.) Ach.

Carnic Alps: - Piz di Mede, 2000 m, on soil, on acid substratum, in *Rhodoro - vacciniatum*, on a wind-swept ridge, 09.08.1986, leg. N (7702). - M. Zoufplan, 1950 m, on soil, 19.02.1989, leg. Bersan (11657).

S. crocea grows on soil and acid substrata in the subalpine-alpine belts and has an arctic-alpine distribution. In the survey area it was found only in the inner Carnic Alps. New to the survey area.

Sporastatia testudinea (Ach.) Massal.

Carnic Alps: - M. Chiadin, 1900 m, on sandstone, 13.11.1983, leg. Palma (3794). - M. Crostis, 2000 m, on siliceous rock, north exp., 05.09.1983, leg. N, rev. T (3585).

This species has a large distribution, encompassing several mountain areas in both Hemispheres. It grows on siliceous rocks on steeply inclined, exposed surfaces. New to the survey area.

Squamarina lamarckii (DC.) Poelt

Carnic Alps: Passo M. Croce Carnico, c. 1800 m, on limestone, leg. De Bernardi (15098).

S. lamarckii grows on vertical, exposed surfaces of calcareous rocks in the subalpine-alpine belts of the central and southern European mountains. It was previously reported by Clerc (1984) from Passo Pura (Carnic Alps).

Squamarina periculosa (Duf.) Schaerer

Karst: - Val Rosandra, in rock fissures, 27.12.1981, leg. Loi & N (2378). - Val Rosandra, 170 m, vertical calcareous rock, north exp., 19.07.1979, leg. N (763).

This species grows in rock fissures or directly on calcareous rocks, from the Mediterranean region to the southern Alps. In the survey area it was collected only in the Rosandra Valley.

Thyrea girardii (Dur. & Mont.) Bagl. & Car.

Julian pre-Alps: - Ciseriis of Sotto (Tarcento, UD), 350 m, on vertical calcareous face, 05.12.1982, leg. N (2995).

This is a widespread species, which seems to be less frequent in upland areas than the previous one. New to the region.

Tomasellia arthonioides (Massal.) Massal.

Julian pre-Alps: - Bocche di Crosis, 250 m, on *Fraxinus ornus*, 26.06.1985, leg. N (5848).

This species has a submediterranean distribution in Europe, and grows mainly on the smooth bark of *Fraxinus ornus*. New to the survey area.

Trapelia coarctata (Sm.) M. Choisy

Karst: - Near Filtri di Aurisina, 80 m, on sandstone wall, 02.11.1987, leg. N (9891). - Contovello, c. 160 m, in shadow, on sandstone, near the ground, 01.01.1989, leg. T (10951).

T. coarctata has a very broad distribution, and grows on siliceous, subneutral rocks in rather humid situations. New to the survey area.

Trapelia involuta (Taylor) Hertel

Carnic Alps: - Lateis (UD), above C.ra Novarzutta, c. 1730 m, on pebbles on the ground, along the trail, 28.09.1988, leg. N, rev. T (10887).

T. involuta has a subatlantic distribution in Europe, and grows mainly on siliceous rocks, very often on pebbles near the soil. In the survey area it has been certainly overlooked.

Trapelia placodioides Coppins & P. James

Karst: - Contovello, c. 180 m, on a sandstone wall, near the soil, 01.01.1988, leg. T, vdt. Poelt (10938).

This sorediate species is not very frequent and, until now, it is known from scattered localities in Europe and Canada and it is new to Italy. It grows on siliceous substrata, and has been collected also on walls. The specimen is poorly-developed and not fruiting; the specimen was compared with Vezda, Lich. Sel. Exs. n. 2423.

Tremolecia atrata (Ach.) Hertel

Carnic Alps: - M. Paularo, c. 2000 m, siliceous rocks, north exp., 29.09.1990, leg. T (15933). - M. Paularo, 2000 m, on schist, 16.08.1981, leg. N (1722). - M. Crostis, 1950 m, on siliceous rock, 05.09.1983, leg. N (3587). - Passo Cason of Lanza, 1550 m, on siliceous rock, 23.07.1984, leg. N (4359). - Piz di Mede, 2000 m, on sandstone, 09.08.1986, leg. N (7707). M. Chiadin, 1900 m, on sandstone, 13.11.1983, leg. Palma (3788). - Passo Pramollo, 1600 m, on siliceous rock, 25.11.1983, leg. Palma (3840).

In Italy this species is present throughout the Alps, but was never reported from the survey area. It grows on siliceous rocks, very often on metamorphic substrata, and is rather common in the inner Carnic Alps.

Usnea longissima Ach.

Carnic Alps: - Lago di Sauris, Bosco della Stua, 1100 m, on *Picea*, 08.1986, leg. T (9723). - Lago di Sauris, Bosco della Stua, 1000 m, on *Abies alba*, 07.08.1986, leg. N (7783).

Usnea longissima is one of the rarest epiphytic macrolichens of the Alps. It grows in natural moist forest in the montane belt, and presently it is in danger of extinction. This is the only recent record from the Italian Alps, and it refers to a small population surviving on a few conifers above the lake of Sauris.

Xanthoria sorediata (Vainio) Poelt

Julian Alps: - Jof Fuart, 2500 m, on limestone, 21.08.1983, leg. Visintin (3432). - M. Ponze, 1800 m, on limestone, 06.11.1983, leg. Palma (3731). - Jof Fuart, 2500 m, on mosses on calcareous soil, 21.08.1983, leg. Visintin (3326).

This species has an arctic-alpine distribution and grows on nutrient-enriched surfaces, on both siliceous and calcareous rocks. For Italy it is known only from a few stations, but it should be not uncommon in the subalpine-alpine belts of the Alps.

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