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## Lichen Collection in the Herbarium of the University of İstanbul (ISTF)

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**Abstract:** The unidentified lichen specimens collected about 50 years ago and stored in the herbarium of the Faculty of Science, the University of İstanbul (ISTF) were examined taxonomically and identified. This lichen collection includes 67 species, some of which are rare and interesting for the collection sites. Most of the samples are from İstanbul and its surroundings, but some are from several provinces in Anatolia.

**Key Words:** Lichen, flora, ISTF, İstanbul, Turkey.

### İstanbul Üniversitesi Herbariyumu (ISTF) Liken Koleksiyonu

**Özet:** İstanbul Üniversitesi Fen Fakültesi herbariyumunda (ISTF) bulunan ve yaklaşık elli yıl önce toplanarak tayin edilmeden bırakılmış liken örnekleri taksonomik olarak incelenmiş ve tayinleri yapılmıştır. Bu oldukça eski ve zengin liken koleksiyonu, bir kısmı ender ve ilginç türler olmak üzere 67 tür içermektedir. Örneklerin büyük çoğunluğu İstanbul ve çevresinden olmakla birlikte Anadolu'nun çeşitli illerinden de likenler mevcuttur.

**Anahtar Sözcükler:** Liken, flora, ISTF, İstanbul, Türkiye.

### Introduction

Studies determining the lichen flora of Turkey were started by Rigler (1852) and Steiner (1899) in İstanbul, and then continued in Anatolia. Floristic and various other studies on Anatolian lichens are increasing rapidly today (Güner et al., 2000).

The purpose of this study was to determine the unidentified lichen collection kept in the Herbarium of the University of İstanbul (ISTF). This hitherto neglected collection was determined to contribute to the lichen flora of Turkey, and especially to that of İstanbul. The herbarium labels of the lichen specimens indicated that they had been collected between 1948 and 1961 from several places in Turkey, and many were from İstanbul, by the recently deceased botanist Prof. Dr. Hüsnü Demiriz (1920-1999). The collection sites are given in the list of taxa, following the relevant herbarium (ISTF) numbers. The investigations revealed that the lichen specimens have been conserved quite well in the herbarium, although some show a little damage, and also

a few are unsuitable for identification. Furthermore, some of them were fungi or bryophytes, not lichens, although recorded as lichen "L". The original numbers given to the herbarium specimens were retained.

### Materials and Methods

The samples were collected by the botanist H. Demiriz during his excursions concentrating on higher plants between 1948 and 1961, and those unidentified specimens preserved in the herbarium of the Faculty of Science, the University of İstanbul (ISTF). The specimens were given to the author for taxonomical identification in 2002. Undamaged specimens were determined by routine lichenological methods. Investigations were performed under a binocular dissecting microscope (40 SZ Olympus) using the identification keys and some flora books (Jahns, 1987; John, 1990; Dobson, 1992; Purvis et al., 1992; Wirth, 1995). The chemical spot colour reactions (K, 10% KOH; C, commercial bleach; I, iodine solution and P, Paraphenylenediamine) were also applied

when needed to aid identification. Anatomical hand-cut sections were taken from the specimens with fructifications and examined under the light microscope (at x400). Ascospore measurements were carried out in 10% KOH. Substrata differ from tree barks and soil to siliceous and calcareous rock types.

## Results

A complete alphabetical list of the identified lichen specimens is provided, together with herbarium numbers and locality records of ISTF, in the list of taxa. Abbreviations of the authors' names are according to Brummitt & Powell (1992) and the nomenclature follows Purvis et al. (1992) and Wirth (1995). (\*Indicates a first record for İstanbul)

### List of Taxa

#### *Acarospora smaragdula* (Wahlenb.) A.Massal.

3556 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on coastal rocks (siliceous), 400 m, 7.VIII.1956; 3568 L\*. İstanbul-Pendik, North, on coastal rocks (siliceous), 7.VIII.1956.

#### *Alectoria sarmentosa* (Ach.) Ach.

62 L. Bursa-Uludağ, Cennetkaya altı, Paşaçayın forest road, South, on *Abies bornmülleriana*, 1840 m, 17.IX.1948.

#### *Arthonia endlicheri* (Garov.) Oxner

3603 L. İstanbul-Sofular, North-west, cave entrance, on rocks (calcareous), 5 m, 2.IX.1956.

#### *Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold

3564 L\*. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 400 m, 7.VIII.1956.

#### *Aspicilia calcarea* (L.) Mudd

3588-3591 L. İstanbul-Damalı: Harmankaya, on coastal rocks (calcareous), 10 m, 2.IX.1956; 3604-3605 L. İstanbul-Sofular, North-west, cave entrance, on rocks (calcareous), 5 m, 2.IX.1956; 3684 L. Antalya-Alanya: Deretürbemas Yolu, *Pinus brutia* forest, on rocks (calcareous), 760 m, 25.VII.1957; 4543 L. Antalya-Akseki: Cevizli köyü, North, on rocks (calcareous), 1150 m, 29.IV.1961.

#### *Aspicilia cinerea* (L.) Körb.

3572 L. İstanbul-Pendik, North, on rocks (siliceous), 7.VIII.1956; 4094 L. İstanbul-Aydos Dağı, South-west slopes, on rocks (siliceous), 7.IV.1961.

#### *Bagliettoa parmigerella* (Zahlbr.) Vezda & Poelt

3698 L. Antalya-Alanya, 10 km before Manavgat, roadside, on rocks (calcareous), 26.VII.1957.

#### *Bryoria fuscescens* (Gyeln.) Brodo & D.Hawksw.

62 L. Bursa-Uludağ, Cennetkaya altı, Paşaçayın forest road, South, on *Abies bornmülleriana*, 1840 m, 17.IX.1948.

#### *Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr.

3616 L. İstanbul-Caddebostan, on *Juglans regia*, 15.IX.1956.

#### *Caloplaca flavescens* (Huds.) J.R.Laundon

3588-3591 L\*. İstanbul-Damalı: Harmankaya, on coastal rocks (calcareous), 10 m, 2.IX.1956; 3681-3683 L. Antalya-Alanya: Alaiye Kalesi, among ruins, on rocks (calcareous), 250 m, 24.VII.1957.

#### *Caloplaca holocarpa* (Hoffm. ex Ach.) A.E.Wade

3588-3591 L. İstanbul-Damalı: Harmankaya, on coastal rocks (calcareous), 10 m, 2.IX.1956.

#### *Caloplaca saxicola* (Hoffm.) Nordin

3671 L. Burdur-Bucak, 20 km, around Kaplanpınarı, mountain steppe, on rocks (calcareous), 1250 m, 23.VII.1957; 3677 L. Antalya: Serik-Manavgat, 11 km, Belkis Harabeleri, among ruins, on wall (calcareous), 24.VII.1957; 3694 L. Antalya-Alanya: Deretürbemas-Kargıçay, rocky slopes, on rocks (calcareous), 750 m, 25.VII.1957.

#### *Candelariella vitellina* (Hoffm.) Müll.Arg.

3475 L. Ağrı-Talıçay-Karaköse-Tutak: Murat Nehri Vadisi, on roadside rocks (siliceous), 1500 m, 24.VII.1956; 3531 L. Bitlis: City Centre, on rocks (siliceous), 1620 m, 26.VII.1956.

#### *Chaenotheca furfuracea* (L.) Tibell

4329 L. İstanbul-Yalova; Thermals, forest, 8.IV.1961.

#### *Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng.

570 L. Zonguldak-Karabük, around Station, road and forest sides, (on soil), 140 m, 20.VI.1948; 851 L. Zonguldak-Kirazağılı sırtı, South, on stone, 420 m, 4.X.1951; 1297 L. İstanbul-Ayazağa, Kemerburgaz, roadside rocks (on soil), 27.III.1953; 2568 L. Zonguldak, East of City, Fenerburnu Tepesi, East and South-east, (on soil), 70 m, 13.V.1956; 4325 L. İstanbul-Yalova; Thermals, forest, 8.IV.1961.

**Cladonia foliacea** (Huds.) Willd.

24 L. İstanbul-Kınalıada, seaside, s.l. (on soil), 10.IV.1948; 2379 L. İstanbul-Yakacık-Aydos Yolu, around Hayrettin Çeşmesi, macchie, (on soil), 1.IV. 1956; 4289 L. İstanbul-Beykoz; Dereseki Karakulak Suyu Menbaası, rocks (on soil), 7.IV.1961.

**Cladonia mediterranea** Duvign. & des Abb.

4290 L\*. İstanbul-Beykoz; Dereseki Karakulak Suyu Menbaası, rocks (on soil), 7.IV.1961.

**Cladonia pyxidata** (L.) Hoffm.

3215 L. Antalya-Alanya, Alaiye Kalesi, Kale Harabeleri, (on soil), 220 m, 23.VI.1956.

**Cladonia rangiformis** Hoffm.

24 L. İstanbul-Kınalıada, sea side, s.l. (on soil), 10.IV.1948; 1294 L. İstanbul-Ayazağa, 6 km from Kemberburgaz, damp macchie, (on soil), 28.III.1953; 2382 L. İstanbul-Yakacık, East, macchie, (on soil), 1.IV.1956.

**Collema crispum** (Huds.) Weber ex Wigg.

2798 L. Konya-Cihanbeyli, Yarısan Yolu, Tuz Gölü, lakeside, salty steppe, (on soil), 960 m, 27.V.1956.

**Collema tenax** (Sw.) Ach. em. Degel.

3570 L. İstanbul-Pendik, North, rocks (on soil), 7.VIII.1956; 3585 L\*. İstanbul-Anadoluhisarı, Göksu Vadisi, macchie, rocks (on soil), 25.VIII.1956.

**Dimelaena oreina** (Ach.) Norm.

3572 L\*. İstanbul-Pendik, North, on rocks (siliceous), 7.VIII.1956.

**Diploicia canescens** (Dicks.) A.Massal.

1669 L. İstanbul-Sivriada, East shore, s.l., on seaside rocks, 19.V.1953.

**Evernia divaricata** (L.) Ach.

62 L. Bursa-Uludağ, Cennetkaya altı, Paşaçayın forest road, South, on *Abies bornmülleriana*, 1840 m, 17.IX.1948; 67 L. Bursa-Uludağ, Dombay Çukuru-Sofraboğan, on *Abies bornmülleriana*, 1650 m, 17.IX.1948.

**Evernia prunastri** (L.) Ach.

4048-4049 L. Kırklareli: Demirköy-İğneada Yolu, 10 km, *Fagus*, *Quercus*, *Acer* forest, 320 m, 8.VII.1958.

**Flavoparmelia caperata** (L.) Hale

850 L. Zonguldak-Kirazağılı sırtı, South, on *Erica*, 420 m, 4.X.1951.

**Hypotrachyna laevigata** (Sm.) Hale

850 L. Zonguldak-Kirazağılı sırtı, South, on *Erica*, 420 m, 4.X.1951.

**Lasallia pustulata** (L.) Mérat

3557 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 400 m, 7.VIII.1956; 4291 L\*. İstanbul-Beykoz; Dereseki Karakulak Suyu Menbaası, on rocks (siliceous), 7.IV.1961.

**Lecanora argentata** (Ach.) Malme

3618 L. İstanbul-Caddebostan, on *Juglans regia*, 15.IX.1956; 3656 L\*. İstanbul-Belgrad Ormanı, Neşet Suyu, on *Carpinus betulus*, 23.VI.1957; 4033-4034 L. Kırklareli: Yeniceköy-Demirköy, 7 km, Istranca Dağları, *Fagus orientalis* forest, on *F. orientalis*, 940 m, 7.VII.1958.

**Lecanora campestris** (Schaer.) Hue

3545 L. İstanbul-Caddebostan, on *Robinia pseudoacacia*, 4.VIII.1956.

**Lecanora chlarotera** Nyl.

3607-3613 L\*. İstanbul-Sofular, North-west, cave entrance rocks, 5 m, 2.IX.1956.

**Lecanora dispersa** (Pers.) Sommerf.

3681-3683 L. Antalya-Alanya: Alaiye Kalesi, among ruins, on rocks (calcareous), 250 m, 24.VII.1957.

**Lecanora muralis** (Schreb.) Rabenh.

3529 L. Bitlis: City Centre, on rocks (siliceous), 1620 m, 26.VII.1956; 3580 L. İstanbul-Anadoluhisarı, Göksu Vadisi, macchie, on rocks (siliceous), 25.VIII.1956.

**Lecanora saligna** (Schrad.) Zahlbr.

3550 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on *Cupressus*, 320 m, 7.VIII.1956; 3618 L\*. İstanbul-Caddebostan, on *Juglans regia*, 15.IX.1956.

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

3607-3613 L. İstanbul-Sofular, North-west, cave entrance rocks, 5 m, 2.IX.1956; 3618 L. İstanbul-Caddebostan, on *Juglans regia*, 15.IX.1956; 4033-4034 L. Kırklareli: Yeniceköy-Demirköy, 7 km, Istranca Dağları, *Fagus orientalis* forest, on *F. orientalis*, 940 m, 7.VII.1958.

**Leptogium cyanescens** (Rabenh.) Körb.

1295 L\*. İstanbul, Ayazağa-Kemerburgaz, 6 km, water side rocks (on soil), 28.III.1953.

**Melanelia subargentifera** (Nyl.) Essl.

3657 L. İstanbul-Belgrad Ormanı, Neşet Suyu, on *Carpinus betulus*, 23.VI.1957.

**Neofuscelia pulla** (Ach.) Essl.

3561 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 320 m, 7.VIII.1956.

**Opegrapha varia** Pers.

3596-3599 L. İstanbul-Sofular, North-west, cave entrance rocks, 5 m, 2.IX.1956.

**Opegrapha vulgata** Ach.

3607-3613 L. İstanbul-Sofular, North-west, cave entrance rocks, 5 m, 2.IX.1956.

**Parmelia sulcata** Taylor

4048-4049 L. Kırklareli: Demirköy-İğneada Yolu, 10 km, *Fagus*, *Quercus*, *Acer* forest, 320 m, 8.VII.1958.

**Peltigera horizontalis** (Huds.) Baumg.

4324 L. İstanbul-Yalova; Thermals, forest, 8.IV.1961.

**Peltigera polydactylon** (Neck.) Hoffm.

1295 L\*. İstanbul, Ayazağa-Kemerburgaz, 6 km, water side rocks (on soil), 28.III.1953.

**Peltigera praetextata** (Flörke ex Sommerf.) Zopf

4324 L. İstanbul-Yalova; Thermals, forest, 8.IV.1961.

**Pertusaria dealbescens** Erichsen

3566 L\*. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 320 m, 7.VIII.1956.

**Physcia adscendens** (Fr.) H.Olivier

3577 L. İstanbul-Anadoluhisarı, Göksu Vadisi, on *Quercus coccifera*, 25.VIII.1956.

**Physcia tribacia** (Ach.) Nyl.

3530 L. Bitlis: City Centre, on rocks (siliceous), 1620 m, 26.VII.1956; 3474 L. Ağrı-Talıçay-Karaköse-Tutak: Murat Nehri Vadisi, roadside rocks (siliceous), 1500 m, 24.VII.1956.

**Physcia stellaris** (L.) Nyl.

3547 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on *Cupressus*, 320 m, 7.VIII.1956.

**Physconia grisea** (Lam.) Poelt

3548 L\*. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on *Cupressus*, 320 m, 7.VIII.1956.

**Protoparmelia picea** auct.

3559 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 320 m, 7.VIII.1956.

**Pseudevernia furfuracea** (L.) Zopf

62 L. Bursa-Uludağ, Cennetkaya altı, Paşaçayın forest road, South, on *Abies bornmülleriana*, 1840 m, 17.IX.1948.

**Psora decipiens** (Hedw.) Hoffm.

2353 L. Ankara-Aksaray-Koçhisar Yolu, Tuz Gölü, stony steppe (on soil), 900 m, 23.II.1955; 2797 L. Konya-Cihanbeyli, Yarısan Yolu, Tuz Gölü, lakeside, salty steppe (on soil), 960 m, 27.V.1956.

**Ramalina farinacea** (L.) Ach.

4048-4049 L. Kırklareli: Demirköy-İğneada Yolu, 10 km, *Fagus*, *Quercus*, *Acer* forest, 320 m, 8.VII.1958.

**Rhizoplaca melanophthalma** (DC.) Leuck. & Poelt

3353 L. Kars-İğdir: Ağrı Dağı, North-east, mountain steppe, on rocks (siliceous), 1950-2000 m, 20.VII.1956; 3473 L. Ağrı-Talıçay-Karaköse-Tutak: Murat Nehri Vadisi, roadside, on rocks (siliceous), 1500 m, 24.VII.1956.

**Rhizocarpon geographicum** (L.) DC.

3561 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 320 m, 7.VIII.1956; 3572 L. İstanbul-Pendik, North, on rocks (siliceous), 7.VIII.1956; 3779-3782 L. İstanbul-Aydos Dağı, South slopes, macchie, on rocks (siliceous), 400 m, 12.V.1958; 4088-4094 L. İstanbul-Aydos Dağı, South-west slopes, on rocks (siliceous), 7.IV.1961; 4292-4294 L. İstanbul-Beykoz; Dereşeki Karakulak Suyu Menbaası, on rocks (siliceous), 7.IV.1961.

**Roccella phycopsis** (Ach.)

1671 L\*. İstanbul-Sivriada, East, on coastal rocks, s.l., 19.V.1953.

**Squamarina cartilaginea** (With.) P.James

4516 L. Konya-Beyşehir-Akseki, stony rocks (on soil), 1500 m, 29.IV.1961.

**Tephromela atra** (Huds.) Hafellner

3779-3782 L. İstanbul-Aydos Dağı, South slopes, macchie, on rocks (siliceous), 400 m, 12.V.1958; 4292-

4294 L. İstanbul-Beykoz; Dereseki Karakulak Suyu Menbaası, on rocks (siliceous), 7.IV.1961.

**Toninia sedifolia** (Scop.) Timdal

2799 L. Konya-Cihanbeyli, Yarisan Yolu, Tuz Gölü, lakeside, salty steppe (on soil), 960 m, 27.V.1956.

**Usnea barbata** (L.) Weber ex Wigg. s.l.

62 L. Bursa-Uludağ, Cennetkaya altı, Paşaçayın forest road, South, on *Abies bornmülleriana*, 1840 m, 17.IX.1948; 67 L. Bursa-Uludağ, Dombay Çukuru-Sofraboğan, on *Abies bornmülleriana*, 1650 m, 17.IX.1948.

**Verrucaria muralis** Ach.

3588-3591 L. İstanbul-Damalı: Harmankaya, on coastal rocks (calcareous), 10 m, 2.IX.1956; 3596-3599 L\*. İstanbul-Sofular, North-west, cave entrance, on rocks (calcareous), 5 m, 2.IX.1956.

**Xanthoparmelia conspersa** (Ehrh. ex Ach.) Ach.

3709 L. İstanbul-Yakacık, Aydos Yolu, Hayrettin Çeşmesi, on wall (calcareous), 320 m, 7.VIII.1956.

**Xanthoparmelia somloensis** (Gyeln.) Hale

3560 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on rocks (siliceous), 320 m, 7.VIII.1956; 4287 L\*. İstanbul-Beykoz; Dereseki Karakulak Suyu Menbaası, on rocks (siliceous), 7.IV.1961.

**Xanthoparmelia tinctina** (Maheu & A.Gilbert) Hale

4287 L. İstanbul-Beykoz; Dereseki Karakulak Suyu Menbaası, on rocks (siliceous), 7.IV.1961.

**Xanthoria calcicola** Oxner

1675 L. İstanbul-Sivriada, East shore, on coastal rocks (calcareous), s.l., 19.V.1953; 3569 L. İstanbul-Pendik, North, on rocks (calcareous), 7.VIII.1956; 3587 L\*. İstanbul-Damalı: Harmankaya, on coastal rocks, 10 m, 2.IX.1956.

**Xanthoria elegans** (Link) Th.Fr.

3472 L. Ağrı-Talıçay-Karaköse-Tutak: Murat Nehri Vadisi, roadside, on rocks (calcareous), 1500 m, 24.VII.1956; 3532 L. Bitlis: City Centre, on rocks (calcareous), 1620 m, 26.VII.1956.

**Xanthoria parietina** (L.) Th.Fr.

777 L. İstanbul-Caddebostan, in gardens, on *Cedrus libani*, 15 m, 23.IX.1948; 1448 L. İstanbul-Caddebostan,

in gardens, on *Cedrus* trunk, 10 m, 1.V.1953; 1670 L. İstanbul-Sivriada, East shore, on coastal rocks (calcareous), s.l., 19.V.1953; 3544 L. İstanbul-Caddebostan, on *Cedrus libani*, 4.VIII.1956; 3549 L. İstanbul-Yakacık-Aydos Yolu, Hayrettin Çeşmesi, on *Cupressus*, 320 m, 7.VIII.1956; 3576 L. İstanbul-Anadoluhisarı, Göksu Vadisi, on *Quercus coccifera*, 25.VIII.1956; 3606 L. İstanbul-Sofular, North-west, cave entrance, on rocks (calcareous), 5 m, 2.IX.1956; 3827-3828 L. Kocaeli-Eskihisar, Kale, on castle walls, 50-60 m, 25.V.1958.

## Discussion

As a result of the taxonomical investigations of the ca. 150 specimens, cited as lichen ("L") in the herbarium records, 67 lichen species belonging to 42 genera were identified. The lichens were collected from 12 provinces in Turkey. Of all the taxa, 10 are fruticose, 22 are foliose, 4 are squamulose and 31 are crustose lichens.

The 42 lichen species from İstanbul have the following habit morphologies: 19 crustose and 4 crustose-placodioid, 15 foliose, 3 fruticose and 1 squamulose-dimorphic. There are no other records for the 19 species (marked with an asterisk in the list) previously or recently, and so they are the first records for İstanbul. The lichen specimens collected in and around the city, about 50 years ago, include rare and interesting species that are perhaps now extinct, because the city has rapidly changed into a large metropolitan area. It may not be possible to find some air pollution sensitive species, such as *Caloplaca cerina* (appears below 30 µg SO<sub>2</sub>/m<sup>3</sup>); *Opegrapha varia* and *Opegrapha vulgata* (about 50 µg SO<sub>2</sub>/m<sup>3</sup>); *Physcia adscendens* and *Physcia stellaris* (below 70 µg SO<sub>2</sub>/m<sup>3</sup>); *Diploicia canescens*, *Physconia grisea* and *Xanthoria parietina* (about 60 µg SO<sub>2</sub>/m<sup>3</sup>); and *Lasallia pustulata*, *Roccella phycopsis* and some *Parmelia* species at the same locations exposed to increased levels of pollution (pollution values are according to Dobson, 1992). Further research is required to find out what has happened to the lichen flora of İstanbul in recent decades. However, 18 of the same species have been recorded recently by Çobanoğlu & Akdemir (1997). These are *Aspicilia cinerea*, *Caloplaca cerina*, *Caloplaca holocarpa*, *Cladonia foliacea*, *Cladonia chlorophaea*, *Cladonia rangiformis*, *Diploicia canescens*, *Lecanora campestris*, *Lecanora muralis*, *Lecidella elaeochroma*, *Neofuscellia*

*pulla*, *Physcia adscendens*, *Protoparmelia picea*, *Rhizocarpon geographicum*, *Tephromela atra*, *Xanthoparmelia conspersa*, *Xanthoparmelia tinctoria* and *Xanthoria parietina*.

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