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Additions to the lichen mycota of Iran from East Azerbaijan Province

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Abstract—This paper reports 48 species of lichens and 30 lichenicolous fungi new to Iran originating from Arasbaran (Gharadaq) in the Province East Azerbaijan.

Key words— Arasbaran forests, lichenized mycota, new records.

Introduction

The preliminary lichen checklist of Iran (Seaward et al. 2004) included 396 lichens and 8 lichenicolous fungi based on literature records and study of voucher material. It also summarized the literature on Iranian lichens. A study of the Golestan National Park, NE Iran (Sohrabi & Sipman, in prep.) yielded another 14 species to the list. This paper reports new collections from the Arasbaran area, East Azerbaijan Province in NW Iran, all new reports to Iran. Other papers from Arasbaran deal with *Cladonia* (Ahti & Sohrabi 2006), *Lepraria* (Sohrabi & Orange 2006), *Peltigera* (Sohrabi & Vitikainen, in prep.), *Candelariella* (Westberg & Sohrabi, in prep.) and *Caloplaca* (Søchting & Sohrabi, in prep.), all adding several new species to the list of Iranian lichens.

Arasbaran Biosphere Reserve is located in the northwest of Iran at the borderline the republics Azerbaijan and Armenia, approximately 90 km north-east of Tabriz (Fig. 1). It covers an area of about 164 000 hectares, and has a variety of natural features such as high mountains, deep valleys, steep slopes, dense forests and vast rangeland. The Arasbaran area is under influence of three different climatic zones: the southern part is cold and semi-arid (Irano-Turanian region, loc. I), the central high mountains (Saigiram daq) and the eastern part are humid or sub-humid and relatively warm [subtropical climate of the southwest of the Caspian Sea (Talish region) and Hyrcanian belt, locs. V and VI], and the western and northern parts are relatively cold and sub-humid, affected by the Caucasus region and the Black Sea (Mediterranean climate, locs. II-IV and VII).

This climatic variation results in a large diversity of plant species and ecosystems. Approximately 1000 plant species are found in the region, among them 140 are woody plants. The main plant species include *Quercus macranthera*, *Juniperus communis*, *Pistacia atlantica*, *Carpinus betulus*, *Fraxinus rotundifolia*, and *Acer campestre*. It reaches from semi-arid steppe foothills at ca. 1500 m in the south to alpine areas in the central mountains up to ca. 2800 m, and down into the valley of the

Aras River (in the Caspian drainage basin) at ca. 700 m in the north. Moisture-laden winds from the Caspian Sea support a rather isolated patch of deciduous forest up to c. 2000 m, an outlier of extensive forests further north, and lush alpine meadows above the tree-line. Access to the Reserve has remained difficult because of the absence of all-weather roads. Large areas of forest have been cleared for the cultivation of cereals and vegetables and for orchards and pastureland, and much of the remaining forest has been degraded by grazing and cutting of fuel wood. Land ownership is public.

Arasbaran rock units include volcanic and sedimentary rocks of Eocene epoch intruded by microgranodiorite and biotite-hornblende granite of Oligocene epoch. These rocks are altered by hydrothermal kaolinization, aluminization and silicification. Also, granitic to granodioritic rocks intrude into the cretaceous marl, sandstone and limestone.

Materials and Methods

The material was collected by the first author in 2001, 2004 and 2005 as part of voluntary study on lichen flora of Arasbaran. Masoomeh Ghobadnejhad participated in the collection at loc. III. The authors examined the collections under the microscope and with usual test reagents during the second author's stay at the Botanical Museum of Helsinki in August 2006. The nomenclature follows Santesson et al. (2004) when possible. The specimens are kept in Herbarium Sohrabi with duplicates of most species in H, and with a few duplicates in C.

As to the information on ecology and distribution we have primarily consulted Clauzade & Roux (1985), Clauzade, Diederich & Roux (1989), John et al. (2004), Santesson et al. (2004), Esslinger (2006), and other literature mentioned under the entries.

Localities

I- Varzegan, ca. 26 km west of Varzegan and ca. 6 km east of Joshin village (Kharvana), Joshin Castle, 1700-2000 m, 46°21'N, 38° 39'_E., 18.07.2005.

II- Jolfa, Jolfa to Khoda-afarin, 5 km from the south of road, Missan village, 1000-1500 m, 15.7.2001.

III- Kaleibar, 21 km south of the road of Khoda-afarin to Jolfa, Aynaloo, 1700-1900 m, 38°50'03"E, 46°47'29"N, 20.08.2005.

IV- Kaleibar, ca. 10 km south of Aras River and the road Khoda-afarin to Jolfa, Dar-Aghzi village, 39°05'E, 46°53'N, 450 m., 19.08.2005.

V- Kalibar, ca. 4 km SW of Kalibar, Galadarasi, toward Babak Castle (Bez Galasi), 1750-2500 m, 38°52'07"E, 46°58'06"N; 19.08.2005.

VI- Kalibar, ca. 10 km west of Kalibar, Hejrandoost village, 1750-1850 m, 38°52'07"E, 46°58'06"N, 20.08.2005.

VII- Jolfa, Arasbaran, the road of Khoda-afarin to Jolfa, crossing at Uoshtipin village road, Hrass, 500 m, road side lichens, 20.07. 2004.

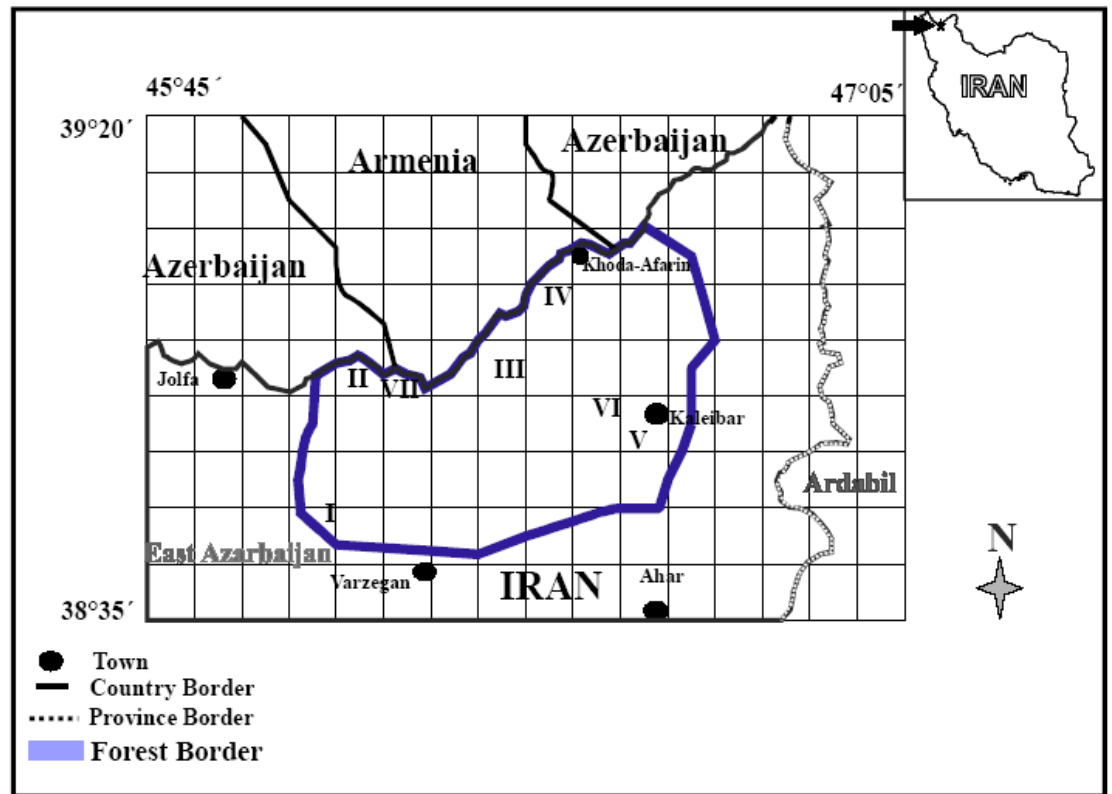


Fig.1- Location of the Arasbaran area in East Azerbaijan Province in Northwest of Iran

List of taxa

(L: lichenized species; LF: lichenicolous fungi; LL: lichenicolous lichen. Roman numbers refer to the locality number and Arabic numbers are the collection numbers of M. Sohrabi).

Abrothallus caeruleus Kotte

LF; on *Xanthoparmelia* sp., III: 4089b. The species is known from several species of *Xanthoparmelia* in Europe and N America.

Arthonia galactinaria Leight.

LF; on *Lecanora* sp., I: 3562. Known from *Lecanora* spp. in several European countries.

Arthonia intexta Almq.

LF; on *Lecidella elaeochroma*, on bark, **III**: 4063b. Cosmopolitan on *Lecidella* spp., occurring in the hymenia only.

Arthonia varians (Davies) Nyl.

LF; on *Lecanora rupicola*, **VI**: 4295. This is a widespread species on members of the *Lecanora rupicola* group.

Arthrorhaphis aeruginosa R. Sant. & Tønnsberg

LF; on *Cladonia chlorophaea*, **II**: 1388b. A widespread boreal parasite on *Cladonia* squamules.

Bryoria nadvornikiana (Gyelnik) Brodo & D. Hawksw.

L; on mosses on rock, **V**: 4531, 4656, 4518, 4510. A widespread boreal species mostly occurring on conifers and rarely over mossy rocks.

Buellia badia (Fr.) A. Massal.

L L; on *Xanthoparmelia pulla*, **III**: 3790. A widespread, lichenicolous lichen occurring on several saxicolous parmeliaceous and crustose lichens.

Caloplaca chrysojeta (Vain. ex Räsänen) Dombr.

L; on silicate rocks, **V**: 4571. The species is widespread.

Catapyrenium cinereum (Pers.) Körb.

L; on calcareous soil and rock crevices, **II**: 1401. The species is widespread.

Catillaria chalybeia (Borrer) A. Massal.

L; on silicate rock near the river, **I**: 4574.

Seaward et al. (2004) doubted the occurrence of this species in Iran. Its occurrence is herewith confirmed. The species is widespread.

Cetraria islandica (L.) Ach. subsp. *islandica*

L; on sandy soil in the shrub lands, **II**: 175; **VI**: 4269.

According to Kärnefelt (1979) *C. islandica* is distributed in arctic-alpine, boreal and temperate regions in the northern hemisphere. He mapped the distribution of this subspecies as reaching the Caucasus area, but cited no locality for Iran.

Cetraria steppae (Savicz) Kärnefelt

L; on soil in steppe areas and shrub lands, **VI**: 4389, 4391. This is a Mediterranean species known from Spain to Central Asia.

Chaenotheca furfuracea (L.) Tibell

L; on old wood, **II**: 149; **VI**: 4511, 4512. A widespread species especially in the boreal zone.

Clypeococcum cladonema (Wedd.) D. Hawksw.

LF; on *Xanthoparmelia verruculifera*, **III**: 4242. This species is known from various foliose lichens in oceanic areas of W Europe and Macaronesia. In Arasbaran it occurs at the upper forest limit in a humid situation.

Dactylospora saxatilis (Schaer.) Hafellner

LF; on *Pertusaria* sp., **I**: 3596, 3631. The species occurs on saxicolous *Pertusaria* spp. in Europe, N Africa, Greenland and N America (Triebel et al. 1991).

Dermatocarpon moulinii (Mont.) Zahlbr.

L; on silicate rocks, **II**: 91, 125. This species is known from the mountains of Europe.

Echinothecium reticulatum Zopf

LF; on *Parmelia saxatilis* (129, 4672, 4446); on *Parmelia sulcata* (4465b), **II**: 129; **V**: 4672, 4446, 4465b. This is a widespread species on *Parmelia* spp. (s.str.), especially in the boreal zone of Europe, Greenland, N and S America (Triebel et al. 1991).

Endocarpon pallidum Ach.

L; on calcareous soil, **III**: 3796. The species is known from calcareous substrates in N America and C and S Europe.

Endococcus perpusillus Nyl.

LF; on *Rhizocarpon geographicum*, **V**: 4582. The species is widespread, occurring on several species of saxicolous, crustose lichens, known from Europe, N America and New Zealand.

Fuscopannaria leucophaea (Vahl) P. M. Jørg.

L; moss over silicate rocks, **III**: 4223. A widespread species especially found in the boreal zone.

Lecania dubitans (Nyl.) A. L. Sm.

L; on deciduous trees (*Fraxinus* sp.), **II**: 136; **V**: 4564. This is a widespread, epiphytic species in temperate and boreal zones.

Lecanora albellula (Nyl.) Th. Fr.

L; on bark of coniferous trees, **III**: 3700b. The species is widespread, occurring on conifers.

Lecanora carpinea (L.) Vain.

L; on trunk and branches of deciduous trees, **II**: 124; **III**: 4070a, 4156, 3782; **V**: 4665, 4714.

This is a widespread species on broadleaved trees in the temperate and boreal zones.

Lecanora reagens Norman

L; on rocks, soil and mosses, **III**: 3796b; **V**: 4513, 4548b. The species is widespread in the boreal to low arctic zones.

Lecanora rupicola (L.) Zahlbr.

L; on silicate rocks, **II**: 1511, 1417, **V**: 4656, 4652; **VI**: 4295. The species is widespread in temperate to boreal areas, on acid rocks.

Lecanora symmicta (Ach.) Ach.

L; on bark of trees, **III**: 3703c. It is a widespread species in temperate and boreal zones occurring on bark and lignum.

Lecidea swartzioidea Nyl.

L; on siliceous rocks, **V**: 4445b. The species is widespread in mountain areas, occurring on acid rocks.

Lecidella carpathica Körb.

L; on siliceous or slightly calcareous rocks, **I**: 3565; **II**: 1419; **III**: 4038; **VI**: 4351. widespread in temperate to low arctic areas, especially occurring on intermediate rocks.

Lecidella stigmatea (Ach.) Hertel & Leuckert

L; on siliceous rocks, **III**: 3696; **V**: 4442b; **VI**: 4284. The species is widespread in the northern hemisphere.

Leptogium burnetiae C. W. Dodge

L; on mosses on rock among trees or in sheltered positions, **II**: 375b; **III**: 4055, 4143, 4207. The species is known from N America and C Europe.

Leptogium gelatinosum (With.) J. R. Laundon

L; on soil and mosses, **I**: 3525, 3538; **II**: 1517; **V**: 4711, 4658. This species is widespread in temperate to arctic regions, occurring on a wide range of substrates.

Lichenocodium pyxidatae (Oudem.) Petr. & Sydow

LF; on *Cladonia pyxidata*, **II**: 89. It is common on *Cladonia* spp., especially in the boreal zone of Europe and N America.

Lichenocodium usneae (Anzi) D. Hawksw.

LF; on *Cladonia pyxidata*, **II**: 1448b. It is common and widespread, occurring on many host lichens.

Lichenostigma cosmopolites Hafellner & Calatayud

LF; on *Xanthoparmelia stenophylla*, **II**: 1460, 1387; **III**: 3789b; **V**: 4586; on *Physconia muscigena* **III**: 3789c; on *Rhizocarpon geographicum*, **V**: 4643. As the epithet implies, the species is very widespread, occurring on *Xanthoparmelia* spp.

Lichenostigma rugosum G. Thor

LF; on *Diploschistes scruposus*, **I**: 3547; **III**: 3631, 3640. It is a widespread species occurring on diverse *Diploschistes* spp., in the Middle East known from Libya and Saudi-Arabia (Triebel et al. 1991).

Lobaria scrobiculata (Scop.) DC.

L; on rocks covered by mosses, **V**: 4450, 4675, 4677, 4607, 4538. This is a common and widespread arctic-alpine species found on mossy rocks and in scrubs.

Marchandiomyces aurantiacus (Lasch) Diederich & Etayo

LF; on *Physcia stellaris*, **V**: 4454b. The species is known from several European countries, where it is found on different host genera.

Muellerella ventosicola (Mudd) D. Hawksw.

LF; on *Rhizocarpon geographicum*, **V**: 4706. The species is widespread, mostly occurring on *Rhizocarpon* spp. or *Ophioparma ventosa* (Triebel et al. 1991).

Mycobilimbia carnealbida (Müll.Arg.) Vitik. et al.

L; on bark of trees, **II**: 1388c. widespread in temperate to arctic areas, occurring on mossy trees and mosses on the ground.

Mycobilimbia tetramera (De Not.) Vitik. et al.

L; on soil and mosses, **VI**: 4393. This is a widespread species in temperate to arctic regions, mostly found on mosses.

Opegrapha culmigena Libert

LF; on *Lecanora* sp., **III**: 3703b, 4164b. This species is widespread in Europe, occurring on trees, dead herbaceous stems or mossy, shaded rocks.

***Pachypiale fagicola* (Hepp) Zwackh**

L; on bark of tree, **III**: 3774b. A widespread species, occurring on bark in temperate and montane areas.

***Parmeliella triptophylla* (Ach.) Müll. Arg.**

L; on mosses, **V**: 4730. The species is widespread from northern temperate to arctic-alpine areas, occurring on trees, mosses and dead plant material.

***Phaeosporobolus alpinus* R. Sant. et al.**

LF; on *Pertusaria albescens*, **II**: 1527. This species is widespread in boreal and arctic-alpine areas, where it is common on *Ochrolechia* and *Pertusaria* spp.

***Phaeosporobolus usneae* D. Hawksw. & Hafellner**

LF; on *Ramalina polymorpha*, **I**: 3521b. The species is widespread in temperate and boreal regions, occurring on several macrolichen genera.

***Physcia dubia* (Hoffm.) Lettau**

L; on silicate rocks, **II**: 1422; **III**: 4068, 4201; **V**: 4533, 4574. This is a very widespread and common species being found on trees, mosses and rocks, especially in nitrophilous places.

***Physconia deterosa* (Nyl.) Poelt**

L; on bark of tree and mosses, **I**: 3526, 3529; **III**: 4189, 3765; **V**: 4545. The species is widespread in boreal and arctic-alpine areas, being found on trees as well as mosses on the ground.

***Physconia enteroxantha* (Nyl.) Poelt**

L; on bark and mosses, **II**: 1483, 1477, 1518b; **III**: 4025b, 4102; **V**: 4692. This is a widespread species in temperate and boreal regions, occurring on trees and mossy rocks.

***Physconia muscigena* (Ach.) Poelt**

L; on mosses, **I**: 3574b, 3533; **II**: 1518, 1518b; **III**: 3658, 3781; **V**: 4548. It is widespread in boreal and arctic-alpine areas being found on mosses on the ground or over rocks.

***Polycoccum pulvinatum* (Eitner) R. Sant.**

LF; on *Physcia dubia*, **III**: 3663. This is a widespread species in Mediterranean to boreal and subarctic areas, forming galls on *Physcia* spp.

***Pronectria robergei* (Mont. & Desm.) Lowen**

LF; on *Peltigera praetextata*, **V**: 4449b. It is widespread in boreal areas, occurring on *Peltigera* spp. Its anamorph *Illosporium carneum* is especially common on soralia of *P. didactyla*

***Protopannaria pezizoides* (Weber) P. M. Jørg. & S. Ekman**

L; on silicate rocks, **V**: 4737, 4597. This is a widespread species in boreal and arctic-alpine areas where it is found on moss and plant remains.

***Protothelenella sphinctrinoides* (Nyl.) Mayrhofer & Poelt**

L; on moss over silicate rocks, **V**: 4650b. The species is widespread in boreal and arctic-alpine areas, occurring on mosses and dead thalli of *Peltigera* and *Solorina*.

Psilolechia lucida (Ach.) M. Choisy

L; on silicate rocks, **III**: 4094. This is a widespread species in temperate and boreal regions. The cited collection is the almost leprose form occurring on rocks and not the granular, sorediate var. *theiotes* (Ach.) occurring on lignum.

Raciborskiomyces peltigericola (D. Hawksw) M. E. Barr

LF; on *Peltigera praetextata*, **III**: 3758b. It is a widespread boreal to arctic species being found on *Peltigera* spp.

Ramalina polymorpha (Lilj.) Ach.

L; on silicate rocks, **I**: 3521. This species is widespread in temperate and boreal areas, mostly being found on rocks in nitrophilous places.

Rhizoplaca subdiscrepans (Nyl.) R. Sant.

L; on silicate rocks, **II**: 1501; **III**: 3740, 3753, 4116; **V**: 4595, 4682. The species is widespread in boreal regions where it occurs both on calcareous and non-calcareous rocks.

Rimularia insularis (Nyl.) Rambold & Hertel

LL; on *Lecanora rupicola*, **V**: 4652. This obligately lichenicolous lichen is widespread in Mediterranean to boreal regions always occurring on *Lecanora rupicola* or related species.

Rinodina milvina (Wahlenb.) Th. Fr.

L; on silicate rocks, **III**: 3708, 4090; **VI**: 4344; **VII**: 4258a. widespread in boreal and arctic-alpine areas, it is always found on acid rocks.

Rinodina pyrina (Ach.) Arnold

L; on bark, **III**: 4070c. The species is widespread from Mediterranean to arctic-alpine areas, where it is found on bark and lignum.

Rosellinula frustulosae (Vouaux) R. Sant.

LF; on *Schistoplaca (Lecanora) argopholis* (Ach.) Brusse, **I**: 3523. This obligate parasymbiont on *Schistoplaca argopholis* is rarely reported. It is known from Greenland, Norway, Spain, and Crimean Peninsula.

Scoliciosporum umbrinum (Ach.) Arnold

L; on silicate rocks, **V**: 4442b, 4724b. This is a widespread species occurring in northern temperate, boreal and alpine areas on acid rocks.

Sphaerellothecium cladoniae (Alstrup & Zhurb.) Hafellner

LF; on *Cladonia pocillum*, **I**: 3531a; on *Cladonia foliacea*; **V**: 4537. This recently described species is widespread in arctic-alpine areas of the northern hemisphere, being found on squamules of *Cladonia* spp.

Staurothela fissa (Taylor) Zwackh

L; on silicate rocks at a late snow-patch, **I**: 3551, 3550. It is a widespread species in boreal and arctic-alpine areas, being found on acid rocks near water, sometimes periodically submerged.

Stigmidium congestum (Körb.) Triebel

LF; on *Lecanora allophana*, **III**: 3689, 4215b; **V**: 4744. It is a boreal species being found on apothecia of epiphytic *Lecanora* spp. in Europe and N America.

Stigmidium fuscatae (Arnold) R. Sant.

LF; on *Acarospora fuscata*, **II**: 1459. This is a widespread species in temperate to arctic-alpine areas, being found on *Acarospora fuscata*.

Stigmidium pumilum (Lettau) Matzer & Hafellner

LF; on *Physcia dubia*, **II**:1422b; **V**: 4533b. The species is widespread in boreal to alpine areas, being found on *Physcia* spp.

Stigmidium tabacinae (Arnold) Triebel

LF; on *Toninia tristis*, **II**: 1372b. This is a rarely reported species known from Norway, Germany, Spain, Canary Islands and N America, always found on *Toninia tristis*.

Stigmidium xanthoparmeliarum Hafellner

LF; on *Xanthoparmelia stenophylla*, **II**: 158; **III**: 3668. A rarely reported species known from France (Corsica).

Thelenella muscorum (Fr.) Vainio

L; on mosses and mixed with *Cladonia* sp., **I**: 3531b. This species is widespread in the temperate to subtropical zone.

Toninia tristis (Th. Fr.) Th. Fr.

L; on soil, **II**: 1372; **III**: 3678. The species is found on calcareous soil and rock fissures especially in the Mediterranean region but also Norway and N America.

Tremella ramalinae Diederich

LF; on *Ramalina sinensis*, **III**: 4135. This heterobasidiomycete is widespread, especially in warm areas, occurring on *Ramalina* spp.

Umbilicaria cinerascens (Arnold) Frey

L; on silicate rocks, **V**: 4698. This is an alpine species known from C European mountains.

Umbilicaria cinereorufescens (Schaer.) Frey

L; on silicate rocks, **V**: 4698. It is widespread lichen in boreal to arctic-alpine areas, being found on acid rocks.

Umbilicaria freyi Codogno et al.

L; on silicate rocks, **II**: 99, 1464. This is a common and widespread species on acid rocks in boreal and montane areas.

Umbilicaria vellea (L.) Hoffm.

L; on silicate rocks, **II**: 102, 150; **V**: 4529, 4619, 4699, 4740. The species is widespread in boreal and arctic-alpine areas on silicate rocks.

Verrucaria tristis (A. Massal.) Trevis.

L; on calcareous rocks, **III**: 4048b. The species is known from calcareous rocks in montane and alpine areas of Europe.

Xanthoriicola physciae (Kalchbr.) D. Hawksw.

LF; on *Xanthoria parietina*, **VI**: 4368. This hyphomycete is known from Europe where gives a black colour to the apothecia of *Xanthoria parietina* and *X. polycarpa*, being most common in the warmer parts.

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