Two new species of Lichenostigma (Lichenotheliaceae, lichenicolous Fungi) from Iran

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Abstract

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Two species of Lichenostigma, both from Iran, are described as new to science: L. iranicum, growing on Lobothallia praeradiosa, is characterised by rounded to elongate ascomata, sparse hyphal strands, 6(–8)-spored asci and the almost complete absence of pigmentation in the lower ascomatal wall; L. verrucosum, growing on Pleopsis gobiense, is distinguished by rounded to irregular ascomata with radiating superficial hyphae, verrucose brown ascospores and by the complete absence of pigmentation in the lower ascomatal wall.

Additional key words: Ascomycota, Acarosporaceae, Aspiciliaceae, biodiversity, taxonomy

Introduction

In 1982 Hafellner introduced the genus Lichenostigma for the single species L. maureri from Austria, growing on Usnea spp. and Pseudevernia furfuracea. This species, which is now known from various fruticose lichens, is characterised by the following combination of features: rounded ascomata, fissitunicate asci, absence of hamathelial filaments but with more or less spherical cells filling the interascal spaces and 1-septate, brown ascospores with the upper cell broader than the lower one (Hafellner 1982). Later, two subgenera were recognised: L. subg. Lichenostigma with cushion-like ascomata not connected to dark superficial hyphal strands, and L. subg. Lichenogramma Nav.-Ros. & Hafellner with sack-shaped superficial ascomata connected to superficial stromatic or simple hyphal strands (Calatayud & al. 2002; Ihlen 2004).

Material and methods

The study is based on specimens collected by the first author in 2004 and 2008 in Iran. The morphological and anatomical observations were made using standard microscopic techniques. Microscopic measurements were made with an accuracy of up to 0.5 µm on hand-cut sections mounted in water. Measurements of ascospores are recorded in the descriptions as (minimum–) X–X+s (–maximum) followed by the number of measurements.

Lichenostigma iranicum Brackel & Valadbeigi, sp. nov.

MycoBank: 518508
Holotype: Iran, Gilan, c. 6 km on the road from Masouleh to Majalan village, siliceous rocks, on Lobothallia praeradiosa, c. 1600 m, 2004, T. Valadbeigi 9061 (TARI; isotype: herb. Valadbeigi).

Fungus lichenicola in thallo lichenis Lobothallia praeradiosa vigens. Filamenta superficialia rara, curta, fusco-olivacea, aspera. Ascomata superficialia, rotunda vel elongata, dispersa, pulla, ad 100–110 µm crassa, cellulis subglobosis composita; filamenta interascalia nulla. Paries ascomatis in partem inferiorem hyalinus. Ascii obovati, fissitunicati, 6(–8)-spori, 25–30×14 µm, iodo
Description. — Vegetative hyphae rare, superficial on the host thallus, short, single-stranded, unbranched, brownish olive, slightly constricted at the septa, hyphal cells 4–7 µm in diam., surface rugose. Ascomata superficial, scattered, not connected by vegetative hyphae, rounded to elongate, dark brown, shiny, 100–110 µm diam. and up to 70 µm high; ascomatal wall in section in the upper and lateral part distinctly brown, in the lower part (part connected to the host thallus) not continuous, hyaline or single cells pale brown; outermost cells brown, subglobose, 6–10 µm diam., on the outside covered by a granular brown pigment; internal cells subglobose to somewhat irregular, hyaline, 4–8×3–5 µm; centrum I+ yellow to pale orange, K/I−. Asci obovate, 25–30×14 µm, fissitunicate, (6–)8-spored, apically thickened, I−. Ascospores ovoid to oblong-ovoid, grey to dark brown, finely verruculose, 1-septate, slightly constricted at the septum, lower cell narrower and shorter than upper cell, (10–)10.5–11(–11.5)×5.5–6 µm (n=30), perispore I+ slightly blue.

Habitat and distribution. — Lichenostigma iranicum is so far known from one locality in Iran. It was found on Lobothallia prae-radiosa (Nyl.) Hafellner (Aspiciliaceae) on horizontal and inclined faces of siliceous rock.

Etymology. — The new species is named after Iran, the native country of the first author and the country of the type locality. As the Greek word “stigma” and following the genus name is neuter, also the epithet has to get the neutral form.


The distinguishing features of Lichenostigma species growing on Aspicilia and Lobothallia are summarised in Table 1. The new species differs from all other species of Lichenostigma living on Aspicilia or Lobothallia in the almost complete lack of pigmentation in the lower ascomatal wall; only some single cells show a slight tinge of brown colour and darkened outer walls. The border between the ascoma and the host cells is not clearly distinguishable (Fig. 1D, 1E). Moreover, the aforementioned five species differ in the following characters: Lichenostigma elongatum has larger ascospores (9–13×6.8–8.5 µm) with granular ornamentation, 8-spored asci, distinct and ramifying dark superficial hyphae and always elongate ascomata. L. canariense has smaller ascospores (8.5–10.5×5–6 µm) and ascomata (25–80 µm) and no superficial mycelium. L. radicans has pale brown inner ascomatal cells and a penetrating, not superficial mycelium without ornamentation. L. iranicum is more similar to L. triseptatum, with subglobose to elongate-ellipsoid ascomata, intermediate between the subgenera Lichenogramma (elongate ascomata connected to simple or pluriphylal strands of vegetative hyphae, growing superficially on the host thallus and ascomata) and Lichenostigma (rounded ascomata without connection of superficial hyphal strands). However, L. triseptatum has mostly 3-septate, larger ascospores and asci, and red-brown to black or dark reddish brown ascospores. L. supertegentinis differs from L. iranicum in the larger ascospores (16–25×7–12 µm) and asci (40–50×25–35 µm) as well as in the absence of a superficial mycelium.

Lichenostigma verrucosum Brackel & Valadbeigi, sp. nov.

MycoBank: 518509
Holotype: Iran, Azarbayejan, Arasbaran protected area, top mountain to Mazgar, siliceous rocks, on Pleopsidium gobiense, 38°40’n, 47°00’e, c. 2200–2600 m, 1.2.2008, T. Valadbeigi 6525 (TARI; isotype: herb. Valadbeigi).


Description. — Vegetative hyphae radiating from the ascomata, superficial on the host thallus, sometimes penetrating into the thallus, near the ascomata pluriphylal, then single, branched, dark brown, slightly constricted at the septa, hyphal cells 5–10 µm in diam., suborbicular to irregular, surface rugose, later cracked. Ascomata superficial, loosely aggregated, not connected by vegetative hyphae, rounded to irregular, black, matt, 120–130 µm in diam. and 40–80 µm high; ascomatal wall in section in the upper and lateral part distinctly brown, in the lower part (part connected to the host thallus) not visible, hyaline; outermost cells brown, subglobose, 5–8 µm diam., covered by a granular brown pigment; internal cells subglobose to somewhat irregular, hyaline, 3–8 µm in diam.; centrum I+ pale blue, K/I−. Asci saccati, 30–45×25–33 µm, fissitunicati, 8-spored, apically thickened, I−. Ascospores ovoid to oblong-ovoid, pale to dark brown, distinctly verrucose, 1-septate, constricted at the septum, easily splitting into two single cells, lower
Table 1. Main distinguishing features of *Lichenostigma* (*L.*) species growing on *Aspicilia* (*A.*) and *Lobothallia* (*Lo.*).

<table>
<thead>
<tr>
<th>Species</th>
<th>Host</th>
<th>Spores Size [µm]</th>
<th>Colour</th>
<th>Ornamentation</th>
<th>Asci Cells</th>
<th>Spores / ascus</th>
<th>Ascomata Wall colour</th>
<th>Ascomata Size [diam. × h in µm]</th>
<th>Shape</th>
<th>Mycelium Strands</th>
<th>Colour and ornamentation</th>
</tr>
</thead>
</table>
| *L. iranicum*    | *Lo. praera-  
| dionia*         | (10 –)11(– 11.5) × (5.5 –)6 | grey to dark brown | verruculose         | 2          | 25–30 × 14   | brown               | 100–110 × 70               | rounded to elongate       | rare, superficial, simple, in single rows | brown, rough – |
| *L. canariense*  | *A. calcarea*  | 8.5 – 10.5 × 5–6 | hyaline to brown    | smooth              | 2          | 22 × 16      | brown               | 25–80                     | ellipsoid to subglobose    | immersed, rare, simple or ramified – + |
| *L. elongatum*   | *A. ssp. + Lo.  
| radiosa*        | (9 –)10 – 13 × 6–8.5 | hyaline to brown    | finely granular     | 2          | 20–25 × 15–18| dark brown          | 50–200 × 30–60            | elongated                  | partly superficial, partly penetrating, simple or ramified | brown? + |
| *L. radicans*    | *A. ssp.*      | (9–10)–13(–14) × 5–7(–7.5) | soon brown         | verruculose        | 2          | 18–22 × 13–15| dark brown          | 90–170 × 45–70            | rounded                  | penetrating downwards, not superficial, rootlike | pale brown, smooth ± |
| *L. triseptatum* | *A. ssp.*      | (12–)13–16.5 × 6.5–10 | subhyaline to dark red-brown to almost black | slightly verruculose | (2–)4 × (6) | 32.5–44 × 16–22 | brown to dark reddish brown | 100–200 × 100–300 | subglobose to elongate ellipsoid or irregular | absent or poorly developed, simple | dark brown to black + |
| *L. supertegentis* | *A. super- 
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... cell narrower and shorter than upper cell, 12–14(–16)×(5.5–)6–7.5(–9.5) µm (n=32), perispore hyaline, 1–1.5 µm, I+ slightly blue.

Habitat and distribution. — Lichenostigma verrucosum so far is known only from the type locality in Iran. It was found on Pleopsis gobiense (H. Magn.) Hafellner (Acarosporaceae), on siliceous rock.

Observations. — Until now no species of Lichenostigma was known on hosts of the genus Pleopsis. On Acarospora, which belongs to the same family as Pleopsis (Acarosporaceae), four species of the genus have been described: L. subradicans Hafellner & al. on yellow and rarely on brown species of Acarospora, L. gracile Calatayud & al. on A. fuscata, L. anatolicum Halıcı & Kocakaya on an unidentified species of Acarospora and L. svandae Vondrák & Soun on A. cervina. The first three have clearly smaller ascospores (9–10×5–6 µm, 9–12×5–6 µm, and 9.2–11.8×5.5–7 µm, respectively) than the new species. L. svandae is similar to the new species in several features, but distinguished by root-like coloured hyphae penetrating the host thallus below the ascomata and an I− centrum. From all mentioned species L. verrucosum is distinguished by the easily splitting spores.

Fig. 1. A, C–D: Lichenostigma iranicum: on Lobothallia praeradiosa, habitus (A); ascoma without basal wall (C) and section through an ascoma (D); ascospores (E). – B: L. elongatum: ascoma with basal wall. – F–H: L. verrucosum: vegetative hyphal strands (F); section through an ascoma (G); ascospores (H). – A, C, F = photographs from the type collections; B = photograph from a specimen from Italy, Sicily, Prov. Palermo, on Aspilia calcarea agg. (herb. IVL 3943); D, E, G, H = drawn from the type collections.
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