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Lichens collected during the 12th “Iter Mediterraneum” in Tunisia, 24 March – 4 April 2014

Abstract

Guttová, A., Vondrák, J., Schultz, M. & El Mokni, R: Lichens collected during the 12 “Iter Mediterraneum” in Tunisia, 24 March – 4 April, 2014. — *Bocconea* 27: 69-76. 2015. — ISSN: 1120-4060 printed, 2280-3882 online.

A preliminary list of the so far identified lichens collected during the 12th OPTIMA Iter to Tunisia in 2014 is presented. Altogether 37 collecting sites in the northern part of the country were visited. The lichen collection comprises ≤ 300 capsules kept in SAV, of which duplicates are being prepared for the Palermo Herbarium (PAL). Ecological and distributional data are provided for 46 taxa, 23 of which had not been included in the published checklist of lichens of Tunisia (e. g. *Anema nummularium*, *Athallia skii*, *Caloplaca pollinii*, *Heppia adglutinata*, *Scytinium palmatum*, *Leprocaulon microscopicum*, *Solenopsora grisea*, and *S. olivacea* subsp. *olivacea*). In an additional list, samples recently collected in the southern and eastern Mediterranean region are mentioned, which include elements characteristic of the habitats of N African mountains (e.g. the Atlas ranges) and Israel (e.g. *Gloeoheppia turgida*, *Lichinella algerica*, and *Peccania fontqueriana*).

Key words: biodiversity, lichenized fungi, North Africa.

Introduction

Tunisia is situated at the junction of the two basins that make up the Mediterranean – the Mashreq (in Arab: East) and the Maghreb (in Arab: West) and contains many interesting habitats awaiting to be explored from a lichenological point of view (Seaward 1996). The mountain ranges in the north and east are part of the Tell Atlas and Saharan Atlas. The arid high steppes are drained by oueds (wadis), and the semi-arid low steppes end at a flat coastal strip. The bioclimatic zones cover a south-north gradient, from the hyper-arid Saharan area to the humid Mediterranean mountains. Forests and matorral cover 5 % of the land and include oak woods (*Quercus canariensis*, *Q. ilex*, *Q. suber*, *Q. coccifera*) and stands of, e.g., *Olea europaea*, *Pistacia lentiscus*, *Pinus halepensis*, and *Tetraclinis articulata*. Approximately 20 % of the country are covered by steppes dominated among others by *Stipa tenacissima*, *Artemisia herba-alba*, and *Rhanterium sua-veolens* (Ghrabi Gammar 2011).

Seaward (1996) presented a comprehensive overview of Tunisia’s lichen diversity, based on a detailed literature survey, the revision of herbarium material, and his own collections. In the same paper he summarised the history of the country’s lichenological investigation, providing lists of collectors, herbaria, exsiccate, and unpublished reports. The checklist comprises 395 species and additional infraspecific taxa (3 subspecies, 13 varieties, and 4 formae).

The present paper is a contribution to the knowledge of lichen diversity of Tunisia. It includes ecological and distributional data linked to the species so far identified from among the lichen material collected during the 12th OPTIMA Iter to Tunisia in 2014. Examples of taxa with larger, macroscopic thalli are members of *Cladonia*, *Collema*, *Degelia*, *Diploschistes*, *Fulgensia*, *Gyalecta*, *Chrysothrix*, *Nephroma*, *Opegrapha*, *Peltigera*, *Physcia*, *Psora*, *Ramalina*, *Roccella*, *Toninia*, *Umbilicaria*, *Xanthoparmelia*, and *Xanthoria*. In addition, microlichens were also collected (e.g.: *Agonimia*, *Catillaria*, *Gyalecta*, *Lecania*, and *Lecanora*); their identification is in progress, with the objective to prepare a comprehensive paper.

Material and Methods

During the 12th OPTIMA Iter 2014, we (AG, REM) sampled 37 localities, all in the northern part of Tunisia (Table 1). They cover a wide range of habitats on limestone and siliceous bedrock – saline shores, coastal sand dunes, phrygana and macchia with rocky outcrops, *Tetraclinis articulata* groves, *Quercus* woodlands, from sea level up to an elevation of ca. 880 m a.s.l. We collected lichens from different types of substrate present at these sites: tree bark, decayed wood, soil, bones, rocks. In total, our lichen collection comprises ≤ 300 capsules, to be kept in SAV, of which duplicates are being prepared for the Palermo herbarium (PAL). Where indicated, further duplicates are deposited in HBG and in the herb. J. Vondrák. Identification of the material is based on standard light microscopy, molecular markers were also studied in selected samples. The nomenclature, in

Table 1. List of collecting sites (coordinates in degrees, decimal minutes).

No	area	locality	latitude	longitude	altitude	date
1	Cap Bon	Bou Kornine Mt.	36° 42.352'	10° 20.672'	119 m	24/3/2014
2	Cap Bon	Bou Kornine Mt.	36° 42.223'	10° 20.591'	176 m	24/3/2014
3	Cap Bon	Bou Kornine Mt.	36° 42.189'	10° 20.510'	227 m	24/3/2014
4	Cap Bon	Bou Kornine Mt.	36° 43.525'	10° 19.545'	70 m	24/3/2014
5	Cap Bon	Soliman	36° 42.315'	10° 27.378'	11 m	24/3/2014
6	Cap Bon	Massif de Djebel Sidi Abderrahmane	36° 46.661'	10° 45.608'	202 m	25/3/2014
7	Cap Bon	Massif de Djebel Sidi Abderrahmane	36° 47.002'	10° 45.688'	193 m	25/3/2014
8	Cap Bon	Chot Ezzorhou	36° 40.811'	10° 56.237'	10 m	25/3/2014
9	Cap Bon	coastline between Elentoba and Korba	36° 37.129'	10° 53.377'	4 m	25/3/2014
10	Cap Bon	Djebel Haouaria Mt.	37° 04.282'	11° 02.456'	367 m	26/3/2014
11	Cap Bon	Les Grottes	37° 03.451'	10° 59.694'	18 m	26/3/2014

Table 1. continued.

12	Cap Bon	coastline between Kalibia and Sidi Jamel Eddine	36° 48.100'	11° 01.722'	12 m	26/3/2014
13	Cap Bon	ZaghouanMt.	36° 21.883'	10° 05.281'	593 m	27/3/2014
14	Cap Bon	ZaghouanMt.	36° 22.047'	10° 05.390'	618 m	27/3/2014
15	Cap Bon	ZaghouanMt.	36° 21.852'	10° 05.215'	590 m	27/3/2014
16	Cap Bon	Oued Enzit	36° 27.135'	10° 18.233'	190 m	27/3/2014
17	Cap Bon	Djebel Ressayas	36° 35.847'	10° 19.359'	243 m	28/3/2014
18	Les Mogods	Djebel Ichkeul	37° 08.277'	9° 41.511'	55 m	29/3/2014
19	Les Mogods	Djebel Ichkeul	37° 08.230'	9° 41.454'	82 m	29/3/2014
20	Les Mogods	Djebel Ichkeul	37° 07.929'	9° 41.336'	7 m	29/3/2014
21	Les Mogods	Corniche - La Grotte	37° 19.956'	9° 50.593'	27 m	29/3/2014
22	Les Mogods	along the road between Teskrine (Teskraia) and Sejeune, near Fejet Errich	37° 13.550'	9° 29.602'	205 m	30/3/2014
23	Les Mogods	along the road between Teskrine (Teskraia) and Sejeune, near Fejet Errich	37° 13.547'	9° 29.690'	235 m	30/3/2014
24	Les Mogods	Cap Serrat	37° 13.213'	9° 13.374'	15 m	30/3/2014
25	Les Mogods	Cap Serrat	37° 13.362'	9° 13.438'	37 m	30/3/2014
26	Les Mogods	Bizerte	37° 14.941'	9° 54.946'	18 m	31/3/2014
27	Les Mogods	Bizerte	37° 15.245'	9° 55.561'	10 m	31/3/2014
28	Les Mogods	along the road P7 between Sejenane and Oued Zitoun	37° 00.960'	9° 19.617'	402 m	1/4/2014
29	Kroumirie	Tabarka	36° 56.757'	8° 42.445'	194 m	2/4/2014
30	Kroumirie	Tabarka	36° 57.977'	8° 52.592'	38 m	2/4/2014
31	Kroumirie	Ein Draham	36° 47.390'	8° 41.001'	775 m	2/4/2014
32	Kroumirie	Massif de Feidja	36° 29.313'	8° 18.333'	771 m	3/4/2014
33	Kroumirie	Natural Park el Feidja, Ain Soltane	36° 30.330'	8° 20.194'	820 m	3/4/2014
34	Kroumirie	Natural Park el Feidja, Ain Soltane	36° 31.432'	8° 19.681'	876 m	3/4/2014
35	Kroumirie	Ein Draham	36° 44.363'	8° 40.988'	688 m	3/4/2014
36	Kroumirie	Ein Draham	36° 45.255'	8° 41.266'	661 m	4/4/2014
37	Kroumirie	Ein Draham	36° 43.755'	8° 42.314'	562 m	4/4/2014

Teloschistaceae, follows Arup & al. (2013), and in *Collembataceae*, Otálora & al. (2014). Species marked by an asterisk (*) were not reported by Seaward (1996) in his checklist of Tunisian lichens. Figures in **bold** refer to the collecting locality as numbered in Table 1. Collecting numbers (in italics) indicate the sequential numbering of lichens collected by Guttová & El Mokni during the 12th OPTIMA Iter.

Results

This preliminary list of identified samples comprises 23 taxa that were not reported in the extant checklist of Tunisian lichens (Seaward 1996). They include several *Caloplaca* species, reflecting the big progress recently achieved in the knowledge of this group (e. g., Arup & al. 2013; Joshi & al. 2011; Šoun & al. 2011; Vondrák & al. 2008, 2009a-b, 2010a, 2010b). During the excursion we focused on collecting members of the genus *Solenopsora*, where phylogenetic relationship among Mediterranean species were disclosed recently (Guttová & al. 2014); currently, the phylogeography of the two sister species *S. candicans* and *S. cesatii* is being studied, with an aim to clarify their origin in the Carpathians, at the periphery of their range in continental Europe (Fačkovcová 2015). We added at the end a list of samples recently collected in the southern and eastern Mediterranean region, to document characteristic elements of North African mountain habitats, e.g. in the Atlas ranges, and of Israel. These are mostly members of *Lichinaceae* – common species such as *Lichinella stipatula* or members of the genus *Peccania*, which is in need of revision (Schultz & al. 2009).

- **Anema nummularium* (Dufour) Nyl. – **13**: semi-natural outcrops of limestone rock along the dirty road bank, on perpendicular rock faces, *106* (SAV, PAL, HBG)
- **Arthonia cinnabarina* (DC.) Wallr. – **10**: on twigs of *Erica* and *Phyllirea* growing on the cliff tops, *1, 2, 3, 4, 6* (all: SAV)
- Athallia* aff. *holocarpa* (Hoffm.) Arup & al. – **1**: on branches of *Tetraclinis articulata* (SAV, PAL, herb. Vondrák); **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops, *19* (SAV, PAL, herb. Vondrák)
- **Athallia skii* (Khodos. & al.) Arup & al. – **8**: on fallen trunk of *Phoenix dactylifera*, *80* (SAV, PAL, herb. Vondrák)
- Blastenia* cf. *hungarica* (H. Magn.) Arup & al. – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops *7, 22* (both: SAV, PAL, herb. Vondrák)
- **Blastenia coralliza* (Arup & Åkelius) Arup & al. – **34**: on *Quercus* sp., *48* (SAV, PAL, herb. Vondrák)
- Caloplaca aegatica* Giralt & al. – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops *5, 7, 8, 17* (all: SAV, PAL, herb. Vondrák)
- Caloplaca haematites* (Chaub. ex St.-Amans) Zwackh – **33**: on bark of *Quercus suber*, *57* (SAV, PAL, herb. Vondrák)
- **Caloplaca pollinii* (A. Massal.) Jatta – **22**: on bark of *Quercus suber*, *53* (SAV, PAL, herb. Vondrák)
- **Caloplaca stillicidiorum* (Vahl.) Lyngé – **1**: on branches of *Callitris articulate*, *62* (SAV, PAL, herb. Vondrák)

- **Caloplaca ulcerosa* Coppins & P. James – **5**: on dry twigs among grass 39 (SAV, PAL, herb. Vondrák); **8**: on fallen trunk of *Phoenix dactylifera*, 80 (SAV, PAL, herb. Vondrák)
- **Flavoplaca austrocitrina* (Vondrák & al.) Arup & al. – **5**: on dry twigs among grass, 39 (SAV, PAL, herb. Vondrák); **8**: on fallen trunk of *Phoenix dactylifera*, 80 (SAV, PAL, herb. Vondrák)
- Flavoplaca* cf. *austrocitrina* (Vondrák & al.) Arup & al. – **5**: on bone lying on the soil, 24 (SAV, PAL, herb. Vondrák); on sandstone rock among grass, 28 (SAV, PAL, herb. Vondrák)
- **Flavoplaca oasis* (A. Massal.) Arup & al. – **5**: on sandstone rock among grass, 29, 34 (both: SAV, PAL, herb. Vondrák)
- **Gyalolechia flavorubescens* (Huds.) Arup & al. – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops, 2, 16 (both: SAV, PAL, herb. Vondrák); **21**: on *Juniperus* twigs, 47 (SAV, PAL, herb. Vondrák)
- **Haloplaca* aff. *suaedae* (O. L. Gilbert & Coppins) Arup & al. – **5**: on wood of dry bushes, 49 (SAV, PAL, herb. Vondrák); **8**: on branches of *Rhetama* sp., 74 (SAV, PAL, herb. Vondrák); **21**: on *Juniperus* twigs, 41, 43 (both: SAV, PAL, herb. Vondrák)
- **Heppia adglutinata* (Kremp.) A. Massal. – **24**: sea coast with schistous outcrops and *Quercus suber*, on soil, 93 (SAV, PAL, HBG).
- Hyperphyscia adglutinata* (Flörke) H. Mayrhofer & Poelt – **16**: on bark of *Olea*, *s.n.* (SAV)
- Lecania spadicea* (Flot.) Zahlbr. – **19**: in fissures and on faces of calcareous rocks, *s.n.* (SAV); **20**: in fissures and on faces of calcareous rocks, *s.n.* (SAV)
- **Leprocaulon microscopicum* (Vill.) Gams ex D. Hawksw. – **25**: on sandstone rock, *s.n.* (SAV)
- Lichinella stipitata* Nyl. – **3**: on hard calcareous boulder with crystalline intrusions, 98 (SAV, PAL, HBG)
- Lobaria amplissima* (Scop.) Forssell – **35**: on bark of *Quercus canariensis*, *s.n.* (SAV)
- Lobaria pulmonaria* (L.) Hoffm. – **31**: on mossy bark of *Quercus canariensis*, *s.n.* (SAV)
- Normandina pulchella* (Borrer) Nyl. – **31**: on mossy bark of *Quercus canariensis*, *s.n.* (SAV)
- Peltula* cf. *euploca* (Ach.) Poelt – **3**: on hard calcareous boulder with crystalline intrusions, 98 (SAV, PAL, HBG)
- Physcia biziana* (A. Massal.) Zahlbr. – **20**: on bark of *Olea*, *s.n.* (SAV)
- Placynthium* sp. – **13**: semi-natural outcrops of limestone rock along the dirty road bank, on perpendicular rock faces, 106 (SAV, PAL, HBG)
- Polychidium muscicola* (Sw.) Gray – **32**: among mosses on crystalline rock, *s.n.* (SAV)
- Psora decipiens* (Hedw.) Hoffm. – **4**: on calcareous soil, *s.n.* (SAV)
- Psorotichia* cf. *diffracta* (Nyl.) Forssell (epruinose form) – **13**: semi-natural outcrops of limestone rock along the dirty road bank, on perpendicular rock faces, 106 (SAV, PAL, HBG)
- **Scytinium palmatum* (Hudson) Gray – **32**: among mosses on crystalline rock, *s.n.* (SAV)
- **Scytinium schraderi* (Bernh.) Otálora & al. – **1**: on calcareous soil, 129 (SAV); **3**: on calcareous soil, 112 (SAV); **4** (SAV); **13**: on calcareous soil, 119 (SAV)
- **Scytinium tenuissimum* (Dicks.) Otálora & al. – **1**: on calcareous soil, 129 (SAV); **3**: on calcareous soil, 109 (SAV); **13**: on calcareous soil, 120 (SAV); **24**: on soil, 124 (SAV)

- **Scytinium teretiusculum* (Wallr.) Otálora & al. – **24**: on bark of *Quercus suber*, 125, 126 (SAV)
- **Scytinium turgidum* (Ach.) Otálora & al. – **1**: on calcareous soil, 129 (SAV); **24**: on soil, 127 (SAV)
- Solenopsora candicans* (Dicks.) J. Steiner – **3**: siliceous boulder in open place between scrub vegetation, in fissures of rock, *s.n.* (SAV); **7**: on sheltered parts or in fissures of the sand- stone rock, *s.n.* (SAV); **19**: shaded calcareous outcrops, on rock faces, *s.n.* (SAV); **28**: calcareous outcrops on the pasture, on rock, *s.n.* (SAV)
- **Solenopsora grisea* (Bagl.) Kotlov – **13**: limestone outcrops among the scrub vegetation, *s.n.* (SAV); **14**: karst formations among the scrub vegetation (*Olea* sp.), on sheltered parts of the rock, *s.n.* (SAV); **17**: sheltered limestone rocks in the pass, in fissures, *s.n.* (SAV); **19**: semi-shaded calcareous outcrops, in fissures and on faces of calcareous rocks, *s.n.* (SAV). – *Additional specimen*: Tunesien: Djebel Zaghouan (NW-Flanke). Felspartien abseits der Straße zur Relaisstation bei 700–780 m, 19/4/1982, *Poelt* as *Solenopsora* sp.(GZU 41–82)
- **Solenopsora olivacea* (Dufour ex Fr.) Kiliás subsp. *olivacea* – **19**: shaded calcareous outcrops, on rock faces, *s.n.* (SAV)
- Solenopsora vulturiensis* A. Massal. – **7**: on sheltered parts or in fissures of the sandstone rock, *s.n.* (SAV); **10**: on sandstone rocks and surrounding soil, *s.n.* (SAV); **23**: siliceous sandstone outcrops on the summint, in fissures, *s.n.* (SAV); **31**: on siliceous sandstone rocks, *s.n.* (SAV); **32**: sandstone cliffs, in sheltered parts of the rock, *s.n.* (SAV)
- **Synalissa ramulosa* (Hoffm.) Fr. – **2**: on calcareous rock, 95 (SAV, PAL, HBG). – DNA sample 4724
- **Teloschistes chrysophthalmus* (L.) Th. Fr. – **35**: on bark of *Quercus canariensis* (SAV – C OPTIMA ITER 2014_s.n.)
- Tephromela atra* (Huds.) Hafellner – **3**: on hard siliceous metamorphic rock (SAV – C OPTIMA ITER 2014_s.n.)
- Thelopsis isiaca* Stizenb. – **12**: on bark of *Cupressus* sp., *s.n.* (SAV); **18**: on bark of *Pinus halepensis*, *s.n.* (SAV)
- Tornabea scutellifera* (With.) J. R. Laundon – **10**: on wood of *Erica* and *Phyllirea* branches growing on the cliff tops (SAV – C OPTIMA ITER 2014_8)
- Variospora aurantia* (Pers.) Arup & al. – **9**: on calcareous rock, 69 (SAV, PAL, herb. Vondrák)

Additional samples collected in the southern and eastern Mediterranean region:

- Gloeoheppia turgida* (Ach.) Gyeln. – Morocco, Anti Atlas, Tiznit, near the village Tizoughrane (road R104), open calcareous outcrops above the village Albid, on soil in rock fissures, elev. 862 m, 29°33.655'N 9°21.803'W, 3/5/2013, *Guttová & al.* (SAV)
- Heppia adglutinata* (Kremp.) A. Massal. – Morocco, Anti Atlas, Tiznit, near the village Tizoughrane (road R104), open calcareous outcrops above the village Albid, on soil in rock fissures, elev. 862 m, 29°33.655'N 9°21.803'W, 3/5/2013, *Guttová & al.* (SAV)

- Lichinella algerica*** (J. Steiner) P. P. Moreno & Egea – Morocco, Anti Atlas, Guelmin-Es-Smara, Tata, along the road R109 between Tata and Igherm vádí near Imitek, in fissures of sandstone rock, elev. 714 m, 29°42.207'N 8°6.537'W, 4/5/2013, A. Guttová & al. (SAV, HBG); Israel, Southern District – Negev Desert – Eilat Mts: Eilat, Hidden valley, on shaded sandstone rocks on a mountain pass, elev. 333 m, 29°40.117'N, 34°56.432'E, 5/3/2014 Guttová & al. (SAV)
- Lichinella cribellifera*** (Nyl.) P. P. Moreno & Egea – Morocco, Rabat-Salé-Zemmour-Zaër, Rommani, the valley of the stream Oued el Mechra along the road R404, on soil in rock fissures, elev. 296 m, 33°32.009'N 6°37.671'W, 30/4/2013, Guttová & al. (SAV, HBG).
- Peccania coralloides*** (A. Massal.) A. Massal. – Morocco, Haut Atlas Mts, Meknes Tafilalt, Ar-Rachidia, Gorges du Ziz, the valley of the river Oued Ziz, calcareous outcrops near the tunnel Zaval, on rock, elev. 1158 m, 32°5.722'N 4°22.228'W, 8/5/2013, Guttová & al. (SAV, HBG).
- Peccania fontqueriana*** P. P. Moreno & Egea – Morocco, Anti Atlas, Tiznit, Guttová & al. (SAV)
- Peccania tiruncula*** (Nyl.) Henssen – Morocco, Anti Atlas, Guelmin-Es-Smara, Guttová & al. (SAV, HBG)
- Seiophora contortuplicata*** (Ach.) Frödén – Morocco, Moyen Atlas Mts, Oualegh, limestone cliffs along the road N13 between Timahdite and Oualegh, on rock, elev. 2161 m, 32°59.917'N, 5°4.449'W, 2/5/2013, Guttová & al. (SAV)
- Seiophora villosa*** (Ach.) Frödén – Morocco, NW foot of Anti Atlas Mts, Aït Baiha, along the road R105 from Biougra to Tafraoute, on twigs of *Argania spinosa*, elev. 521 m, 30°6.287'N, 9°13.416'W, 2/5/2013, Guttová & al. (SAV)

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