

The lichen flora of the Termessos National Park in Southwestern Turkey

ÖZGE TUFAN, HÜSEYİN SÜMBÜL & AYŞEN ÖZDEMİR TÜRK

ozgetufan@akdeniz.edu.tr

*Akdeniz University, Faculty of Arts and Sciences, Biology Department,
TR-07058 Antalya, Turkey*

Abstract – Between March 2002 and September 2003, the lichen flora of the Termessos National Park was studied for the first time. In all, 161 taxa (152 species, 4 subspecies, 5 varieties) were determined from 1114 lichen samples, of which 86 were new to Antalya Province and 5 were new to Turkey.

Key words – lichens, Güllük Mountain, Antalya

Introduction

The number of studies on the lichen flora of Turkey has increased significantly over the last two decades (e.g., Aslan 2000, Breuss & John 2004, Çiçek & Özdemir Türk 1998, Güvenç et al. 1996, Özdemir Türk & Güner 1998, Öztürk & Güvenç 2003). Although the lichen flora of the Mediterranean phytogeographical region of Turkey has received more attention than the other regions of Turkey (John 1996, 2003; John & Nimis 1998; Nimis & John 1998; John et al. 2000), even this area needs additional research. To determine the lichen flora of the region, floristic studies that focus on small areas with high biodiversity are needed.

Throughout the Mediterranean region of Turkey, there are ruins and cities from the ancient civilizations, but until now no lichen floristic or biodeterioration study has been published from such places. Termessos (Güllük Mountain) National Park, located on the West side of the Taurus Mountains in Antalya province, southwestern Turkey, is such a site. It is famous for its ancient city, Termessos, which is situated on a natural platform at the top of Güllük Mountain, which has been formed by chemical erosion and tectonic movements. It includes a canyon with very steep walls as high as 500-600 m.

Material and Methods

The research is based on 1114 lichen samples, which were collected from 54 localities (Table 1) in Termessos National Park between March 2002 and September 2003. In every locality coordinates and altitude were measured by GPS (Garmin 12X) and all lichen samples were taken together with their substratum. The samples were brought the laboratory and air-dried under room conditions (25 ± 2 °C, RH 60 ± 10).

For identification, macroscopic and microscopic characters were examined with stereo- and light microscopes and by reference to recent literature (e.g. Wirth 1995, Purvis et al. 1992, Clauzade & Roux 1985, Giordani et al. 2002, Jørgensen 1997, Zeybek et al. 1993, Breuss 1990, Moberg 1977). Following identification, the lichens were deposited in Akdeniz University Herbarium (AKDU).

Results

The lichen species encountered in Termessos National Park are listed below, together with locality numbers and substrata. The abbreviations of authors in that list are in accordance with Brummitt & Powell (1992), and lichen taxa new to Turkey are indicated by *, and those new to Antalya province by #.

- #*Acarospora cervina* A.Massal., Loc. 36, on calcareous rock
- #*Acarospora impressula* Th.Fr., Loc. 20, on siliceous rock
- #*Amandinea punctata* (Hoffm.) Coppins & Scheid., Loc. 9, on shrubs
- Anaptychia ciliaris* (L.) Körb., Loc. 2, 4, 2, 53, on *Pinus brutia*, *Quercus coccifera*, *Juniperus excelsa*
- #*Anthracocarpon virescens* (Zahlbr.) Breuss, Loc. 19, on soil, Det. O. Breuss
- Aspicilia calcarea* (L.) Mudd, Loc. 4, 6, 8, 11, 45, 50, 52, on calcareous rock
- #*Aspicilia cinerea* (L.) Körb., Loc. 4, 5, 6, 9, 10, 54, on siliceous rock
- Aspicilia contorta* (Hoffm.) Kremp. subsp. *contorta*, Loc. 5, 19, 27, 36, on calcareous rock
- Aspicilia contorta* subsp. *hoffmanniana* S.Ekman & Fröberg, Loc. 4, 13, 15, on calcareous rock
- #*Aspicilia desertorum* (Kremp.) Mereschk., Loc. 36, 43, on calcareous rock
- Aspicilia farinosa* (Flörke) Motyka, Loc. 8, 12, on calcareous rock
- #*Aspicilia hispida* Mereschk., Loc. 36, 43, on soil
- Bacidia rubella* (Hoffm.) A.Massal., Loc. 12, 14, on *Acer sempervirens*, *Pinus brutia*
- Bryoria fuscescens* (Gyeln.) Brodo & D.Hawksw., Loc. 23, 46, on *Juniperus excelsa*
- Caloplaca alociza* (A.Massal.) Mig., Loc. 4, 5, 15, on calcareous rock
- #*Caloplaca adriatica* (Zahlbr.) Servít, Loc. 15, 17, on calcareous rock, Det. V. John
- #*Caloplaca atroflava* (Turner) Mong., Loc. 4, 6, 14, 18, 49, on siliceous rock
- Caloplaca aurantia* (Pers.) Hellb., Loc. 7, 12, 41, on calcareous rock
- #*Caloplaca cerina* (Ehrh. ex Hedw.) Th.Fr. var. *cerina*, Loc. 2, 25, 36, 54, on *Pinus brutia*, *Quercus coccifera*
- #*Caloplaca cerinelloides* (Erichsen) Poelt, Loc. 26, on *Pinus brutia*
- #*Caloplaca chrysodeta* (Vain. ex Räsänen) Dombr., Loc. 6, 9, 51, on calcareous rock
- #*Caloplaca citrina* (Hoffm.) Th.Fr., Loc. 4, 14, 35, on calcareous rock
- #*Caloplaca crenulatella* (Nyl.) H.Olivier, Loc. 4, 22, on calcareous rock
- #*Caloplaca dolomiticola* (Hue) Zahlbr., Loc. 12, 21, on calcareous rock
- #*Caloplaca erythrocarpia* (Pers.) Zwackh, Loc. 26, 27, on calcareous rock
- Caloplaca flavorubescens* (Huds.) J.R.Laundon, Loc. 2, 10, 28, on calcareous rock
- Caloplaca flavovirescens* (Wulfen) Dalla Torre & Sarnth., Loc. 28, on *Pinus brutia*
- #*Caloplaca holocarpa* (Hoffm.) A.E.Wade, Loc. 5, 10, 15, 23, 36, on calcareous rock, siliceous rock, *Pinus brutia*
- #*Caloplaca lactea* (A.Massal.) Zahlbr., Loc. 12, 26, 47, on calcareous rock, siliceous rock
- #*Caloplaca variabilis* (Pers.) Müll.Arg., Loc. 4, 36, on calcareous rock
- Caloplaca xantholyta* (Nyl.) Jatta, Loc. 4, 6, 10, 12, 40, on calcareous rock
- #*Candelariella aurella* (Hoffm.) Zahlbr., Loc. 4, 30, 33, on calcareous rock
- #*Candelariella vitellina* (Hoffm.) Müll.Arg., Loc. 5, 15, 36, on siliceous rock

- #*Candelariella xanthostigma* (Pers. ex Ach.) Lettau, Loc. 2, 25, 36, on *Juniperus excelsa*, *Quercus coccifera*, dead trees
- #*Catapyrenium daedaleum* (Kremp.) Clauzade & Cl.Roux, Loc. 21, on soil, Det. O. Breuss
- #*Catillaria nigroclavata* (Nyl.) Schuler, Loc. 4, on *Quercus coccifera*
- #*Cladonia cervicornis* (Ach.) Flot., Loc. 32, on moss, Det. T. Ahti
- Cladonia convoluta* (Lam.) Cout., Loc. 6, 16, 32, 38, on calcareous rock, soil, moss
- #*Cladonia fimbriata* (L.) Fr., Loc. 4, 8, on dead trees
- Cladonia pyxidata* (L.) Hoffm. subsp. *pyxidata*, Loc. 8, on soil
- Cladonia rangiformis* Hoffm., Loc. 8, on soil
- *#*Collema conglomeratum* Hoffm., Loc. 4, on *Pinus brutia*
- Collema crispum* (Huds.) Weber ex F.H.Wigg., Loc. 5, on calcareous rock, Det. P.M. Jørgensen
- Collema cristatum* (L.) Weber ex F.H.Wigg. var. *cristatum*, Loc. 4, 5, 21, on calcareous rock, soil
- Collema cristatum* var. *marginale* (Huds.) Degel., Loc. 5, on soil, Det. P.M. Jørgensen
- #*Collema furfuraceum* (Arnold) Du Rietz, Loc. 12, 14, on *Cistus creticus*
- Collema nigrescens* (Huds.) DC., Loc. 4, 6, 14, 30, on *Cistus creticus*, *Quercus coccifera*, *Pinus brutia*
- Collema tenax* (Sw.) Ach., Loc. 14, 16, on moss
- #*Collema undulatum* var. *granulosum* Degel., Loc. 36, on calcareous rock, Det. P.M. Jørgensen
- Degelia plumbea* (Lightf.) P.M.Jørg. & P.James, Loc. 14, on *Pinus brutia*, Det. P.M. Jørgensen
- Dermatocarpon miniatum* (L.) W.Mann, Loc. 14, on siliceous rock
- #*Diploschistes gypsaceus* (Ach.) Zahlbr., Loc. 13, on calcareous rock
- Diploschistes muscorum* (Scop.) R.Sant., Loc. 9, on moss
- Diploschistes ocellatus* (Vill.) Norman, Loc. 1, 7, 8, 39, 43, on calcareous rock
- Diploschistes scruposus* (Schreb.) Norman, Loc. 4, on siliceous rock
- Diplotomma alboatrum* (Hoffm.) Flot., Loc. 2, 4, 36, 14, 15, on different trees and shrubs
- Evernia prunastri* (L.) Ach., Loc. 4, 10, 46, on different trees and shrubs
- #*Farnoldia jurana* (Schaer.) Hertel, Loc. 15, 21, on calcareous rock
- #*Fulgensia fulgens* (Sw.) Elenkin, Loc. 11, 13, 14, 42, 52 on calcareous rock, moss, soil
- #*Hypocenomyce anthracophila* (Nyl.) P.James & Gotth.Schneid., Loc. 23, on *Acer sempervirens*
- #*Hypocenomyce scalaris* (Ach. ex Lilj.) M.Choisy, Loc. 9, 21, on *Pinus brutia*
- Hypogymnia tubulosa* (Schaer.) Hav., Loc. 21, 22, 36, on *Pinus brutia*
- #*Lecania cyrtella* (Ach.) Th.Fr., Loc. 2, on *Cupressus sempervirens*
- Lecania fuscella* (Schaer.) Körb., Loc. 2, on *Cupressus sempervirens*
- *#*Lecania inundata* (Hepp ex Körb.) M.Mayrhofer, Loc. 10, 17, on calcareous rock
- Lecanora bolcana* (Pollini) Poelt, Loc. 4, 11, on siliceous rock
- #*Lecanora chlarotera* Nyl., Loc. 2, 4, 10, on *Pinus brutia*, *Acer sempervirens*, *Juniperus excelsa*
- #*Lecanora dispersa* (Pers.) Sommerf., Loc. 4, 27, 36, on calcareous rock

- Lecanora expallens* Ach., Loc. 5, 6, 9, on *Pinus brutia*
Lecanora muralis (Schreb.) Rabenh., Loc. 4, 5, 6, 7, 12, 32, on calcareous rock, siliceous rock
#*Lecanora saligna* (Schrad.) Zahlbr., Loc. 15, 32, 36, on *Pinus brutia*
#*Lecidea fuscoatra* (L.) Ach., Loc. 18, on siliceous rock, Det. V. John
#*Lecidella carpathica* Körb., Loc. 4, 5, on siliceous rock
Lecidella elaeochroma (Ach.) M.Choisy, Loc. 3, 10, 14, 15, 21, on various trees and shrubs
#*Lecidella stigmatea* (Ach.) Hertel & Leuckert, Loc. 5, 18, on calcareous rock, siliceous rock
#*Lepraria incana* (L.) Ach., Loc. 6, 9, on calcareous rock, soil
Lepraria nivalis J.R.Laundon, Loc. 10, on calcareous rock, moss
Leptochidium albociliatum (Desm.) M.Choisy, Loc. 4, on *Pinus brutia*, Det. P.M. Jørgensen
Leptogium corniculatum (Hoffm.) Minks, Loc. 4, 10, 15, 20, on *Pinus brutia*, moss
Leptogium gelatinosum (With.) J.R.Laundon, Loc. 4, 5, 12, 14, 18, 27, on calcareous rock, moss, soil
*#*Leptogium furfuraceum* (Harm.) Sierk, Loc. 25, on *Quercus coccifera*, Det. P.M. Jørgensen
Letharia vulpina (L.) Hue, Loc. 23, 36, on *Pinus brutia*
Lobothallia radiosa (Hoffm.) Hafellner, Loc. 4, 6, 15, 19, 32, 48, on calcareous rock, siliceous rock
#*Megaspora verrucosa* (Ach.) Hafellner & V.Wirth, Loc. 15, 21, 22, on *Juniperus excelsa*, moss
#*Melanelia exasperata* (De Not.) Essl., Loc. 22, on *Pinus brutia*
Melanelia glabra (Schaer.) Essl., Loc. 2, 3, 12, 34, on *Pinus brutia*
Mycobilimbia lurida (Ach.) Hafellner & Türk, Loc. 8, 13, on soil, Det. O. Breuss
#*Mycocalicium subtile* (Pers.) Szatala, Loc. 2, on *Juniperus excelsa*
#*Neocatapyrenium rhizinosum* (Müll.Arg.) Breuss, Loc. 6, on soil, Det. O. Breuss
#*Neofuscelia pulla* (Ach.) Essl., Loc. 4, 5, 6, 7, 32, 42, 53, on siliceous rock
Ochrolechia pallescens (L.) A.Massal., Loc. 2, 4, 10, 14, 21, on *Pinus brutia*
#*Opegrapha rupestris* Pers., Loc. 15, on calcareous rock, Det. B.J. Coppins
Parmelia saxatilis (L.) Ach., Loc. 21, 36, on *Pinus brutia*
#*Parmelina carporrhizans* (Taylor) Poelt & Vězda, Loc. 2, 4, 5, 11, on *Pinus brutia*, *Juniperus excelsa*
Parmelina tiliacea (Hoffm.) Hale, Loc. 2, 4, 6, 9, 20, on *Pinus brutia*, *Juniperus oxycedrus* subsp. *oxycedrus*
#*Peltigera canina* (L.) Willd., Loc. 4, 14, 21, 28, on soil
*#*Peltigera monticola* Vitik., Loc. 12, 20, 28, on moss, Det. O. Vitikainen
#*Peltigera neckeri* Hepp, Loc. 4, 14, 28, on moss
Pertusaria albescens (Huds.) M.Choisy & Werner, Loc. 2, 4, 9, 12, 14, 15, 18, on calcareous rock, *Pinus brutia*
Pertusaria hymenea (Ach.) Schaer., Loc. 4, 10, 16, on *Pinus brutia*
#*Pertusaria leioplaca* DC., Loc. 4, 10, 11, 14, on *Pinus brutia*
Pertusaria pertusa (Weigel) Tuck., Loc. 2, 10, 50, 51, on *Pinus brutia*
Phaeophyscia ciliata (Hoffm.) Moberg, Loc. 4, on *Quercus coccifera*

- #*Phaeophyscia orbicularis* (Neck.) Moberg, Loc. 20, 25, on *Pinus brutia*, *Quercus coccifera*
- #*Phlyctis agelaea* (Ach.) Flot., Loc. 4, on *Pinus brutia*
- Phlyctis argena* (Spreng.) Flot., Loc. 4, on *Pinus brutia*
- Physcia adscendens* (Th.Fr.) H.Olivier, Loc. 2, 37, on *Quercus coccifera*, *Phlomis grandiflora*
- Physcia aipolia* (Ehrh. ex Humb.) Fűrnr., Loc. 2, 4, 14, on *Phlomis grandiflora*, *Quercus coccifera*, *Pinus brutia*
- Physcia semipinnata* (J.F.Gmel.) Moberg, Loc. 2, 4, 10, 36 on *Pinus brutia*
- #*Physcia stellaris* (L.) Nyl., Loc. 6, 10, on *Pinus brutia*
- Physconia distorta* (With.) J.R.Laundon, Loc. 2, 3, 9, 11, 12, 34, 44, on *Quercus coccifera*, *Pinus brutia*, *Phlomis grandiflora*, *Pinus nigra*
- #*Physconia grisea* (Lam.) Poelt, Loc. 9, 11, 15, on *Pinus brutia*, *Juniperus excelsa*, *Quercus coccifera*
- #*Physconia muscigena* (Ach.) Poelt, Loc. 20, on moss
- Physconia perisidiosa* (Erichsen) Moberg, Loc. 6, 9, on *Pinus brutia*
- *#*Physconia servitii* (Nádv.) Poelt, Loc. 9, on *Juniperus excelsa*, Det. R. Moberg
- #*Placidium pilosellum* (Breuss) Breuss, Loc. 13, on soil
- Placidium squamulosum* (Ach.) Breuss, Loc. 6, 35, 36, on soil
- Placynthium nigrum* (Huds.) Gray, Loc. 4, 5, 6, 14, 19, on calcareous rock
- Platismatia glauca* (L.) W.L.Culb. & C.F.Culb., Loc. 22, 23, 36, on *Pinus brutia*
- Placolecis opaca* (Fr.) Hafellner, Loc. 8, 15, 18, on calcareous rock, Det. V. John
- #*Pleurosticta acetabulum* (Neck.) Elix & Lumbsch, Loc. 4, 12, 21, 36, on *Pinus brutia*
- #*Polysporina simplex* (Davies) Vězda, Loc. 9, on calcareous rock
- #*Porpidia macrocarpa* (DC.) Hertel & A.J.Schwab, Loc. 20, on siliceous rock
- #*Porpidia musiva* (Körb.) Hertel & Knoph, Loc. 6, on siliceous rock
- #*Protoblastenia incrustans* (DC.) J.Steiner, Loc. 18, on calcareous rock
- #*Pseudevernia furfuracea* var. *ceratea* (Ach.) D.Hawksw., Loc. 21, 23, 36, on *Pinus brutia*
- Psora decipiens* (Hedw.) Hoffm., Loc. 6, 11, 21, 41, 49, on soil
- #*Ramalina farinacea* (L.) Ach., Loc. 4, 10, 44, on *Pinus brutia*
- Ramalina fastigiata* (Pers.) Ach., Loc. 4, 12, on *Pinus brutia*
- Ramalina fraxinea* (L.) Ach., Loc. 4, 10, 14, 21, on *Pinus brutia*
- #*Rhizocarpon geminatum* Körb., Loc. 4, on siliceous rock
- #*Rhizocarpon geographicum* (L.) DC., Loc. 4, 18, on siliceous rock
- #*Rhizocarpon reductum* Th. Fr., Loc. 20, on siliceous rock
- #*Rinodina bischoffii* (Hepp) A.Massal., Loc. 4, 36, on calcareous rock
- #*Rinodina capensis* Hampe, Loc. 4, on *Pinus brutia*
- #*Rinodina dubyana* (Hepp) J.Steiner, Loc. 4, on calcareous rock, Det. H. Mayrhofer
- #*Rinodina trachytica* (A.Massal.) Bagl. & Carestia, Loc. 5, on siliceous rock, Det. H. Mayrhofer
- Sarcogyne regularis* Körb., Loc. 1, on calcareous rock
- Solenopsis candicans* (Dicks.) J.Steiner, Loc. 37, on calcareous rock
- Solenopsis liparina* (Nyl.) Zahlbr., Loc. 7, 15, 37, on calcareous rock

- Squamarina cartilaginea* (With.) P.James, Loc. 6, 7, 9, 10, 43, on calcareous rock, on moss
- Staurolemma omphalarioides* (Anzi) M.Jørg. & Henssen, Loc. 4, on *Pinus brutia*, Det. P.M. Jørgensen
- #*Staurothele hymenogonia* (Nyl.) Th.Fr., Loc. 13, on calcareous rock
- #*Tephromela atra* (Huds.) Hafellner, Loc. 10, 20, on calcareous rock, siliceous rock
- #*Thyrea confusa* Henssen, Loc. 13, on calcareous rock
- Toninia candida* (Weber) Th.Fr., Loc. 18, 19, on soil
- Toninia cinereovirens* (Schaer.) A.Massal., Loc. 9, 19, on moss
- #*Toninia diffracta* (A.Massal.) Zahlbr., Loc. 6, 10, on soil
- Toninia physaroides* (Opiz) Zahlbr., Loc. 12, on soil
- Toninia sedifolia* (Scop.) Timdal, Loc. 6, 12, on calcareous rock, soil
- Verrucaria fuscella* (Turner) Winch, Loc. 32, on calcareous rock, Det. A. Orange
- #*Verrucaria lecideoides* (A.Massal.) Trevis., Loc. 36, on calcareous rock
- Verrucaria macrostoma* Dufour ex DC., Loc. 13, on calcareous rock, Det. A. Orange
- Verrucaria marmorea* (Scop.) Arnold, Loc. 7, 8, 15, 17, on calcareous rock
- Verrucaria muralis* Ach., Loc. 5, 8, 17, on calcareous rock
- Verrucaria nigrescens* Pers., Loc. 13, on calcareous rock, Det. A. Orange
- #*Xanthoparmelia somloënsis* (Gyeln.) Hale, Loc. 5, on siliceous rock
- #*Xanthoparmelia tinctina* (Maheu & A.Gillet) Hale, Loc. 6, 32, on siliceous rock
- #*Xanthoria calcicola* Oksner, Loc. 10, on calcareous rock
- #*Xanthoria elegans* (Link) Th.Fr., Loc. 20, on siliceous rock
- #*Xanthoria parietina* (L.) Th.Fr., Loc. 2, 4, 10, 36, on *Phlomis grandiflora*, *Populus alba*, *Quercus coccifera*, *Pinus brutia*

Discussion

This study reports 161 taxa from Termessos National Park, of which *Collema conglomeratum*, *Lecania inundata*, *Leptogium furfuraceum*, *Peltigera monticola* and *Physconia servitii* are new to Turkey and 86 are new to Antalya province. Although the lichen flora of the Mediterranean region of Turkey is reasonably well studied, it is quite remarkable to find still so many new lichen records for the region as well as some new to the country, emphasizing that much more explorative effort should be made on its lichen flora.

In the study area, in addition to common lichen species for the Mediterranean Region, such as *Lecanora bolcana* and *Diploschistes ocellatus*, we determined “manna” lichens, such as *Aspicilia desertorum* and *A. hispida*, that usually grow in steppes, suboceanic species such as *Degelia plumbea* and *Staurolemma omphalarioides*, and oceanic species, such as *Collema furfuraceum* and *C. nigrescens*. Although the study area is relatively small (ca. 6702 ha), the wide variation in its topology, formed by high mountains, valleys and a deep canyon, evidently provides habitats for a rich lichen biodiversity.

Calcareous species are dominant due to the widespread occurrence of calcareous rocks throughout the study area, and because of the frequency of trees with acidic bark, such as *Pinus nigra* and *Quercus coccifera*, most of the epiphytic species are acidophytic.

Of particular note are *Anthracoarpon virescens*, *Caloplaca adriatica*, *Hypocomyce anthracophila*, *Neocatapyrenium rhizinosum*, *Pertusaria hymenea*, *Placidium pilosellum*, *Solenopsora liparina* and *Staurolemma omphalarioides* for which there are only one or two records from Turkey (Pisut 1970; Breuss 1998; Nimis & John 1998; John et al. 2000; John 1996, 2003; Breuss & John 2004).

On the ruins of the ancient city of Termessos, not only species with a wide ecological amplitude, such as *Aspicilia calcarea*, *Caloplaca aurantia*, *Lecanora muralis*, *Lobothallia radiosa*, *Placynthium nigrum* and *Xanthoria elegans* were found, but also species mainly found in the Boreal-Mediterranean region and between the south of Central Europe and the Mediterranean Region such as *Aspicilia farinosa*, *Caloplaca chrysojeta*, *C. xantholyta*, *Collema cristatum*, *Diploschistes ocellatus*, *Lepraria nivalis*, *Solenopsora candicans* and *Solenopsora liparina* (Wirth 1995). Because the ancient city was built from local stones, the species on the ruins are similar to the lichen flora found elsewhere in the study area

Acknowledgements

The authors thank Prof. Mark R. D. SEAWARD (England) and Dr. Harrie SIPMAN (Germany) for suggestions and comments that improved the manuscript. The lichen species were collected during the project "The comparison of the lichen floras of the Termessos National Park and Düzlerçamı Region damaged in the July 1997 fire", funded by Akdeniz University Scientific Research Projects Unit (Project number 2002.02.0121.02). We are indebted to Akdeniz University Scientific Research Projects Unit for financial support, to Prof. Dr Per. Magnus JØRGENSEN (Norway), Prof. Dr Helmut MAYRHOFER (Austria), Prof. Dr Teuvo AHITI (Finland), Assoc. Prof. Dr Roland MOBERG (Sweden), Dr Othmar BREUSS (Austria), Dr Orvo VITIKAINEN (Finland), Dr Brian COPPINS (Edinburg), Dr Volker JOHN (Germany) and Alan ORANGE (Britain) for their identification of lichens, and to the Antalya Directorate of National Parks for granting permission for this study in Termessos National Park.

Literature Cited

- Aslan A. 2000. Lichens from the regions of Artvin, Erzurum, and Kars (Turkey). *Israel Journal of Plant Sciences* 48: 143–155.
- Breuss O. 1990. Die Flechtengattung *Catapyrenium* in Europa. *Stapfia* 23, 110 pp.
- Breuss O. 1998. *Catapyrenium* und verwandte Gattungen (lichenisierte Ascomyceten, Verrucariaceae) in Asien-eine erste Übersicht. *Annalen des Naturhistorischen Museum in Wien*, B, 100: 656–669.
- Breuss O, John V. 2004. New and interesting records of lichens from Turkey. *Österreichische Zeitschrift für Pilzkunde* 13: 281–294.
- Brummitt RK, Powell CE. 1992. *Authors of Plant Names*. Royal Botanical Gardens, Kew, 732 pp.
- Clauzade G, Roux C. 1985. *Likenoj de Okcidenta Eurupo*. *Bulletin de la Société Botanique du Centre-Ouest, Nouvelle série*, 893 pp.
- Çiçek A, Özdemir Türk A. 1998. Lichen flora of Sakarya province (Turkey). *Doğa-Turkish Journal of Botany* 22: 99–119.
- Giordani P, Nicora P, Rellini I, Brunialti G, Elix JA. 2002. The lichen genus *Xanthoparmelia* (Ascomycotina, *Parmeliaceae*) in Italy. *Lichenologist* 34 (3): 189–198.
- Güvenç Ş, Aslan A, Öztürk Ş. 1996. The lichen flora of Kapıdağ Peninsula.- In: Öztürk, M. A., Seçmen, Ö. & Görk, G. (eds.) *Plant life in southwest and central Asia*. *Proceedings of the 4*

- th plant life in southwest Asia symposium held in Izmir 21 - 28 may 1995, Ege Univ. Press, Bornova-Izmir, pp. 472-478.
- John V. 1996. Preliminary catalogue of lichenized and lichenicolous fungi of Mediterranean Turkey. *Bocconea* 6: 173-216.
- John V. 2003. Flechten aus der Türkei, von G. ERNST gesammelt. *Herzogia* 16: 167-171.
- John V, Nimis PL. 1998. Lichen flora of Amanos mountain and the province of Hatay. *Doğa-Turkish Journal of Botany* 22: 257-267.
- John V, Seaward MRD, Beatty JW. 2000. A neglected lichen collection from Turkey: Berkhamsted School expedition 1971. *Doğa-Turkish Journal of Botany* 24: 239-248.
- Jørgensen PM. 1997. Further notes on hairy *Leptogium* species. *Symbolae Botanicae Upsalienses* 32 (1): 113-130.
- Moberg R. 1977. The lichen genus *Physcia* and Allied Genera in Fennoscandia. *Symbolae Botanicae Upsalienses* 22: 1-108.
- Nimis PL, John V. 1998. A contribution to the lichen flora of Mediterranean Turkey. *Cryptogamie, Bryologie et Lichénologie* 19: 35-58.
- Özdemir Türk A, Güner H. 1998. Lichens of the Thrace region of Turkey. *Doğa-Turkish Journal of Botany* 22: 397-407.
- Öztürk Ş, Güvenç Ş. 2003. Lichens from the western part of the Black Sea Region of Turkey. *Acta Botanica Hungarica* 45: 169-182.
- Pisut, I. 1970. Interessante Flechtenfunde aus der Türkei. *Preslia (Praha)* 42: 379-383.
- Purvis OW, Coppins BJ, Hawksworth DL., James PW., Moore DM. 1992. The Lichen flora of Great Britain and Ireland. Edmondsbury Press, London, 719 pp.
- Wirth V. 1995. Die Flechten Baden - Württembergs. Teil: 1-2, Eugen GmbH & Co., Stuttgart, 1006 pp.
- Zeybek U., John V, Lumbsch HT. 1993. Türkiye likenlerinden *Hypogymnia* (Nyl.) Nyl. cinsi üzerinde taksonomik araştırma. *Doğa-Turkish Journal of Botany* 17: 109-116.
- Zeybek U., John V, Lumbsch HT. 1993. Türkiye likenlerinden *Hypogymnia* (Nyl.) Nyl. cinsi üzerinde taksonomik araştırma. *Doğa-Turkish Journal of Botany* 17: 109-116.

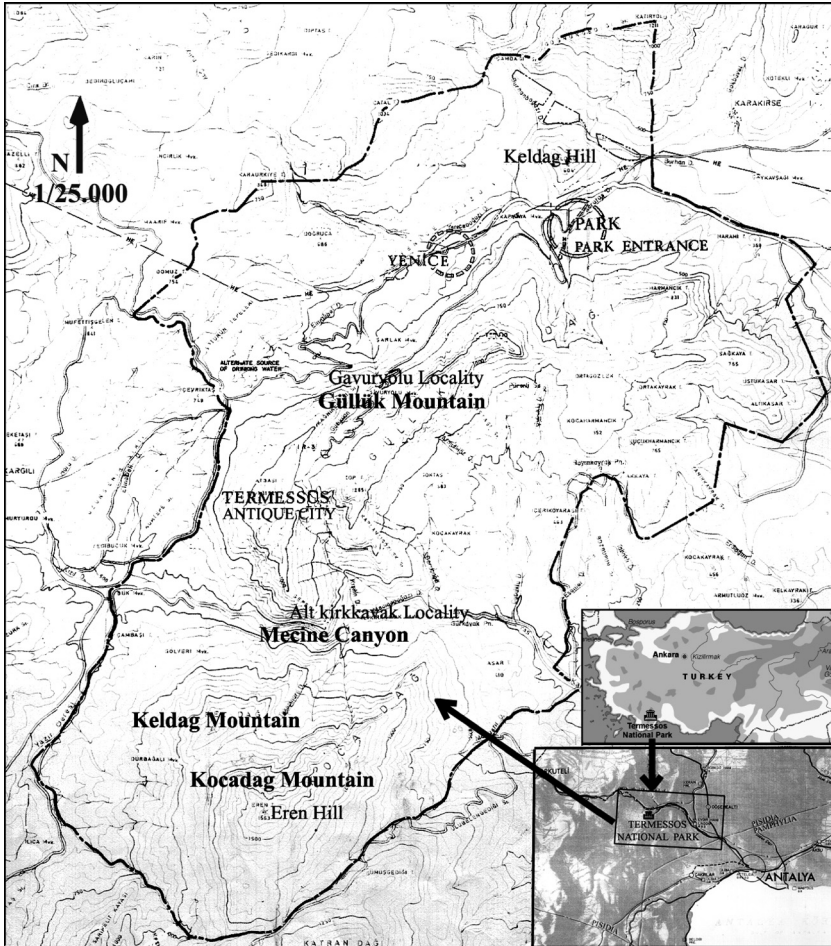


Figure 1: Map of Termessos National Park

Table 1: The 54 localities, their altitudes, coordinates and collecting date.

No	Localities	Altitudes	Coordinates	Dates
1.	Güllük Mountain, Gavuryolu Locality, road to Termessos Ancient City	440 m	37° 00.986' N 30° 29.980' E	09.03.2002
2.	Güllük Mountain, Termessos Ancient City	1045 m	36° 58.969' N 30° 27.816' E	09.03.2002
3.	Güllük Mountain, Termessos Ancient City, 50 m north of the Family Graveyard	970 m	36° 59.212' N 30° 27.891' E	09.03.2002
4.	Güllük Mountain, Termessos Ancient City, mergin of car park	905 m	36° 59.289' N 30° 28.080' E	16.03.2002
5.	Güllük Mountain, valley 1 km from museum of Termessos National Park	452 m	37° 00.849' N 30° 30.182' E	06.04.2002
6.	500 m behind museum of Termessos National Park, stabilized road	450 m	37° 00.692' N 30° 30.260' E	04.05.2002
7.	Hill 700 m behind museum of Termessos National Park	490 m	37° 00.835' N 30° 30.171' E	04.05.2002
8.	Hill south of the old entrance of Termessos National Park	357 m	37° 00.988' N 30° 31.420' E	04.05.2002
9.	North slope of Güllük Mountain.	475 m	37° 00.698' N 30° 27.524' E	04.05.2002
10.	Güllük Mountain, North slope of Top Hill	985 m	36° 58.975' N 30° 27.944' E	25.05.2002
11.	Güllük Mountain, Kayrak Fire Watching Tower	1145 m	36° 58.716' N 30° 27.524' E	25.05.2002
12.	Güllük Mountain, Atbaşı Hill	1152 m	36° 58.960' N 30° 27.378' E	25.05.2002
13.	2,6 km west of Fish Restaurant, South of Mecine Canyon	254 m	36° 58.126' N 30° 29.428' E	06.09.2002
14.	Güllük Mountain, footpath from car park to Ancient City	965 m	36° 59.113' N 30° 27.920' E	09.09.2002
15.	Top of Keldağ Hill	640 m	37° 01.235' N 30° 30.535' E	15.09.2002
16.	North slope of Keldağ Hill	580 m	37° 01.410' N 30° 30.590' E	15.09.2002
17.	Mecine Canyon, Altkırkkavak Locality	308 m	36° 58.175' N 30° 27.989' E	21.09.2002
18.	Mecine Canyon, 1 km north of Bük Locality	375 m	36° 58.210' N 30° 27.453' E	21.09.2002
19.	Bük Locality, North of Mecine Strait Brook	430 m	36° 58.230' N 30° 26.987' E	21.09.2002
20.	Valley between Kocadağ and Katran Mountains	1211 m	36° 55.912' N 30° 27.769' E	05.10.2002
21.	Southwest slope of Kocadağ Mountain	1285 m	36° 55.952' N 30° 27.585' E	05.10.2002

Table 1, continued

No	Localities	Altitudes	Coordinates	Dates
22.	South slope of Kocadağ Mountain	1316 m	36° 56.060' N 30° 27.585' E	05.10.2002
23.	Southeast slope of Kocadağ Mountain	1360 m	36° 56.142' N 30° 27.645' E	05.10.2002
24.	West slope of Keldağ Hill	404 m	37° 01.408' N 30° 29.954' E	26.10.2002
25.	Olive garden on west slope of Keldağ Hill	393 m	37° 01.253' N 30° 29.822' E	26.10.2002
26.	West of Yeniceboğazı Brook	380 m	37° 01.193' N 30° 29.753' E	26.10.2002
27.	East of Çevriktaş Hill	650 m	37° 00.059' N 30° 26.879' E	26.10.2002
28.	Old road to Korkuteli, 500 m before entrance of Bük Research Forest stabilized road	600 m	36° 59.668' N 30° 27.365' E	26.10.2002
29.	Old road to Korkuteli, 2 km before entrance of Bük Research Forest stabilized road	610 m	36° 59.684' N 30° 28.098' E	26.10.2002
30.	South of Yenice Fountain	580 m	36° 59.935' N 30° 28.016' E	26.10.2002
31.	1 km north of Yenice Fountain, <i>Pinus brutia</i> forest	560 m	37° 00.419' N 30° 28.465' E	26.10.2002
32.	South slope of Çatalca Hill	415 m	37° 01.081' N 30° 29.220' E	26.10.2002
33.	Güllük Mountain, road to Bük Research Forest, 500 m south of old road of Korkuteli	696 m	36° 59.382' N 30° 27.110' E	26.10.2002
34.	Güllük Mountain, road to Bük Research Forest, 1600 m south of old road of Korkuteli	657 m	36° 58.844' N 30° 26.929' E	26.10.2002
35.	Güllük Mountain, road to Bük Research Forest, 3 km 350 m south of old road of Korkuteli	546 m	36° 58.456' N 30° 27.638' E	26.10.2002
36.	Kocadağ Mountain, Top of Eren Hill	1665 m	36° 56.671' N 30° 27.638' E	02.11.2002
37.	Güllük Mountain, Gavuryolu Locality, side of road to Termessos Ancient City	593 m	37° 00.374' N 30° 29.311' E	07.06.2003
38.	South slopes of Katıryolu Hill	750 m	37° 02.154' N 30° 30.677' E	14.06.2003
39.	Top of Katıryolu Hill	1211 m	37° 02.304' N 30° 30.730' E	14.06.2003
40.	West of Burhanboğazı Brook	350 m	37° 02.148' N 30° 29.847' E	21.06.2003

Table 1, concluded

No	Localities	Altitudes	Coordinates	Dates
41.	Southeast slopes of Çatal Tepe Hill	855 m	37° 01.650' N 30° 29.549' E	21.06.2003
42.	Valley between Keldağ and Kocadağ Mountain	1050 m	36° 57.001' N 30° 27.405' E	28.06.2003
43.	Top of Keldağ Mountain	1360 m	36° 57.271' N 30° 27.270' E	28.06.2003
44.	East slopes of Kocadağ Mountain	580 m	36° 57.282' N 30° 29.138' E	29.06.2003
45.	East slopes of Kocadağ Mountain	894 m	37° 01.195' N 30° 28.830' E	29.06.2003
46.	East slopes of Kocadağ Mountain	1486 m	36° 56.974' N 30° 28.229' E	29.06.2003
47.	Güllük Mountain, East slopes of Sağkaya Hill	424 m	37° 00.582' N 30° 31.020' E	06.09.2003
48.	Güllük Mountain, top of Sağkaya Hill	765 m	37° 00.578' N 30° 30.981' E	06.09.2003
49.	Güllük Mountain, East slopes of Altukasar Hill	386 m	36° 58.892' N 30° 30.996' E	06.09.2003
50.	Top of İçerikoyarası Hill	463 m	36° 58.720' N 30° 30.180' E	13.09.2003
51.	South of Kocaharmancık Hill	472 m	36° 58.720' N 30° 30.209' E	13.09.2003
52.	Top of Akkaya Hill	705 m	36° 58.738' N 30° 30.676' E	13.09.2003
53.	Güllük Mountain, Kapıkaya Locality, road to Termessos Ancient City	403 m	37° 00.696' N 30° 29.751' E	21.09.2003
54.	North slopes of Güllük Mountain	861 m	36° 59.935' N 30° 29.793' E	21.09.2003