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EPIPHYTIC LICHENS FROM TOWNS AND VILLAGES IN GREECE

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Abstract

Thirty-nine epiphytic lichens from towns and villages across Greece are recorded. Ten species are new for one or more Greek provinces. Species composition reflects the nutrient enrichment of such human environments. An alternative interpretation of the results of Diamantopoulos et al. (1992) and Pirintsos et al. (1993) on the distribution of epiphytic lichens in the Thessaloniki area is provided. The list of species growing on *Platanus* in Greece (Christensen 2014) is supplemented with six species.

Introduction

Most papers on Greek lichens are mainly floristic in nature and few deal with specific biotopes or substrata, e.g. Arcadia (2018 - *Juniperus*), Christensen (2014 - *Platanus*) and Christensen & Alstrup (2013 - rocks). Though wayside trees are easily accessible, there has been little study of their epiphytic lichens in Greece. Christensen (1989) reported on lichens on an *Ulmus* wayside tree in a north Greek mountain village. Wayside trees on Kos were included in Christensen (2022) and Christensen (2007) included *Cupressus sempervirens* wayside trees also on Kos.

This paper deals with the lichen biota on *Cupressus sempervirens, Melia azedarach, Pinus pinea, Platanus orientalis* and *Robinia pseudacacia* wayside trees in towns and villages. It is shown that, regardless of host species and the condition of the bark, the anthropogenic environment induces similar species composition at the sites, only modified by the level of humidity.

Materials and methods

The specimens are identified by their collection numbers. In 1977 specimens were not numbered in the field. They are given arbitrary numbers prefixed by GR. The specimens are deposited in the Biological Museum, University of Lund (LD), in the Botanical Museum in Berlin-Dahlem (B) and in the private herbarium of the author. Whenever possible geographical names are in accordance with The Times Atlas (1997). Latitudes and longitudes are readings from Google Map made in 2022. The distribution of the species in Greece is checked against Abbott (2009) and Arcadia (2022).

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The localities

1. The Ionian island, Kerkyra (Corfu), about 4 km SSW of Benitses, the village Kornata, 39.517958, 19.900794. *Cupressus sempervirens* wayside trees in the village. Alt. 250 m. Date 29. V. 2002.

2. Ipeiros (Ipiros, Epirus), nomos Ioannina, Ioannina town, the Turkish castle, at the Fetiche-Pasha mosque, 39.670378, 20.861598. Alt. 495 m. Date 23. IV. 1989. Small group of coniferous trees.

3. Ipeiros, nomos Ioannina, eparchia Konitsas, N Pindos, Konitsa town, 40.043813, 20.750726. Alt. c. 630 m. Date 18.-19. VII. 1977. *Robinia* wayside trees in the town. Eight trees, diameter at breast height 30-40 cm, surveyed.

4. Makedonia, nomos Kastoria, Kastoria town, the lakeside N of the old town, along the promenade leading to the town Hloi, 40.525215, 21.263897. Alt. 625 m. Date 12. & 15. IX. 2013. Large, old *Platanus* trees between the promenade and an unpaved car park.

5. Peloponnisos, Messinia, about 8 km ESE of Gargalianoi, the village Chora, 37.044814, 21.708630. Alt. 200-500 m. Date 16. IV. 1989. *Robinia* wayside trees in the village.

6. The east Aegean island group, Dodekanissos, Kos island, N slope of Mt Dikeos, E outskirts of the village Zia, 36.846660, 27.205965. *Robinia* wayside trees in *Cupressus sempervirens* forest on N facing limestone slope. Alt. 300 m. Date 26. IV. 1988.

7. The east Aegean island group, Dodekanissos, Kos island, Kos town, Vironos street, 36.891687, 27.290315. Pollarded *Melia azedarach* wayside trees in the town. Alt. 5-10 m. Date 20. IV. 1988.

8. The east Aegean island group, Dodekanissos, Kos island, Kos town, Pindou street, 36.894461, 27.283116. *Melia azedarach* wayside trees in the town. Alt. 5-10 m. Date 28. IV. 1988.

9. The east Aegean island group, Dodekanissos, Kos island, Kos town, 31th Martiou street (25th Martiou street on Google Map), 36.893348, 27.287419. *Melia azedarach* wayside trees in the town. Alt. 5-10 m. Date 1. V. 1988.

The species

* = New for one or more provinces.

* ***Agonimia octospora*** Coppins & P. James - On trunk of *Platanus*. 4: 14821. - Only known from the Aegean islands Ikaria and Chios (Arcadia 2022). New for Makedonia.

Alyxoria varia (Pers.) Ertz & Tehler - On trunk of *Cupressus sempervirens*. 1: 12582a.

Buellia griseovirens (Turner & Borrer ex Sm.) Almb. - On trunk of *Platanus*. 4: (with *Piccolea ochrophora* 14822).

Caloplaca cerina (Hedw.) Th. Fr. - On trunks of *Melia azedarach* and *Robinia*. 3: (with *Physcia biziana* GR2). 5: (with *Lecanora horiza* 5729a). 6: (with *Catillaria nigroclavata* 4818, 4823, *Lecanora chlarotera* 4819, *L. horiza* 4820a, 4821, *Rinodina exigua* 4822, 4824). 7: (with *Caloplaca coralliza* 4682). 8: (with *Physcia biziana* 4959). 9: (with *Physcia biziana* 5042).

Caloplaca cerinella (Nyl.) Flagey - On trunk of *Platanus*. 4: (with *Phaeophyscia orbicularis* 14810, 14811).

Caloplaca flavorubescens (Huds.) J. R. Laundon - On trunks and thin branches of *Robinia*. 5: (with *Physcia biziana* 5728). 6: (with *Catillaria nigroclavata* 4818, 4823, *Lecanora chlarotera* 4819, *Lecanora horiza* 4820a, *Physcia biziana* 4817, 4825, *Rinodina exigua* 4822, 4824).

Caloplaca haematites (Chaub.) Zwachk - On trunks of *Melia azedarach* and *Robinia*. 6: (with *Rinodina exigua* 4824, *Catillaria nigroclavata* 4818). 7: (with *Rinodina colobina* 4682).

Caloplaca pyracea (Ach.) Zwackh. - On trunk of *Robinia*. 3: (with *Physcia biziana* GR2). 4: 14812. 6: (with *Rinodina exigua* 4824).

* ***Candelaria concolor*** (Dickson) B. Stein - On trunks of *Cupressus sempervirens, Platanus* and *Robinia*. 2: 5816. 3: (with *Physcia biziana* GR2). 4: 14729, 14801. - New for Ipeiros and Makedonia.

* ***Candelariella antennaria*** Räsänen - On trunk of *Robinia*. 5: (with *Xanthoria parietina* 5731). - Only known from Kriti (Arcadia 2022). New for Peloponnisos.

Candelariella reflexa (Nyl.) Lettau - On trunk of *Platanus*. 4: 14728.

* ***Candelariella subdeflexa*** (Nyl.) Lettau - On trunk of *Platanus*. 4: 14820a. - Hitherto only known from Kos (Christensen 2022). New for Makedonia.

* ***Candelariella viae-lactea*** G. Thor & V. Wirth - On trunk of *Platanus*. 4: 14730. - At the type locality in Hungary *Candelariella viae-lactea* was growing in a community of species favoured by nutrient-enrichment (Thor & Wirth 1990). It seems to be a species of mineral-rich or nutrient-enriched, well-lit tree trunks (Wirth et al. 2013). - New for Makedonia.

Candelariella vitellina (Hoffm.) Müll. Arg. - On trunk of *Platanus.* 4: 14803.

Candelariella xanthostigma (Ach.) Lettau - On trunks of *Pinus pinea, Melia azedarach* and *Platanus*. 2: (with *Physconia grisea* 5825). 4: 14799. 7: 4683. 8: (with *Physcia biziana* 4959). 9: 5043, (with *Physcia biziana* 5042). - Nos 4959 and 5043 are fertile.

Catillaria nigroclavata (Nyl.) J. Steiner - On trunks of *Pinus pinea* and *Robinia*. 2: (with *Hyperphyscia adglutinata* 5819). 6: 4818, 4823.

Collema furfuraceum (Schaer.) Du Rietz - On trunk of *Cupressus sempervirens* and *Platanus*. 1: 12571. 4: 14728a, 14817 14818.

* ***Hyperphyscia adglutinata*** (Flörke) Mayrh. & Poelt - On trunk of *Pinus pinea* and *Robinia*. 1: 12578. 2: 5819. 5: 5730. - New for the Ionian Islands and Peloponnisos (Arcadia 2022).

Lecanora chlarotera Nyl. incl. *L. rugosella Zahlbr.* - On trunks of *Pinus pinea, Platanus* and *Robinia*. 2: 5827, 5828. 4: (with *Candelariella vitelina* 14803). 5: (with *Physcia biziana* 5728). 6: 4819, (with *Catillaria nigroclavata* 4818, *Lecanora horiza* 4820a, *Physcia biziana* 4817, 4820).

Lecanora horiza (Ach.) Linds. - On trunks of *Cupressus sempervirens* and *Robinia*, and thin branches of *Robinia*. 1: 12581. 5: 5729a, (with *Hyperphyscia adglutinata* 5730, *Physcia biziana* 5727, 5728, 5729, *Xanthoria parietina* 5731). 6: 4820a, 4821, (with *Catillaria nigroclavata* 4818, 4823, *Lecanora chlarotera* 4819, *Physcia biziana* 4817, 4820, 4825, *Rinodina exigua* 4822, 4824). 8: (with *Physcia biziana* 4959).

Lecidella elaeochroma (Ach.) M. Choisy - On trunk of *Pinus pinea* and on thin branch of *Robinia*. 2: 5826. 6: (with *Catillaria nigroclavata* 4818, *Lecanora chlarotera* 4819, *Lecanora horiza* 4820a, *Physcia biziana* 4817, 4825).

Lecidella euphorea (Flörke) Kremp. - On trunk of *Platanus* and *Robinia*. 4: 14606a, 14802. 6: (with *Rinodina exigua* 4822).

Myriolecis hagenii (Ach.) Śliwa, Zhao Xin & Lumbsch - On trunk of *Platanus* and on thin branch of *Robinia*. 3: (with *Physcia biziana* GR2). 4: 14820. 5: (with *Physcia biziana* 5727). 6: (with *Physcia biziana* 4825, *Rinodina exigua* 4822).

Parmelina tiliacea (Hoffm.) Hale - On trunk of *Cupressus sempervirens*. 1: 12572.

Phaeophyscia hirsuta (Mereschk.) Essl. - On trunk of *Cupressus sempervirens*. 1: 12579, 12580.

* ***Phaeophyscia nigricans*** (Flörke) Moberg - On trunk of *Platanus*. 4: 14813. - Only known from Kriti (Arcadia 2022). New for Makedonia.

Phaeophyscia orbicularis (Necker) Moberg - On trunks of *Cupressus sempervirens*, *Platanus* and *Robinia*. 2: 5813a. 3: GR1. 4: 14797, 14810, 14811, 14815.

Physcia adscendens H. Olivier - On trunks of *Platanus* and *Robinia*. 4: 14800. 6: (with *Catillaria nigroclavata* 4823, *Lecanora chlarotera* 4819, *Lecanora horiza* 4820a). 7: (with *Rinodina colobina* 4682).

Physcia biziana (A. Massal.) Zahlbr. var. ***biziana*** **-** On trunks of *Cupressus sempervirens, Melia azedarach, Pinus pinea, Platanus* and *Robinia* and on thin branch of *Robinia.* 1: 12573, 12574. 2: 5815, 5818, 5821, 5822, 5823, 5830. 3: GR2, GR3. 4: 14798, 14804, 14806. 5: 5727, 5728, 5729. 6: 4817, 4820, 4825. 7: 4681, 4684, (with *Candelariella xanthostigma* 4683). 8: 4959. 9: 5041, 5042.

Physcia leptalea (Ach.) DC. - On trunk of Platanus. 4: (with *Caloplaca pyracea* 14812).

Physcia stellaris (L.) Nyl. - On trunk of Platanus. 4: 14808, (with *Phaeophyscia orbicularis* 14811).

Physconia distorta (With.) J. R. Laundon - On trunks of *Pinus pinea, Platanus* and *Robinia.* 2: 5820. 3: GR5. 4: (with *Piccolia ochrophora* 14813a).

Physconia enteroxantha (Nyl.) Poelt - On trunk of *Platanus*. 4: 14807.

* ***Physconia grisea*** (Lam.) Poelt subsp. ***grisea*** **-** On trunks of *Cupressus sempervirens, Pinus pinea* and *Platanus*. 1: 12577. 2: 5812, 5813, 5814, 5824, 5825, 5829. 4: 14819. - New for Ipeiros.

* ***Physconia perisidiosa*** (Erichsen) Moberg - On trunk of *Cupressus sempervirens*. 1: 12575, 12576. - New for the Ionian Islands.

* ***Piccolia ochrophora*** (Nyl.) Hafellner - On trunk of *Platanus*. 4: 14796, 14813a, 14814, 14816, 14822. - New for Makedonia.

Rinodina colobina (Ach.) Th. Fr. - On trunks of *Melia azedarach*. 7: 4682, (with *Physcia biziana* 4684). 8: (with *Physcia biziana* 4959). 9: (with *Physcia biziana* 5042). - Not recorded for Kos by Arcadia (2022). Reported from Kos by Christensen (2022).

Rinodina exigua (Ach.) S. Gray - On trunk of *Robinia*. 6: 4822, 4824. - Not recorded for Kos by Arcadia (2022). Reported from Kos by Christensen (2022).

Xanthoria parietina (L.) Th. Fr. - On trunk of *Cupressus sempervirens, Melia azedarach, Platanus* and *Robinia*. 1: 12568, 12569, 12570, 12582, 12583. 2: 5817. 3: GR4. 4: 14805, 14809. 5: 5731, (with *Physcia biziana* 5727). 6: (with *Catillaria nigroclavata* 4818, *Rinodina exigua* 4822). 7: (with *Rinodina colobina* 4682). - The thallus of the specimens of loc. 1 is densely bullate in the central part like the wart-like isidia of *X. calcicol*a Oxner. Thallus is, however, yellow-orange, not deeply orange as *X. calcicola*. *X. parietina* may sometimes have such bullate thallus (Poelt 1969, Christensen 2022).

Discussion

Of the thirty-nine recorded species, six are new for Makedonia: *Agonimia octospora, Candelaria concolor, Candelariella subdeflexa, C. viae-lactea, Phaeophyscia nigricans* and *Piccolia ochrophora*; two species are new for the Ionian Islands: *Hyperphyscia adglutinata* and *Physconia perisidiosa*; two species are new for Ipeiros: *Candelaria concolor* and *Physconia grisea* and two species are new

for Peloponnisos: *Candelariella antennaria* and *Hyperphyscia adglutinata*. The fact that one fourth of the recorded species are new for one or more provinces is an illustration of the present level of floristic research in Greece.

Regardless of host tree species, wayside trees in urban/village environments develop similar epiphytic biota. The *Robinia* trees of the mountain town Konitsa (loc. 3) had only species favoured by nutrient enrichment, as did the *Robinia* trees of the Peloponnesian village Chora (loc. 5) and the *Robinia* trees of the mountain village Zia on Kos (loc. 6). At the Turkish castle of Ioannina (loc. 2) the coniferous trees, *Pinus pinea* and *Cupressus sempervirens,* hosted species common in nutrient-enriched environments. Located in a low-precipitation area of Greece the *Melia azedarac* trees of Kos town (loc. 7-9) had species of more or less nutrient-enriched sites. Christensen (2014) reported 9 species from *Platanus* trees at the waterfront of Ioannina town, all of which were widespread members of the Xanthorion parietinae. In a study in four towns around Etna on Sicily on the epiphytic lichens of the trees with sub-neutral to sub-acid bark (*Tilia, Prunu*s and *Ailanthus*), regardless of tree species the lichen biota consisted mainly of species of nutrient-enriched environments (Caniglia & Grillo 2001). It may be concluded that at some point of nutrient-enrichment, the intrinsic nature of the tree bark is out-weighted by the added nutrients/urban dust.

Though located in the more humid areas of Greece, the *Cupressus sempervirens* trees in the village of Kornata (loc. 1) on the island Kerkyra, with the exception of *Collema furfuraceum*, only harboured nitrophytic lichens. The *Platanus* trees of the Makedonian town Kastoria (loc. 4), situated at the banks of lake Kastoria, mainly have species favoured by nutrient-enrichment. The presence of the hygrophytic *Collema furfuraceum* is probably due to the humid environment created by Lake Kastoria. A similar combination of hygrophytic species and species favoured by nutrient enrichment on *Platanus* was reported by Christensen (2014) from the Peloponnesian mountain village Kosmas. Christensen (1989) recorded 31 species on *Ulmus* in the Makedonian mountain village Perivolion. The epiphytic biota was sociologically a mixture of species of the hygrophilic Lobarion pulmonariae and the nitrophilic Xanthorion parietinae, reflecting the nutrient enriched-environment of a village and the relatively high precipitation of the Pindos mountains. A combination of Xanthorion and Lobarion species is a general trend for *Platanus* trees under humid conditions in Greece (Christensen 2014).

The general conclusion is that, regardless of whether the intrinsic nature of the tree bark is acidic, nutrient-poor or more neutral, the nutrient-enrichment caused by the urban/village environment, results in an epiphytic biota of Xanthorion species and other nitrophytic species. Given humid conditions, this community can be supplemented by Lobarion species or other hygrophytic species.

Christensen (2014) reported 152 species from *Platanus* stands across Greece. Six new species can be added to this list: *Agonimia octospora, Buellia griseovirens, Candelariella subdeflexa, C. viae-lactea, Phaeophyscia nigricans* and *Piccolia ochrophora*.

In 1987 Diamantopoulos et al. (1992) studied the species composition of epiphytic lichens on *Pinus brutia* trees in and around Thessaloniki. They found the lichen species to be clustered in three groups: group 1 closest to town centre (*Amandinea punctata, Hyperphyscia adglutinata, Lecanora chlarotera, Melanelixia glabratula, Physcia adscendens, Physconia distorta, P. grisea, P. sp., Rinodina pyrina* and *Xanthoria parietina*), group 2 intermediate (*Evernia prunastri, Lecanora sp.* and *Parmelia sulcata*) and group 3 in the outskirts/surroundings of the town (*Hypogymnia physodes, Melanohalea exasperatrula, Parmelina quercina, P. tiliacea, Phaeophyscia sp., Physcia aipolia, Pseudevernia furfuracea* and *Usnea sp.*). Though they did not present data for any sulphur dioxide gradient across the town, they concluded that the distribution of the species was governed by the different sulphur

dioxide levels. In a succeeding paper, Pirintsos et al. (1993) present further arguments in favour of a sulphur dioxide gradient as basis for the species distribution. Ten years later they repeated the survey and the conclusion, still without any documentation for a sulphur dioxide gradient across the town (Vokou et al. 1999). In the presence of a sulphur dioxide gradient one would expect the acidity to increase towards the town centre. Based on the ecology of the species it is, however, more likely that the species distribution across Thessaloniki is influenced by a nutrient gradient. Using the ecological annotations of the species in Wirth et al. (2013), it appears the species close to the town centre (group 1) are mainly neutrophytic to weakly acidophytic and mildly to strongly nitrophytic and the species of the outskirts of the town (group 3) are mainly mildly to strongly acidophytic and are non- to weakly nitrophytic. Due to the intrinsic acidic and nutrient-poor nature of pine bark some degree of tolerance of acidity of the species across the gradient is expected though nutrient-enrichment may mitigate the acidity of the substrate. The species composition on pine in the outskirts of the town is more in agreement with the acidic nature of the pine bark though some degree of tolerance of nutrient-enrichment is reflected. In summary: the most acid tolerant species were found in the outskirts of the town while the most nutrient tolerant species were found near the town centre, which is not consistent with an acidity gradient caused by sulphur dioxide but are more in agreement with a nutrient gradient.

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