Lichens of the Hel Peninsula

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The paper contains a list of 131 lichen species collected in Hel Peninsula (western part of Polish Baltic coast). The current lichen flora of this area comprises only 116 species; we have not found 15 taxa which have been recorded earlier.

Key words: Lichen flora, anthropogenic changes.

INTRODUCTION

Human activities had an enormous impact on the Hel Peninsula (northern Poland). The distorted species structure and quantitative relationships in the plant communities, as well as the planting of large numbers of tree and shrub species foreign to both the habitat and this geographical region (e.g. Pinus mughus, P. nigra, P. strobos and Rosa rugosa) are just two examples of the man-made transformations of the vegetation. Moreover, the annual invasion of holidaymakers in their hundreds of thousands during the summer – numbers far in excess of the carrying “tourist capacity” of the place – subjects this environment to intolerable pressure.

CHARACTERISTIC OF THE AREA

Some 35 km long and from 200 m to 3 km broad the Hel Peninsula is one of the most distinctive morphological features of the Polish section of the Baltic Sea coast. It is a very recent spit formation; in the 17th century it still consisted of a number of
sandy islets joined to one another by narrow isthmuses (Dylikowa, 1973). The accumulation of sand continued until the end of the 19th century, but in the early 20th century this process was interrupted by the modernisation of the port at Władysławowo. Since that time abrasion has been the dominant process as a result of which the peninsula has been breached by storm waters on several occasions (Zatorska, 1984).

The climate of the Hel Peninsula is eminently maritime. Thus the diurnal and annual temperature ranges are small, the air humidity is high, the winters are the mildest in the whole of Poland, and windless days are very few in number (< 5% per annum) (see Paskyński, 1984).

The spit is mainly made up of medium-grained dune sands. The soil that have been able to form here comprise a variety of initial soils, weakly podzolized podzols, as well as half-bog and peat soils. They support sandy swards belonging to the Elymo-Ammophiletem, Helichryso-Jasionetum and Spergulo-Corynephoretum associations at various stages of advancement, as well as woodland communities. In the latter, the stands consist of planted Pinus sylvestris, with admixtures of Betula pendula, Quercus spp., Populus tremula and Sorbus aucuparia. Most of the trees are comparatively young; 90-100 year-old specimens are rare. However, the herb layer and undergrowth are typical not so much of coniferous woodland as of acidophilous mixed deciduous woodland (Pirotrowska, 1984). Forest communities cover about 40% of the peninsula.

METHODS

The peninsula was divided into 26 localities (Fig. 1). Localities 1-24, each 1 km wide, were delineated on the basis of maps issued by the Polish Maritime Bureau and correspond to the consecutive kilometers of shoreline on the open-sea side. Locality 25 is much larger than all the rest and is poorly known, covering as it does a restricted military area. We were only once granted an entry pass for a few hours; we are indebted to Jolanta Międlikowska for listing the lichens in this locality and collecting samples of them, and for subsequently passing on to us her data. Locality 26 is that part of the town of Hel and its environs which are accesible to the civilian population. Material was collected in the field in 1984, 1985, 1988, 1989 and 1994.

The species list also contains taxa reported from the Hel Peninsula by Oberlärt (1870), Susza (1928) and Kraiewiec (1933). Our survey failed to record 15 these species, which are indicated by an asterisk*. The species nomenclature is an accordance with Florynowicz (1993) with the exception of the genera Amandinea (Schiedegger, 1993), Pleurosticta (Lumbsch et al., 1988) and Cetraria, Tuckermannopsis and Vulpicida (Randalene, Saaag, 1993). Herbarium specimens are at UGDA.
CHARACTERISTIC OF THE LICHEN FLORA AND RESULTS

Factors mentioned in chapter 1 and 2 combined with the small area of peninsula and the relatively slight differentiation between habitats have all contributed to the comparative poorness of the lichen flora here. In total 116 species have been found, as many as 49 of which at only 1-3 localities. A mere 15 species have been recorded at more than 20 localities. There are mainly common sward or ubiquitous species, non-woodland *Cladina* and *Cladonia* (*Cladina mitis, Cladonia chlorophaea, C. coniocraea, C. fimbriata, C. foliacea, C. furcata, C. macilenta, C. rangiformis* and *C. subulata*), pine epiphytes (*Hypocenomyce scalaris, Hypogymnia physodes, Lecanora conizaeoides* and *Lepraria incana*) and *Lecanora argentata* and *L. expallens*.

Indicators of man-made transformations include:
- the very small proportion of epiphytic macrolichens (23 spp., most of which are sporadic);
- the widespread occurrence of epilithic, calciphilous lichens in areas that have undergone particularly far-reaching changes, i.e. the villages (Fig. 2).

The presence of a number of species that are quite rare in this region is noteworthy, e.g. *Bryoria fuscescens, Cetraria muricata, Cladina stellaris, Lecanora intumescent*, *Ramalina obtusata* and *Usnea subfloridana*. Apart from *Ramalina obtusata*, the others are on the list of lichens endeared in Poland and are in one of
two categories: E – on the verge the extinction, and V – vulnerable (Cieśliński et al., 1992). The species Schismatoma graphidioides is now considered extinct in Poland; Opler (1870) has reported it from Hel, but since then it has never been found again.

List of taxa

Acarospora fuscata (Nyl.) Arnold – on granite post: 3.
Amandinea punctata (Hoffm.) Coppins et Scheidegger [Buellia punctata (Hoffm.) Massal.] – on the bark of deciduous trees: 8, 13, 18, 20, 24, 26.
Bacidia globulosa (Flk.) Hafellner et V. Wirth – on the bark of aspen: 25.
Baeomyces rufus (Huds.) Revent. – on the ground on slope: 25.
*Buellia schaereri De Not. – reported from Hel by Opler (1870).
Calicium viride Pers. – on the bark of deciduous trees: 12, 16-18.
Caloplaca citrina (Hoffm.) Th. Fr. – on concrete: 1, 6, 7, 9, 13, 17, 19, 20, 23-26.
C. saxicola (Hoffm.) Nordin – on concrete: 1, 2, 7, 12, 13, 19, 20, 24, 26.
Candelariella aurella (Hoffm.) Müll. Arg. – on concrete: 1, 2, 6, 7, 10-13, 15, 17, 19, 20, 23, 24, 26.
C. xanthostigma (Ach.) Lettau – on the bark of lime and maple: 20, 23.
Cetraria aculeata (Schreber) Fr. [Coelocaulon aculeatum (Schreber) Link.] – on the ground: 2, 4, 5, 8, 17, 20, 22-26; reported from Hel by Opler (1870) and Krawiec (1933).
C. ericetorum Opiz – on the ground: 25.
C. islandica (L.) Ach. – on the ground: 16, 22-24, 26; reported from Hel by O h l e r t (1870) and K r a w i e c (1933).
C. muricata (Ach.) Eckfeldt [Coelocaulon muricatum (Ach.) Karnefelt] – on the ground: 25; reported from Hel by O h l e r t (1870) and S u z a (1928).
Chaenotheca ferruginea (Turner ex Sm.) Migula – on the bark of the pine: 15, 16, 18, 20, 21, 24.
Chrysothrix candelaris (L.) Laundon – on the bark of birch: 18.
Cladina arbuscula (Wallr.) Hale et W. Culb. – on the ground: 2, 4, 5, 7-11, 14-18, 20, 22-26; reported by K r a w i e c (1933) from Hel as for. decumbens Anders end for. sphagnoides Flk.
C. ciliata (Stirton) Trass var. tenuis (Flk.) Ahti – on the ground: 8, 9, 15-17, 21, 23, 24-26; reported from Hel by S u z a (1928) and K r a w i e c (1933).
C. mitis (Sandst.) Hustich – on the ground, in masses: 1, 2, 4-8, 10-12, 14-17, 20, 22-26; reported from Hel by K r a w i e c (1933).
C. portentosa (Dufour) Follm. – on the ground: 2, 4, 7, 8, 10, 15, 16, 20, 22-26; reported by K r a w i e c (1933) from Hel as for. major Flk. and for. tenuior Delise.
C. stellaris (Opiz) Brodo – on the ground: 26; reported from Hel by K r a w i e c (1933).
*Cladonia bellidiflora (Ach.) Schärer – probably erroneously reported by O h l e r t (1870), this was C. floerkeana (?).
*C. cariosa (Ach.) Sprengel – reported from Hel by S u z a (1928) as for. criibrosa Wallr. and for. squamulosa Mjll. Arg.
*C. carneola Fr. – reported from Hel by O h l e r t (1870), probably erroneously (C. grayi?).
C. cervicormis (Ach.) Flotow subsp. verticillata (Hoffm.) Ahti – on the ground: 23, 24; reported from Hel by S u z a (1928) as var. evoluta Th. Fr. and by O h l e r t (1870) as for. simplex Schärer.
C. chlorophaea (Flk. ex Sommerf.) Sprengel – on the ground: 1, 2, 4, 5, 7-26.
C. coniocraea (Flk.) Vainio – on the ground, wood and on the bark at the base of tree trunks: 1-5, 8-12, 14-18, 20-26.
C. cornuta (L.) Hoffm. – on the ground: 3, 4, 10-12, 17, 20, 22-26; on localities 20, 22-24, and 26 – also in f. phyllopatha (Flk.) Vainio.
*C. crispata (Ach.) Flotow var. dilacerata (Schaerer) Mallbr. – reported from Hel by S u z a (1928).
*C. decorticata (Flk.) Sprengel – probably erroneously reported from Hel by S u z a (1928); The occurrence of this species in the study area is highly unlikely.
C. deformis (L.) Hoffm. – on the ground and lignum: 2, 17.
C. digitata (L.) Hoffm. – on the ground, lignum and at the base of trunks of pine and birch: 2, 3, 10, 12, 14, 16-18, 20, 24-26.
C. fimbriata (L.) Fr. – on the ground, lignum and on the bark of pine: 1-12, 14-18, 20-25; reported from Hel by K r a w i e c (1933).

C. floerkeana (Fr.) Flk. – on the ground, lignum and on the bark: 4, 6, 8-11, 15, 17, 20 [also var. carcata (Ach.) Nyl. ], 22-26; reported from Hel by O h l e r t (1870) as var. xanthocarpa Nyl. and by K r a w i e c (1933) as var. carcata.

C. foliacea (Huds.) Willd. – on the ground: 1, 4-13, 15-17, 20, 22-26; reported from Hel by S u z a (1928).

C. furcata (Huds.) Schrader – on the ground and lignum: 1, 3-5, 7-18, 20-26; reported from Hel by K r a w i e c (1933).

C. glauca Flk. – on the ground, lignum and on the bark of pine: 10, 17, 22-26; reported from Hel by K r a w i e c (1933) as for. capreolata Flk.

C. gracilis (L.) Willd. – on the ground: 8, 9, 16, 17, 20, 22-26; on locality 24 var. dilatata (Hoffm.) Vainio, and on locality 26 var. dilacerata Flk. Reported from Hel by S u z a (1928) and K r a w i e c (1933) as var. dilatata.

C. grayi Merrill – on the ground and lignum: 8-12, 15-17, 20, 22-24, 26.

C. macilentata Hoffm. subsp. macilentata – on the ground, lignum and on the bark of pine: 2-4, 9, 11, 12, 15-17, 19, 20, 24, 26; reported from Hel by K r a w i e c (1933).

C. macilentata Hoffm. subsp. bacillaris Nyl. – on the ground and lignum: 2, 5, 6, 9-13, 15-17, 20, 22-26.

C. ochrochloa Flk. – on the ground: 11, 24; reported from Hel by K r a w i e c (1933) as for. monstrosa Harm.

C. phyllophora Hoffm. – on the ground, exceptionally at the base of pine trunk: 2-4, 6, 11, 12, 14, 15, 17, 18, 20, 21, 23-26; reported from Hel by K r a w i e c (1933).

C. pleurota (Flk.) Schaerer – on the ground and lignum: 8, 17, 20, 22-26; reported from Hel by O h l e r t (1870) and K r a w i e c (1933).

C. pyxidata (L.) Hoffm. – on the ground: 22.

C. rambolosa (With.) Laundon – on the ground: 15, 17, 23, 26; reported from Hel by K r a w i e c (1933) as for. crassiuscula Coem.

C. rangiformis Hoffm. – on the ground: 1, 2, 4, 5, 7-18, 20-24; on localities 8, 16 and 23 – also var. foliosa (Dufour) Flk. Reported from Hel by K r a w i e c (1933) as var. pungens Vainio.


*C. squamosa (Scop.) Hoffm. var. denticollis Flk. – reported from Hel by K r a w i e c (1933).


*C. turgida (Ehrh.) Hoffm. – reported by S u z a (1928).

C. uncialis (L.) Wigg. – on the ground: 8, 16, 17, 20, 22-26.

Cliostomum griffithii (Sm.) Coppins – on the bark of deciduous trees, rarely on pine bark and lignum: 4-7, 9-20, 22, 23.

*Cyphelium tigillare (Ach.) Ach. – reported from Hel by O h l e r t (1870).
*Dimerella diluta* (Pers.) Trevisan – reported from Hel by Ohlert (1870).

*Evenia prunastri* (L.) Ach. – on the bark of deciduous and coniferous trees: 2, 3, 5, 8-10, 12-19, 24, 25.


*Hygnum physodes* (L.) Nyl. – on the bark of trees, shrubs, dwarf-shrubs, on lignum and on soil on dunes: 1-26.

*H. tubulosa* (Schærer) Havaas – on the bark of aspen, willow and rowan: 15, 25.

*Imshaugia aeurites* (Ach.) Fricke Meyer – on the bark of pine and birch: 16-19, 22, 24-26; reported from Hel by K r a w i e c (1933).


*L. argentata* (Ach.) Malme – on the bark of deciduous trees: 4-10, 12-20, 22-24, 26.

*L. carpinea* (L.) Vainio – on the bark of deciduous trees: 5-7, 9, 12-20, 22, 24, 25.

*L. chlorotera* Nyl. – on the bark of deciduous trees: 12, 24, 25.

*L. conizaoides* Nyl. in Cromb. – on the bark of trees, shrubs, dwarf-shrubs and on lignum: 1-26.

*L. dispersa* (Pers.) Sommerf. – on concrete: 1, 2, 6, 7, 10, 11, 13, 17, 19, 20, 24-26.

*L. expallens* Ach. – on the bark of the deciduous trees and pine: 1-10, 12-20, 22-26.

*L. glabratia* (Ach.) Malme – on the bark of maple and horse-chestnut: 4, 12.


*L. intumescens* (Rebent.) Rabenb. – on the bark of horse-chestnut: 4.

*L. muralis* (Schreber) Rabenb. – on concrete: 6, 7, 20.

*L. pulicaris* (Pers.) Ach. – on the bark of aspen and maple: 25.

*L. saligna* (Schrader) A. Zahlbr. var. *saligna* – on the bark of aspen and maple: 14, 20; var. *sarcopis* (Wahlenb.) Hillm. – on the bark of maple: 20.

*L. symmicta* (Ach.) Ach. – on the bark of deciduous trees: 10, 18, 24.


*L. varia* (Hoffm.) Ach. – on pine bark: 25.


*Melanella exasperatula* (Nyl.) Essl. – on the bark of roadside maple: 23.

*M. fuliginosa* (Fr. ex Duby) Essl. – on the bark of pine and aspen: 19, 25.

*M. subaurifera* (Nyl.) Essl. – on the bark of deciduous trees: 4-9, 11, 12, 14-20; reported from Hel by K r a w i e c (1933).

*Micarea denigrata* (Fr.) Hedl. – on lignum: 16, 24.

*Ochrolechia subviridis* (Hoeg.) Erichsen – on pine bark: 19.
*Opegrapha atra* Pers. – reported from Hel by **Krąwiec** (1933).

*O. vulgata* Ach. – reported from Hel by **Ole r t** (1870).

**Parmelia saxatilis** (L.) Ach. – on pine bark: 2, 15.

**P. sulcata** Tayl. – on the bark of deciduous and coniferous trees and on lignum: 2, 4-6, 8-12, 14-20, 23, 25, 26.

**Parmeliopsis ambigu a** (Wulfen) Nyl. – on the bark of pine and birch and on lignum: 18, 19, 25.

**Peltigera canina** (L.) Willd. – on the ground: 1, 2, 4, 8, 16-18, 21, 22.

**P. didactyla** (With.) Laundon – on the ground: 15, 18, 25; reported from Hel by **Krąwiec** (1933).

*P. malacea* (Ach.) Funck – reported from Hel by **Krąwiec** (1933).

**P. neckerii** Hepp. ex Müll. Arg. – on the ground in heath: 8.

**P. polydactyla** (Necker) Hoffm. – on the ground: 1, 2, 4, 5, 7-11, 13, 14, 16-18, 21, 23, 26.

**P. rufescens** (Weiss.) Humb. – on the ground: 1, 4, 15.

**Pertusaria amara** (Ach.) Nyl. – on the bark of rowan and oak, in small numbers: 17, 18.

**P. pertusa** (L.) Tuck. – on the bark of rowan: 18.

**Phaeophyscia nigricans** (Flk.) Moberg – on concrete: 13, 25.


**Physcia adscendens** (Fr.) Olivier – on the bark of deciduous trees and on concrete: 1, 11, 13, 15, 19, 20, 24, 25.

**P. tenella** (Scop.) DC. in Lam. et DC. – on the bark of deciduous trees and lignum and on concrete: 4, 7, 11, 14, 15, 20, 23, 24, 26.

**Placynthiella oligotropha** (Vainio) Coppins et P. James – on the ground and on lignum: 2, 4, 10-12, 14-16, 18, 19, 23-25.

**Platsmatia glauca** (L.) W. Culb. et C. Culb. – on the bark of pine and birch: 15, 18, 19.


**Pseudovernia furfuracea** (L.) Zopf – on the bark of pine, birch and willow: 3, 16, 22-26; reported from Hel by **Suz a** (1928).

**Ramalina farinacea** (L.) Ach. – on the bark of deciduous trees and pine: 2, 4, 5, 9, 12, 14, 15, 17-19.

**R. fastigiata** (Pers.) Ach. – on the bark of deciduous trees, exceptionally on pine: 4, 7, 14, 15, 18, 20.


**Rinodina gennarii** Bagl. – on concrete: 1, 7, 10, 13, 20, 24, 26.

*Schismatomma graphidioides* (Leighton) A. Zahlbr. – reported from Hel by **Ole r t** (1870).
Scoliciosporum chlorococcum (Stenham.) Vezda – on the bark of pine and deciduous trees: 4, 12, 14, 17, 19.

*Stereocaulon paschale* Fr. – reported from Hel by Krawc (1933).

*Thelocarpus laureri* (Nyl.) Flotow – on stones: 25.

*Trapelia coarctata* (Sm.) Choisy in Werner – on brick and sandstone: 10, 25, 26.

*Trapeliopsis fexuosa* (Fr.) Coppins et P. James – on lignum: 25.

*T. granulosa* (Hoffm.) Lumbsch in Hertel – on the ground, lignum and on the bark of pine: 2, 7, 9-12, 15-18, 23-26.

*Tuckermannopsis chlorophylla* (Willd.) Hale [Cetraria chlorophylla (Willd.) Vainio] – on the bark of oak, pine and aspen: 15, 24.

*Usnea hirta* (L.) Weber in Wigg. – on the bark of pine and birch: 16, 18, 22, 23 (leg. T. Sulma 1957), 24-26; reported from Hel by Krawc (1933).


*Xanthoria candelaria* (L.) Th. Fr. – on the bark of pine and on lignum: 5, 20.

*X. parietina* (L.) Th. Fr. – on the bark of deciduous trees, lignum and on concrete: 1, 2, 4, 6-10, 12-15, 18-20, 23-26.

*X. polycarpa* (Hoffm.) Rieber – on the bark of deciduous trees, exceptionally on pine: 1, 13, 14, 18-20, 25.

**REFERENCES**


Porosty Półwyspu Helskiego


treszczenie

Półwysp Helski, jeden z najbardziej charakterystycznych elementów morfologicznych polskiego wybrzeża Bałtyku (rys. 1), jest tworem geologicznie młodym; jako zwarta mierzeja powstał niecałe 300 lat temu. Działalność człowieka spowodowała tutaj duże zmiany: zniekształcona struktura gatunkowa i stosunki ilościowe w zbiorowiskach roślinnych, liczne nasadzenia drzew i krzewów obcych siedliskowo i geograficznie (Pinus mughus, P. nigra, P. strobus, Rosa rugosa i in.) – to tylko niektóre przykłady antropogenicznych przeobrażeń szaty roślinnej. Również ciągły napływ setek tysięcy ludzi w sezonie letnim, wielokrotnie przekraczający tzw. pojemność turystyczną tego terenu, wywiera bardzo duży ujemny wpływ na środowisko. Przedstawione czynniki w połączeniu z niewielką powierzchnią półwyspu i ze stosunkowo małą różnorodnością siedlisk sprawiają, że flora porostów jest tutaj dosyć uboga. Znaleziono 116 gatunków, z których aż 49 ma 1-3 stanowiska.

Jednymi ze wskaźników przeobrażeń antropogenicznych są:
– mały udział makrolichenów epifitycznych (24 gatunki, w tym większość sporadycznych);
– liczne występowanie epilichytycznych porostów kalcyfilnych na terenach szczególnie silnie zmienionych, głównie w miejscowościach (rys. 2).

Na uwagę zasługuje obecność kilku gatunków względnie rzadkich w skali regionu, jak np. Bryoria fusescens, Cetraria mulicata, Cladina stellaris, Lecanora intumescens, Ramalina obtusata i Usnea subfloridana. Poza R. obtusata, pozostałe znajdują się na liści porostów zagrożonych w Polsce, z kategorią „E” – wymierające i „V” – narażone (Cieśliński i in., 1992). Za gatunek wymarły w naszym kraju została uznana Schismatomma graphioides, podana z Helu przez Ohlerta (1870) i ponownie nie odszukana. W wykazie umieszczono również taksony, które z Półwyspu Helskiego podawali Ohlert (1870), Suza (1928) oraz Krawiec (1933). Obecnie nie odnaleziono 15 gatunków podawanych przez tych autorów; są one oznaczone „*”.