

# Hypocreopsis lichenoides (Ascomycetes) in North Europe

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*Hypocreopsis lichenoides* (Tode: Fr.) Seaver is reported as new to Finland, and the records from Norway, Denmark, Sweden and the adjacent U.S.S.R. are surveyed. The species seems to be expanding rapidly in southern Fennoscandia, especially Sweden: the reasons for this development are discussed. New records are published from northern Québec and Labrador, Canada. The species is briefly redescribed and compared with the allied *H. rhododendri* Thaxter, plus six other species of the genus. The ecological properties are discussed and a host list presented. *H. lichenoides* grows predominantly on species of *Salix*, followed by *Corylus avellana*, *Prunus padus* and *Frangula alnus*. In all, 21 angiosperm hosts and 3 gymnosperms are listed.

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## Introduction

*Hypocreopsis lichenoides* (Tode: Fr.) Seaver is a pyrenomycetous ascomycete, which is recognized by its characteristic, finger-like, or radially lobed, stromata. This wood-inhabiting species has already been treated in a fairly large number of papers, but its occurrence in North Europe has undergone remarkable changes during the past 15 years. Our aim is to bring the data concerning the situation in North Europe up to date, and the species is here reported as new to Finland. We also present a compilation of the published records, dispersed in many minor studies, reports of findings, and other notes.

Material was studied in the following herbaria: GB, H, LD, LE, O, S, TUR, and UPS. Further, some specimens are deposited in the reference herbaria of the authors, abbreviated as I.N. and T.N. The symbols KOH, IKI, CB and CRB refer to the microscopic reagents (potassium hydroxide, Melzer's reagent, Cotton Blue and Cresyl Blue, respectively), as proposed by Niemelä (1985).

## Description and taxonomy

*Acrospermum lichenoides* Tode, Fungi Meckl. 1:9, 1790: Fries, Syst. Mycol. 2: 246, 1823. — *Hypocreopsis lichenoides* (Tode: Fr.) Seaver, Mycologia 2: 82, 1910.

*Sphaeria riccioidea* Bolton, Fungi Halifax 4: 182, 1791. — *Hypocreopsis riccioidea* (Bolt.) Karsten, Bidr. Känned. Finlands Nat. Folk. 23: 251, 1873.

For further synonyms, see Müller & von Arx (1962) and Strid (1967).

Stromata developing as roundish patches, in our material up to 10 cm in diam and 1—5 mm thick. They are divided into 2—4 mm wide, radial ridges or lobes, separated in the marginal areas into finger-like, adpressed projections; minute stromata on small

twigs composed of only a few separate lobes encircling the wood. Overall colour cigar-brown, with lighter margin and greyish centre. Surface smooth on young lobes, becoming rugose in central areas, which, when mature, support the perithecia, their ostioles visible as minute, black dots. Context light wood-coloured, soft corky.

Stroma made up of uniform reticulum of intermixed hyphae (textura intricata), which are thin-walled, branched, 3—5  $\mu\text{m}$  in diam (near surface with bladder-shaped, intercalary, swollen cells, 10—15  $\mu\text{m}$  in diam), with hyaline or oily contents, wall IKI—, CB+, CRB—. Surface widely covered by a palisade of fusiform conidiophores (visible in KOH), budding conidia from their apices. Conidia globose, (8—) 9—11.5  $\mu\text{m}$  in diam, with warted, yellowish, 0.5  $\mu\text{m}$  thick walls, weakly CB+. Perithecia round, immersed in the stroma, walls made up of a parenchymatous tissue. Asci 8-spored; ascospores hyaline, smooth, thin-walled, fusiform, with a median septum, (19—) 22—30  $\times$  (5—) 7—9.5  $\mu\text{m}$ , IKI—, CB—.

The growing fruit bodies produce abundant conidia, visible under the lens as a brown, mealy powder. In our study area the perithecia develop only on overwintered stromata, and were not found in all the collections. This causes some uncertainty in the identifications, but there is no indication that any other species can be involved.

*H. lichenoides* was long regarded as the sole species of the genus in Europe (Dennis 1968). Later, it turned out that another species occurs there as well: *H. rhododendri* Thaxter. That species was described from the southern states of the U.S.A. (Thaxter 1922), and Dennis (1976) reported it from the Isle of Mull, Great Britain. Externally, the two species are probably indistinguishable, but *H. rhododendri* has subglobose ascospores with thick, coarsely warted walls. Thus



Figs. 1—2. *Hypocreopsis lichenoides*. — 1: Fully grown fruit body,  $\times 1.8$  (Sweden, Göteborg, Hisingen, 1968 Nordin 4518). — 2: Initial stage,  $\times 5.9$  (Sweden, Västmanland, Västerås-Barkarö, 1967 Nordin 4208).

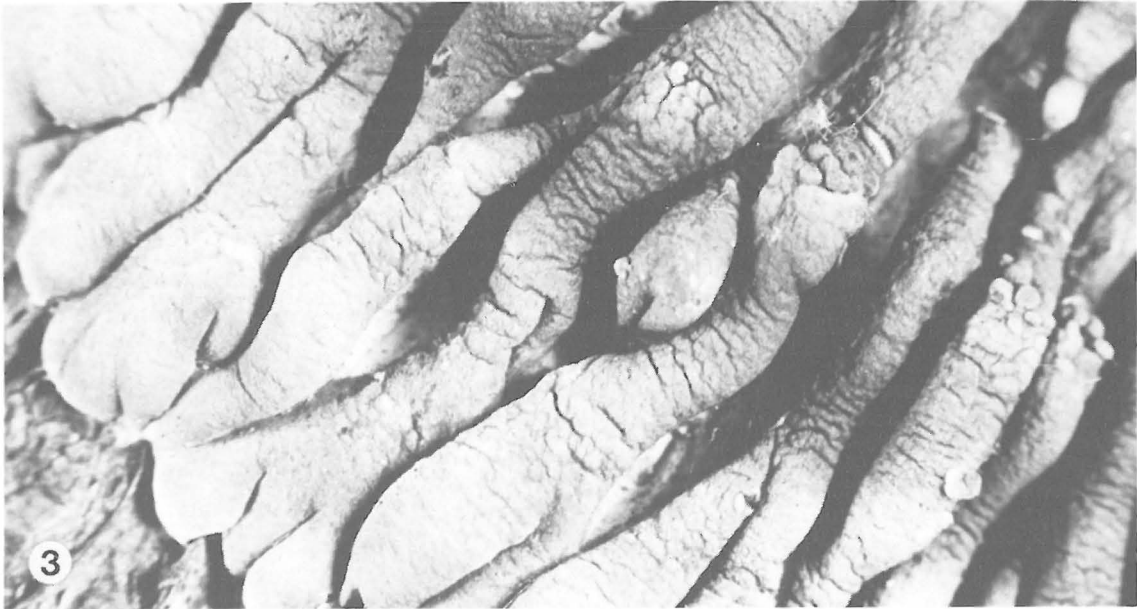


Fig. 3. *Hypocreopsis lichenoides*, detail of a mature fruit body,  $\times 5.7$  (Finland, Nurmijärvi, 1982 Askola 1123).

they can easily be separated at the fertile stage. The spores of a Swedish collection were illustrated by Strid (1967): they represent typical *H. lichenoides*. Two further species of *Hypocreopsis*, viz. *H. subiculoides* Doi (from Japan) and *H. tingomariensis* Doi (from Peru) have the thick-walled, warted spore type (Doi 1977b), and are thus closer to *H. rhododendri*. In addition, they have roundish stromata, without the finger-like projections. The same applies to *H. episphaeria* (Pat.) Müller (from Madagascar), *H. hypoxyloides* Speg. (from Argentina), *H. macrostoma* (Berk. & Curt.) Müller (from the tropics and subtropics) and *H. endoleuca* (Sacc.) Müller (from North America) (Müller & von Arx 1962).

Coloured pictures of *H. lichenoides* were published by Jahn (1979) and Ryman & Holmåsén (1984). *H. rhododendri* was illustrated by Dennis (1976) and Doi (1977a). The scanty records of the latter species (cf. also Cauchon & Ouellette 1964) give the impression that it may be more southern than *H. lichenoides*, in both North America and Europe.

### Distribution

*H. lichenoides* has been known from Scandinavia for a rather short time. It was first reported from Denmark (Lind 1913) and was subsequently found to be widely distributed in that country (Klinge 1956). It was observed in Sweden only 20 years ago (Karlvald 1963) and its expansion has been followed fairly closely since that time. The first record from Norway is ca. 10 years old (Eckblad & Torkelsen 1974) and the species is now known to occur there on two adjacent islands. The two localities in southern Finland were found

quite recently.

Nordin (1969) was the first to suggest that *H. lichenoides* is in process of becoming commoner and more widely distributed in southern Scandinavia. This view, accepted by Eckblad (1981), was based on the 'before-1970' records, which are represented by large dots in Fig. 4. The subsequent collections, from the period 1970–1985, strongly support the theory of expansion.

The history of the species in Sweden began with the report (Karlvald 1963) of a collection from the Göteborg Botanical Garden, southwestern coast of Sweden. In an extensive study, Strid (1967) listed 7 localities, mostly from the southwestern area. A single record was given by Bohlin (1968). Nordin (1969) published 12 new localities: the distribution had already penetrated far inland and was beginning to approach the eastern coast.

During the subsequent 15 years (small dots on the map) the number of localities in Sweden has more than doubled, and is now about 40. Few of these new localities have been published; cf., however, Andersson (1974), Carlstedt (1984, 1985), Johnson (1969) and Nitare (1981). *H. lichenoides* has become abundant in some sites in Västergötland (the main distributional area), but also NW of Stockholm (the eastern sites).

The accumulation of data can often be explained by the growing activity and amount of collectors, which result in an apparent increase of the observed species. Its seems, however, that *H. lichenoides* is in fact expanding. The surroundings of the cities of Oslo, Lund, Stockholm, Uppsala, Turku and Helsinki, for instance, have been extensively studied and collected for over a hundred years, without a trace of the

species. Our map does not show the accumulation of dots around old university towns that is so characteristic of many distribution maps of fungi in the area.

The probability that the present distribution pattern is reliable is increased by the striking habit of the species. The curious, finger-like forms of the fruit bodies arouse interest even among non-mycologists, and the species is certainly easily observed and collected. The situation is quite different, for example, in the case of the corticiaceous or lower fungi, which can mostly be found only by specialists.

We have no theory to explain the spread of *H. lichenoides*. The reasons may be geographical-historical, or may involve climatic or other environmental changes. We suspect the last-mentioned group of factors, but cannot present any definite supportive details. Suitable ecological niches have always existed in the area (lakeside or brookside thickets, grass-herb forests with *Corylus avellana*).

*H. lichenoides* has another, northern distribution area in Finnish Lapland and the adjacent U.S.S.R. The two old collections from the southwestern joint of the Kola peninsula were made by P.A. Karsten during his long collecting journey in 1861. These rich collections, now preserved in H and UPS and distributed in *Fungi Fennici Exsiccati*, remained the only northern records for over a century. They were published as *H. riccioidea* by Karsten (1866, 1873). As indicated by the late Prof. Hans Luther (pers. comm.), they were misplaced on the map of Strid (1967), and their correct position is now given.

In 1970 the author Niemelä collected *H. lichenoides* in northernmost Finland, not far from the Kevo Subarctic Research Station (cf. Kallio 1964). Later it turned out that Prof. Paavo Kallio (Turku, pers. comm.) had also collected it a few kilometres north of that find. These are the northernmost records in Europe, and the first from Finland.

It could be expected that the northern and southern ranges would merge somewhere in the northern U.S.S.R. However, Subin and Krutov (1979) fail to mention the species from Soviet Karelia or the Murmansk region, which makes it possible that these northern occurrences are in fact isolated relicts, originating from a climatically more favourable period. According to the check-list of Järva and Parmasto (1980), the species does not occur in the Estonian S.S.R.

*H. lichenoides* has a scattered distribution in western Central Europe. It has been reported, for example, from Great Britain, the Federal Republic of Germany and France (Heim 1952, Strid 1967, Dennis 1968, 1976, Jahn 1979). It also occurs in North America: Cauchon and Ouellette (1964) and Strid (1967) report several localities in the U.S.A. Cauchon and Ouellette (1964) and Pomerleau (1980) mention it from southern Québec in Canada, and we have studied two collections from further north, not far from the polar timberline:

**Canada:** Newfoundland: Labrador, Mud Lake, *Alnus crispa*, 1963 Kallio (TUR, H; published by Kallio 1980). Québec: Poste-de-la-Baleine, *A. crispa*, 1982 Niemelä 2612 (T.N.).

## NW Europe: List of records

**Norway.** Østfold: Hvaler, 1975 Bjørnland (Ryvarden in litt.), 1971 Ryvarden (O). **Denmark.** Jutland: Djursland, 1957 Myc.congress (Hansen 1959). Randers, 1954 Klinge, 1955 Klinge (3 locs, Klinge 1956). Ribe, 1955 Edelberg (Klinge 1956). Vendsyssel, 1965 Toft (Buchwald 1971). W. Salling, 1955 Klinge (Klinge 1956). **Fyn:** Klingstrup, 1864 Rostrup (Lind 1913). **Sweden.** Halland: Fjärås, 1975 Gilsenius & Wall (Nordin 1969). Onsala, 1972—1975 Wall (GB). **Småland:** Femsjö, 1959 Karlvall 9261 (GB). Mellby, 1980 Andersson & Appelqvist (GB). **Göteborg region:** Göteborg, 1952—1959 Karlvall 5039, 5097, 5402, 6266, 6325, 7274, 8935, 8965 (GB). Mölndal, 1967 Andersson (GB). Rödbo, 1968 Nordin 4518 (GB, S, UPS, O), 1969 Nordin 4908 (I.N.). Säve, 1978 Arvidsson (GB). Styrso, 1967—1968 Selstam (GB). **Västergötland:** Algrås, 1980 Andersson (GB). Alingsås, 1969 Fröberg (GB). Bälinge, 1966 Hjortstam (GB). Bjärklunda, 1968 Hjortstam (GB). Dannike, 1976 Jacobsson (GB). Eriksberg, 1963—1965 Strid 696 (GB). Floby, 1965 Strid 1080 (GB). Hova, 1984 Karjel (I.N.). Kullings-Skövde, 1966—1969 Eliasson (GB), 1969 Eliasson (UPS), 1970 Eliasson (LD, S, UPS, I.N.). Säter, 1984 Carlstedt 1478 (GB, I.N.). Skara, 1973 Neuendorf (GB). Stenum, 1973—1975 Neuendorf (GB). Töllsjö, 1965 Eliasson (GB). Trävattna, 1968 Hjortstam (GB). Vårgårda, 1969 Eliasson (GB). Varnhem, 1971 Bohlin 199 (GB). Västra Tunhem, 1968—1983 Bohlin (S, UPS), 1971 Jeppson (S, UPS). Vilke-Kleva, 1981 Strid (S). **Östergötland:** Hogstad, 1967 Nordin 4219 (UPS). **Närke:** Svennevad, 1968 Carlstedt 588 (GB, UPS). **Södermanland:** Sorunda, 1978 Vesterberg (S). **Uppland:** Sollentuna, 1976—1980 Nitare (GB, S). **Västmanland:** Västerås-Barkarö, 1967 Nordin 4208 (UPS). **Värmland:** Arvika, 1983 Stenberg (I.N.). Färnebo, 1972 Danielsson (S, UPS), 1977 Hallingbäck (GB). Grava, 1983 Jansson (I.N.). Hammarön, 1973 Andersson & Nordström (GB), 1982 Ståhlberg (I.N.). Nedre Ullerud, 1980 Andersson & Appelqvist (GB). Nysund, 1965 Ericsson (UPS), 1965 Hakeliev (UPS). Södra Råda, 1983 Karjel (I.N.). Visnums-Kil, 1985 Carlstedt 1576 (I.N.). **Finland.** *Varsinais-Suomi:* Karjaa, 1983 Kurtto 4442 (H). *Uusimaa:* Nurmijärvi, 1982—1985 Askola 1123, 1212, 1290, 1605 (H). *Inarin Lappi:* Utsjoki, 1964 Kallio (TUR), 1970 Niemelä 553 (T.N.). **U.S.S.R. Leningrad Region:** Sestroretsk Distr., Zelenogorsk, Bondarceva (pers. comm.). Tihvin Distr., Rujuj, 1961 Bondarceva 665 (LE). **Murmansk Region:** Iiaava (Šusijärvi), 1861 Karsten 1903—1905 (H), *Fungi Fenn. Exs.* 664 (H). Knjažaja guba (Knäsä), 1861 Karsten (UPS).

## Notes on the biology

The south Fennoscandian finds of *H. lichenoides* suggest a Temperate to Hemiboreal distribution, but this is ruled out by the records from Lapland. Strid (1967) suggested that the species favours an oceanic climate; at that time most of the European and American collections had been made in coastal areas. The present knowledge of the species also indicates that it favours an at least slightly oceanic climate. The distribution route through southern Sweden goes via the watercourse of the large lakes Vänern, Hjälmaren and Mälaren.

The northern finds lie in the Northern boreal zone. The inner parts of that area are climatically fairly continental, but the collection sites of the species deviate from the general picture. They are situated by the main rivers, not far from the northern coast, and so are exposed to the humid, maritime influence of the Arctic Ocean, warmed by the Gulf Stream. The microclimate of the habitats is moister than average.

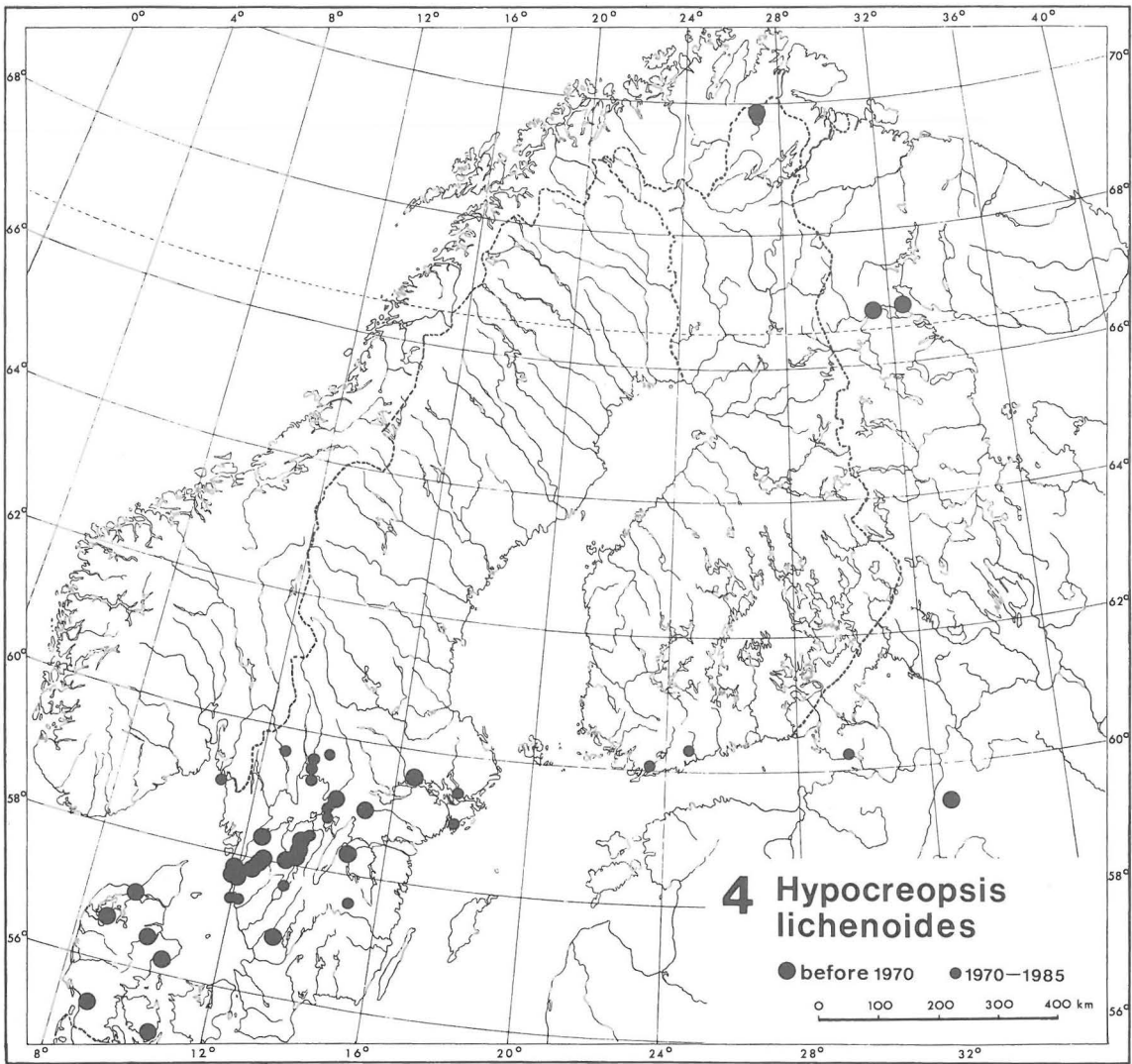


Fig. 4. The distribution of *Hypocreopsis lichenoides* in NW Europe. Old collections are marked with larger dots; numerous recent finds are situated close by them, and therefore cannot be shown.

In the southern area the sites comprise lakesides, riversides, coasts, islands and alluvial swampy thickets. The collection Niemelä 553 (Finnish Lapland) was made in a deep valley bottom, on a branch bent over a rapidly running brook.

Typical habitats are dense, shady grass-herb forests or thickets, rich in thin, dead, standing or fallen trunks and branches. This applies to both the northern and southern areas. The localities in Finnish Lapland lie well north of the northern limit of spruce (*Picea abies*) and the vegetation is composed of mountain birch (*Betula pubescens* ssp. *tortuosa*) and scattered Scots pine (*Pinus sylvestris*). The brooks are lined by dense stands of *Prunus padus*, *Sorbus aucuparia* and willows, with an abundant

undergrowth of grasses and herbs. The flora has been described, for example, by Kallio and Kankainen (1966).

*H. lichenoides* has been collected in North Europe on the following substrata:

<i>Salix</i>	collections
( <i>S. arbuscula</i> , <i>S. aurita</i> , <i>S. caprea</i> , <i>S. cinerea</i> )	30
<i>Corylus avellana</i>	14
<i>Prunus padus</i>	7
<i>Frangula alnus</i>	3
<i>Betula</i>	2
<i>Symphoricarpos rivularis</i>	2
<i>Acer platanoides</i>	1

<i>Crataegus</i>	1
<i>Epilobium angustifolium</i>	1
<i>Fraxinus excelsior</i>	1
<i>Juniperus communis</i>	1
<i>Lonicera periclymenum</i>	1
<i>Picea glauca</i>	1
<i>Pinus</i>	1
<i>Populus tremula</i>	1
<i>Quercus</i>	1
<i>Rosa</i>	1
<i>Rubus</i>	1
<i>Sambucus racemosa</i>	1
<i>Sorbus aucuparia</i>	1
<i>Syringa vulgaris</i>	1

The record from *Juniperus* is based on the specimen Bondarceva 665 (in LE).

Fruit bodies often emerge in places where two thin dead trunks are touching each other, or on branch junctions. They grow mainly on corticated wood, not touching the ground.

As indicated in many earlier papers, *H. lichenoides* grows almost invariably on wood that has been decayed by some species of the Hymenochaetales, mainly *Hymenochaete tabacina* (Sow.: Fr.) Lév. *Hypocreopsis lichenoides* may even overgrow the thin fruit bodies of that species. This association has also been observed in North America (Cauchon & Ouellette 1964, Shigo 1967). In single cases the species has been observed to be associated with *Fomitiporia punctata* (Karst.) Murr. (*Phellinus punctatus*), *Porodaedalea conchata* (Pers.: Fr.) Fiasson & Niemelä (*Phellinus conchatus*), *Inonotus radiatus* (Sow.: Fr.) Karst., and *Hapalopilus rutilans* (Pers.: Fr.) Karst., but these connections may be quite accidental.

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