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Distribution and ecology of the genus Thelocarpon (Lecanorales, Thelocarpaceae) in the Czech Republic

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Of the 20 currently accepted species of the genus *Thelocarpon* Nyl. 8 species are reported from the Czech Republic: *T. epibolum, T. impressellum, T. intermediellum, T. laureri, T. lichenicola, T. olivaceum, T. pallidum* and *T. superellum*. 5 species, *T. epibolum, T. intermediellum, T. olivaceum, T. pallidum* and *T. superellum*, are new for the Czech Republic. *T. laureri* is found to be a common species. *T. epibolum* and *T. lichenicola* are here reported from a number of localities, *T. superellum* is reported from 3 localities, *T. olivaceum* from 2 localities and both *T. impressellum* and *T. pallidum* only from 1 locality. A key to these species, distribution maps, localities as well as data on the ecology of all included species are provided. *T. impressellum* and *T. lichenicola* are reported for the first time from the Slovak Republic. Also, several additional records of *T. epibolum* and *T. laureri* are given from this country. Pycnidia of *T. epibolum, T. intermediellum* and *T. lichenicola* have been discovered and are described for the first time. Drawings of all these are added.

Key words: *Thelocarpon*, pycnidia, Czech Republic, Slovak Republic, distribution maps, ecology.

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Z 20 současně uznávaných druhů rodu *Thelocarpon* Nyl. je nyní známo v České republice 8 druhů: *T. epibolum, T. impressellum, T. intermediellum, T. laureri, T. lichenicola, T. olivaceum, T. pallidum* a *T. superellum*. Poprvé jsou pro území České republiky uváděny: *T. epibolum, T. intermediellum, T. olivaceum, T. pallidum* a *T. superellum*. *T. laureri* je běžně se vyskytující druh, *T. epibolum* a *T. lichenicola* jsou známy z poměrně značného počtu lokalit. *T. superellum* je nyní dokumentován ze tří lokalit, *T. olivaceum* ze 2 lokalit, *T. impressellum* a *T. pallidum* jsou známy každý z 1 lokality. Ke všem druhům jsou podány mapy rozšíření, kompletní výčet známých lokalit a ekologie druhů, rovněž je zahrnut klíč k určování druhů vyskytujících se v České republice. Ze Slovenské republiky je poprvé publikován *T. impressellum* a *T. lichenicola* a uvedeny jsou nové lokality *T. epibolum* a *T. laureri*. U *T. epibolum, T. intermediellum* a *T. lichenicola* byl zjištěn nepohlavní způsob rozmnožování, jsou popsány pyknidy a připojeny perokresby.

INTRODUCTION

The species of the genus *Thelocarpon* Nyl. have already monographically been treated by Magnusson (1935) and Salisbury (1953, 1966, 1974). A diagnosis of the genus, a key to the species as well as references are given by Poelt and Vězda (1977). The lichen flora of Great Britain and Ireland recently published

by Purvis et al. (1992) includes also summarized diagnoses of this genus and the species found in these countries. A key to the species is also provided. Kiszka and Nowak (1966) reported about the rather frequent occurrence of representatives of this genus in Poland and expressed the opinion, that *Thelocarpon* species are much more overlooked than rare. Poelt and Hafellner (1975) found a certain connection between the change in function of the ascocarps from apothecioid to perithecioid and a series of reductions of the ascoapical apparatus. Ahti (1973) recognized two varieties of *Thelocarpon epibolum* during his work on North American *Peltigera* collection. He called the variety distinguished by long spores *Thelocarpon epibolum* var. *epithallinum*, a taxon that was already mentioned by Magnusson under the name f. *longisporum*. Ahti has found most of them to occur only on *Peltigera aphtosa* and *Peltigera leucophlebia*.

Several new species were recently described, such as *Thelocarpon cyaneum* on *Polyblastia* cf. *gothica* from Antarctica by Olech and Alstrup (1990), *Thelocarpon macchiae*, the species with the lowest number of spores in the genus on bare soil in garrigue vegetation with evergreen low bush formation from Italy by Nimis, Poelt and Puntillo (1994). Finally, *Thelocarpon opertum* was described by David and Coppins (1997). This species is characterized by sphaerical spores and immersed growth in cyanobacterial colonies on mossy turf together with calciphilous lichens on calcareous coastal sands.

Thelocarpon laureri was the first species of the genus *Thelocarpon* Nyl. reported from the Czech Republic, distributed as Lojka's exsiccate collection Lichenotheca Universalis no. 197 in 1886 sub *T. epilithellum*. The species was collected for the exsiccate collection by Plosel jr. in 1886 in the same locality where two years before this collector had made the first find of this species, which was so far not published. All the other finds of *Thelocarpon* have been made as late as in 20th century. *T. laureri* was reported by Suza, Anders, Poelt and Vězda and by Vězda (Suza 1919, 1929 sub *T. prasinellum*; Suza 1925, 1931, 1947 sub *T. epilithellum*; Anders 1922 and 1936, both sub *T. epilithellum*; Vězda 1957, 1972 and 1979, Poelt and Vězda 1990). Several of these collections were later mentioned by Migula (1929), Šmarda (1931), Magnusson (1935) and Poelt and Hafellner (1975).

Thelocarpon intermediellum, T. impressellum and *T. lichenicola* are the other species published from the Czech Republic. *T. intermediellum* was recorded by Servít (1930: 31, sub *T. intermixtulum*), *T. impressellum* collected by A. Vězda was mentioned by Poelt and Hafellner (1975) and *T. lichenicola* was published and distributed in Lichenes Selecti Exsiccati no. 1400 by Vězda (1976 sub *Ahlesia strasseri*).

Although *Thelocarpon epibolum* was so far not reported from the Czech Republic, it was collected by Suza in 1919, but left as an unidentified specimen in his collection in the PRM herbarium.

Map 1. Location of Šumava Mts. and Protected Landscape Area Křivoklátsko, the areas which were most frequently visited.

A find of *Thelocarpon lichenicola*, a rich collection with many fruitbodies made in the Šumava Mts. in 1989, evoked my interest in this genus. Also some other Czech lichenologists are presently interested in searching for *Thelocarpon* species. Currently 8 species from the genus *Thelocarpon* are recognized in the Czech Republic: *T. epibolum, T. impressellum, T. intermediellum, T. laureri, T. lichenicola, T. olivaceum*, *T. pallidum* and *T. superellum*. The largest number of collections of the last years were made in the Šumava Mts. and in the Protected Landscape Area Křivoklátsko (see Map 1).

The relatively high number of listed localities of recently collected *Thelocarpon* species shows that these lichens are much more overlooked for their minute size than rare and by purposeful exploration they can be found very frequently.

The species *Thelocarpon impressellum* and *T. lichenicola* recently collected in the Slovak Republic are new to this country and belong together with *T. epibolum, T. depressulum, T. intermediellum* and *T. laureri* to the currently known species of the genus *Thelocarpon* there.

MATERIAL AND METHODS

This study is based mostly on material recently collected by Czech lichenologists including the author's own finds made between 1989–1998. I have attempted to observe as many of the accepted species in their natural habitats as possible because such experience is invaluable for the study of their ecological requirements. The revision of earlier collections is based on all the specimens referring to the area of the Czech Republic we could find. The studied specimens originate from the herbaria PRM, PRC and from the private herbaria of Š. Bayerová, R. Dětinský, J. Halda, Z. Palice and Dr. A. Vězda. The revision of several additional collections is based on material sent on loan from the herbarium in Munich (M).

Observations of external features were made with a MST 131 stereomicroscope. Photographs were made with an Olympus PM 10. Macrophotographs were taken on a stereomicroscope Olympus SZH 10 and photomicrographs on an Olympus BX-50 microscope with a Nomarski Differential Interference Contrast on a Fuji 200 ASA film. For microscopic examination squash preparations and hand cut sections were made in water, 10 % KOH or Lugol's iodine.

ABBREVIATIONS AND SYMBOLS

The four-digit numbers preceding the dates indicate coordinate squares of 10 by 6 minutes (MTB grid) of the listed localities. If several collections were made in the same coordinate square, only the most recent record is mentioned. Symbols used in distribution maps: empty circles and other symbols = specimens collected until 1949; nearly empty circles and other symbols = specimens collected between 1950 and 1974 and full circles and other symbols = specimens collected since 1975. Species marked * are reported from the Czech or Slovak Republic for the first time. All specimens have been revised except those designated "non vidimus"! The following abbreviations are used for the collectors: J. K. or J. H. = Jana Kocourková-Horáková, P. K. = Pavel Kocourek.

RESULTS AND DISCUSSION

Life cycle

Species of the genus *Thelocarpon* Nyl. have been regarded as shortliving pioneer lichens. This opinion was already reported by Zahlbruckner on the label of *Thelocarpon laureri*, the specimen collected by him for the exsiccate Kryptogamae exs. Vindobonensi no. 373 (as syn. *T. prasinellum*) in Slovakia in 1897. Zahlbruckner observed the development of this species during a one-year period. Also Vězda observed the life cycle of this species for a two-year period

on the top of a wooden post of his garden fence in Brno (south Moravia) and published his observation with Poelt (Poelt and Vězda 1990: 387). They indicated that fruitbodies are probably occurring only for several months during the year and that new ones can arise either from ascospores or from existing thallus. In autumn he found fruitbodies with asci in unmature state. In May of the following year the asci examined with a microscope were mature. Vězda also repeatedly observed the disappearing of fruitbodies during dry sunny days during summer.

The development of fruitbodies and the ripening of asci of *Thelocarpon laureri* were found by him dependent on the seasons of the year (Poelt and Vězda 1990). This result seems to be clear, but we found the process to be more complicated. Asci of several species were found mature in various seasons of the year including winter and summer. We observed that groups of fruitbodies, forming some sorts of colonies, appear any time of the year, but the most frequently in spring and autumn under the most favourable moisture conditions. By microscopical examination we found various colonies of fruitbodies of *T. epibolum* and *T. lichenicola* on the same lying decaying trunk in different stages of development several times during year. The same observation was made in *T. laureri*, observed on several stumps in our garden. However, in one colony we always found asci in almost the same stage of development. In *T. lichenicola* a tendency was observed to form pycnidia (see below for description) before the ascomata started to arise or ripen. Therefore, we would rather hold the opinion, that both the development of fruitbodies and the maturing of asci depend more on the duration of wet periods than on the changing of the seasons during the year.

According to our observation, *Thelocarpon* species are living short in less favourable conditions, but mostly they are living longer than the few months indicated by Poelt and Vězda (1990). They are not tolerant to excessive desiccation for a long period, which damages them up to destruction of the fruitbodies built of tender structures and they are neither able to survive for a long time (several months) when covered by snow. But as the data of finds listed below indicate, it is possible to collect them practically during the entire year. The frequency of finds of individual species during the year mostly depends on the frequency of field studies by diligent collectors in each season of the year. However there is probably a lower number of collections during winter and during summer holidays the Czech Republic.

Five of the currently known species (*T. epibolum, T. intermediellum, T. laureri, T. lichenicola* and *T. olivaceum*) in the Czech Republic were found to live in the winter season, several collection of *T. intermediellum* were even made after a period of very cold and frosty conditions in mountain altitudes. Fruitbodies of *T. epibolum, T. intermediellum, T. laureri* and *T. lichenicola* were observed to survive extremely cold weather even if the temperature staged deeply below freezing-point for a longer time. The fruitbodies of *T. laureri* were found living

on cutting flat of a stump in our garden even if after being covered with snow for almost one month. But we were not able to make a more detailed study of life cycle and how these species survive the winter season in areas with an extremely long winter period in high mountain and alpine situations and (for example) snow cover.

Three species, *Thelocarpon epibolum, T. laureri* and *T. lichenicola* were confirmed to survive hot days during summer months. *T. epibolum* and *T. lichenicola* were observed by us several times on lying decaying trunks in two wet valleys in the Protected Landscape Area Křivoklátsko in Central Bohemia from the spring till the end of the summer of the year 1997. The same fruitbodies were found living at each observation.

In favourable habitats under wet conditions *Thelocarpon* species can be observed in the same habitat for several years up to destruction of the organic substratum, unless they are overgrown by other competitively stronger or more expansive lichens or bryophytes, because of weakness in competition.

For two years *Thelocarpon laureri* was observed in the village of Přílepy in Central Bohemia on old wooden roof beams lying in a place exposed to the sun from the eastern for two years. *Thelocarpon laureri* was collected accompanied only by *Absconditella delutula*. After one and half year *Absconditella delutula* vanished, but due to proceeding succession a more extensive covering of the beams by *Placynthiella icmalea* and *Trapeliopsis flexuosa* was observed and only several fruitbodies of *Thelocarpon laureri* were seen. These after *Thelocarpon epibolum* appeared on the decaying wood between *Placynthiella icmalea* and *Trapeliopsis flexuosa*, but only in small quantity (see also Kocourková-Horáková 1998).

Distribution and substrata

Thelocarpon species are distributed from the lowlands to the mountains. They mostly prefer shaded and wet habitats. They occur on a wide range of substrata which are mentioned below in detail under each species. It seems, that they mostly avoid substrata with a high pH. This phenomenon is also obvious from the tables of accompanying species added to each of species. These accompanying species usually also occur on acidic substrata. However, there are species of the genus which were found directly on a calcareous substratum such as *Thelocarpon albidum* or *Thelocarpon opertum*, the last recently described by David and Coppins (1997). *Thelocarpon laureri* is also known to grow rarely on calcareous or alcaline stones. *Thelocarpon* species, being relatively living short, are little affected by air pollution. In the Czech Republic they are for this reason distributed even in suburban areas heavily polluted by sulphur dioxide and its derivatives.

Thelocarpon epibolum, T. lichenicola and *T. superellum* can be found in similar types of habitats which are shaded and wet for a long time. The organic substrata which they colonize, can be found mostly in a more advanced state of

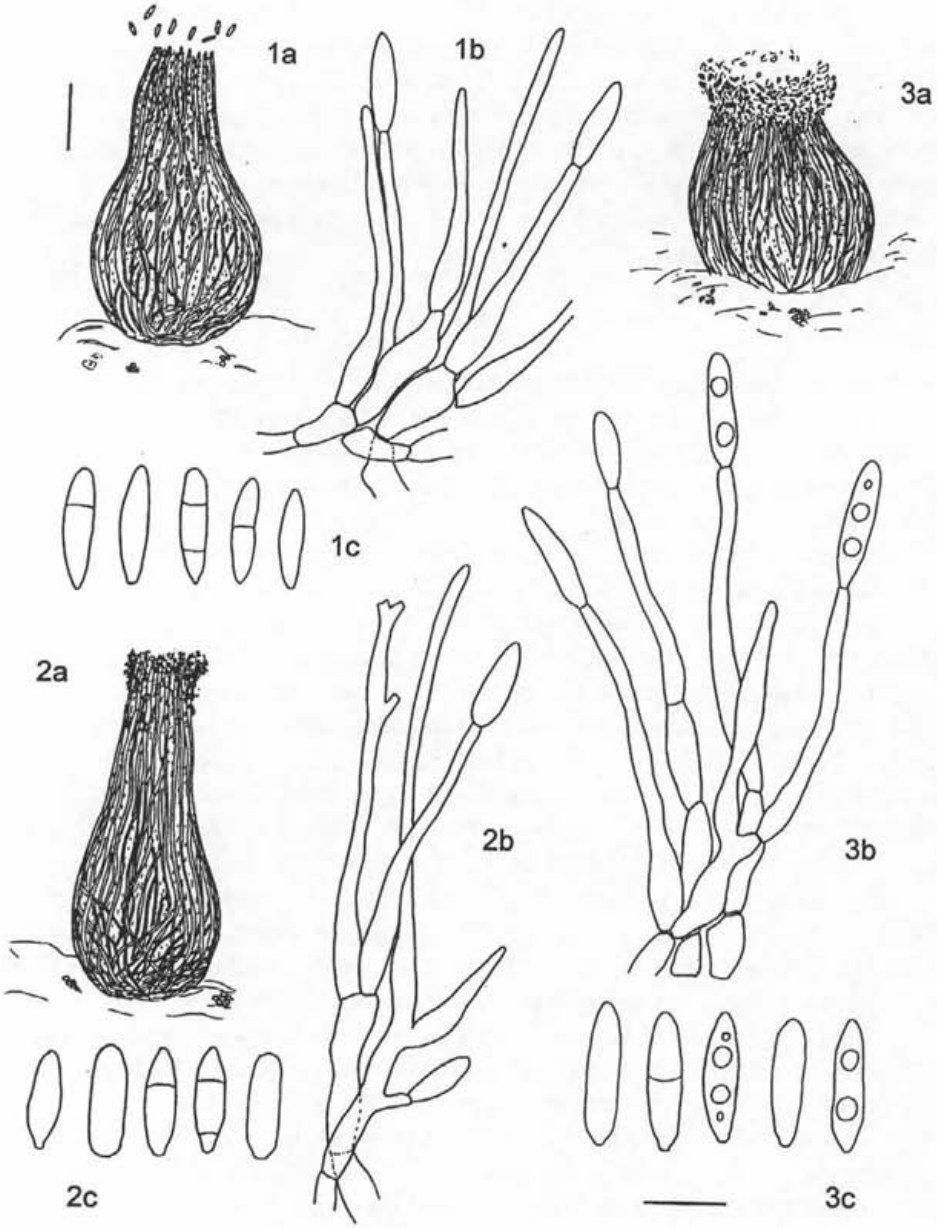


Fig. 1. *Thelocarpon. epibolum* var. *epibolum.* – **Fig. 2.** *Thelocarpon intermediellum.* – **Fig. 3.** *Thelocarpon lichenicola.* **Figs 1–3.** (a) pycnidium. Scale = 20 μm. (b) conidiophores and (c) conidia. Scale = 5 μm.

destruction, such as rotten or decaying wood. *T. laureri* rather occurs in more open habitats and on dry substrata and when on wood, than in an initial stage of destruction. *T. intermediellum* has intermediate requirements. *T. impressellum* and *T. olivaceum* were not collected by us and for that reason we hesitate to estimate their ecological requirements without personal observations. A rather more frequent occurrence of *T. epibolum* and *T. lichenicola* on some lichen hosts shows a certain ability to take up additional nutrients from a host thallus. *Thelocarpon epibolum* var. *epibolum* was found parasitic on thallus squamules of *Omphalina hudsoniana.*

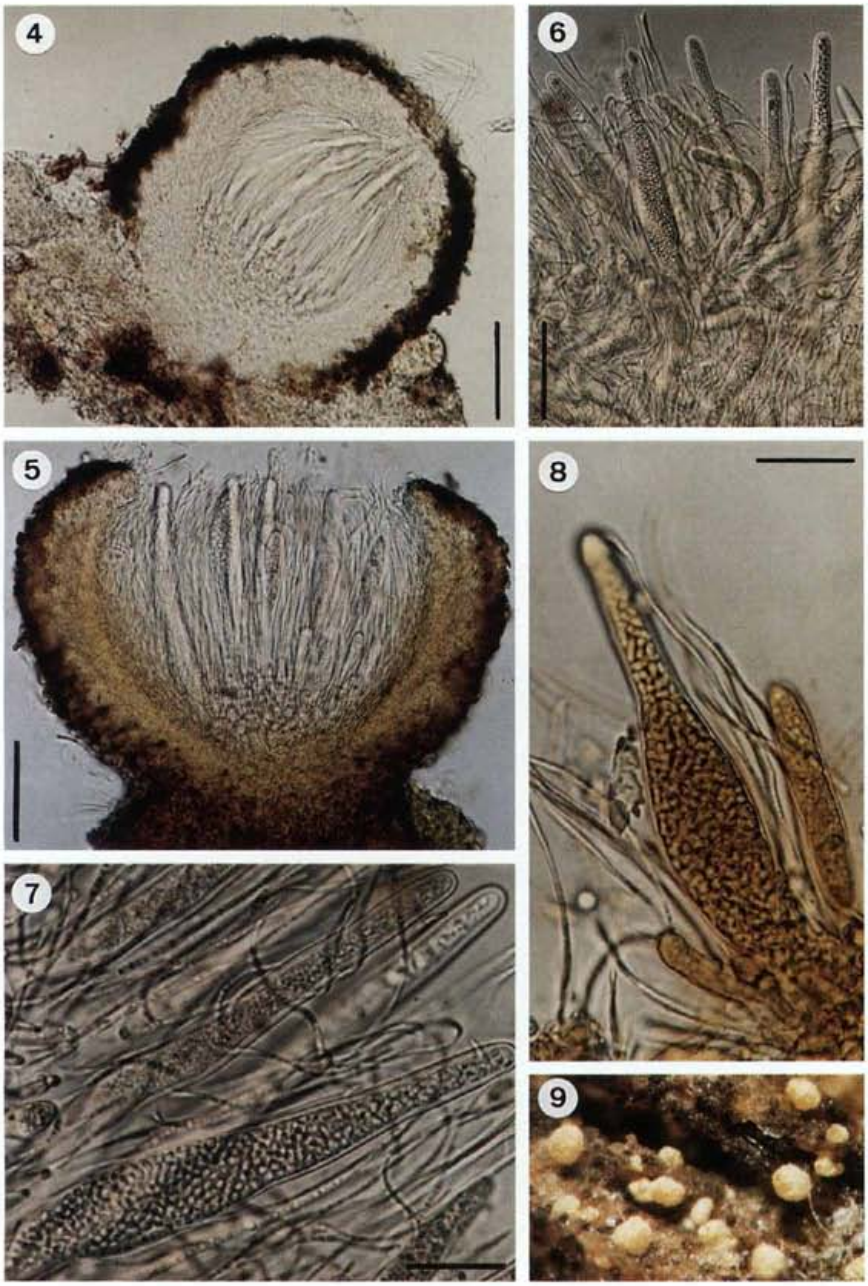
Pycnidia

Because earlier diagnoses of this genus and of all its species discussed here were already provided in detail several times before (Magnusson 1935, Salisbury 1966, 1974, Purvis and al. 1992), we insert only the description of newly discovered pycnidia and a key for easily orientation. Characteristic features of several species are shown in the Figs. 1–22.

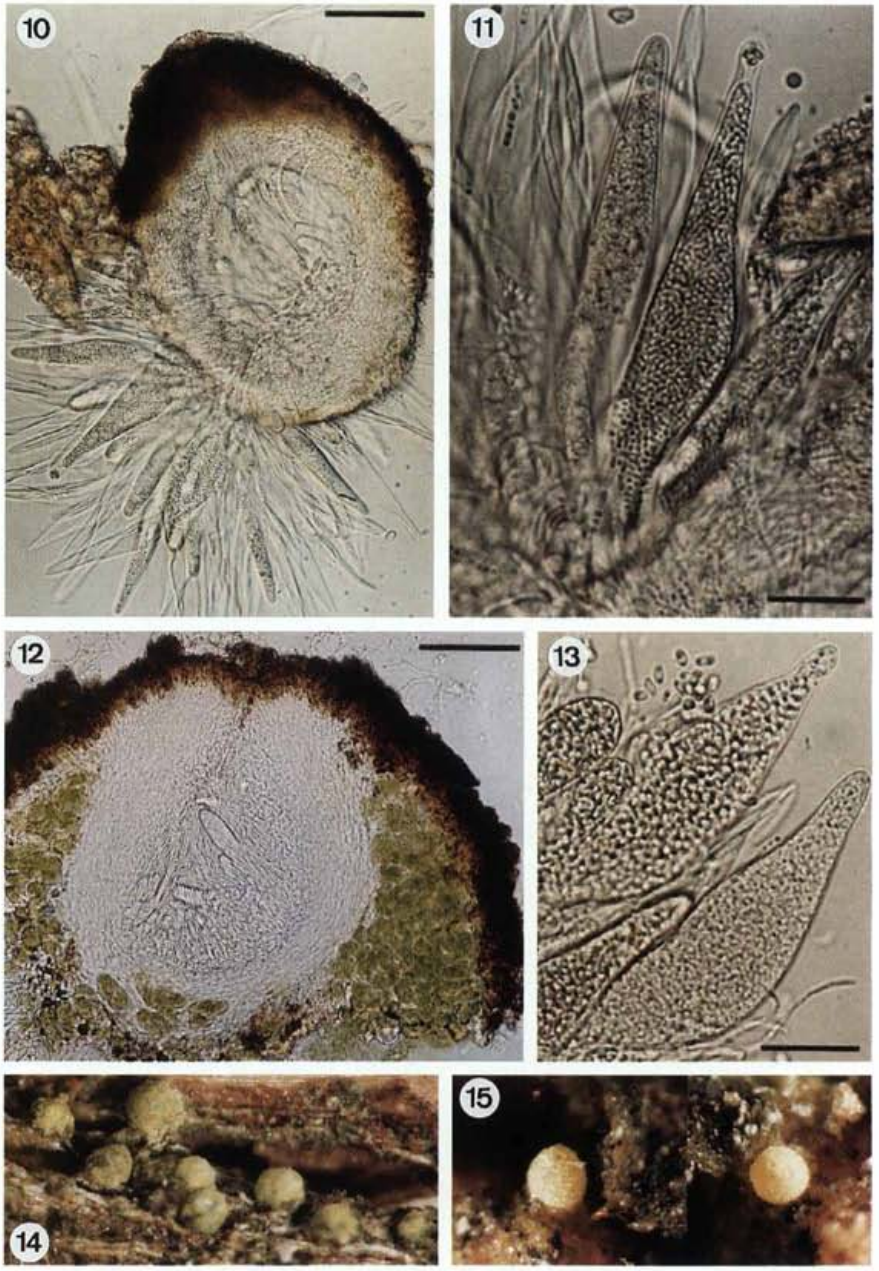
The occurrence of pycnidia within the genus *Thelocarpon* is very rare. Until now they have been known to occur only in *T. albidum, T. olivaceum* and *T. robustum*. The first note about pycnidia was provided for *T. olivaceum* by Magnusson (1936: 296 under *T. intermediellum*), according to a single observation of them on Phillips's collection made on old leather in Salop near Shrewsbury in 1873. This specimen should be deposited in Nylander's herbarium under No. 4127b. Salisbury (1966: 186) later revised probably another part of this collection possibly kept as a separated specimen, marked in Nylander's herbarium No. 4127e. He identified the species as *T. olivaceum*. Because he did not observe any pycnidia in this nor in anyother specimens, he provided only the description given already by Magnusson. A more detailed description of pycnidia is provided by Salisbury for *Thelocarpon albidum*. The origin of observed microconidia in *Thelocarpon robustum* was not traced either by Magnusson nor by Salisbury. A diagnosis of pycnidia for *Thelocarpon olivaceum* is also given by Purvis and al. (1992).

During the revision of several specimens of *Thelocarpon olivaceum* made by collectors in the Czech Republic and material from the Munich herbarium (M), we did not found any pycnidia in this species. However, we discovered pycnidia in *T. epibolum, T. intermediellum* and *T. lichenicola*. Since both *T. albidum* and *T. olivaceum* seem to form conidiomata and conidia of somewhat different form than in our species, a detailed description and drawings of our finds are provided.

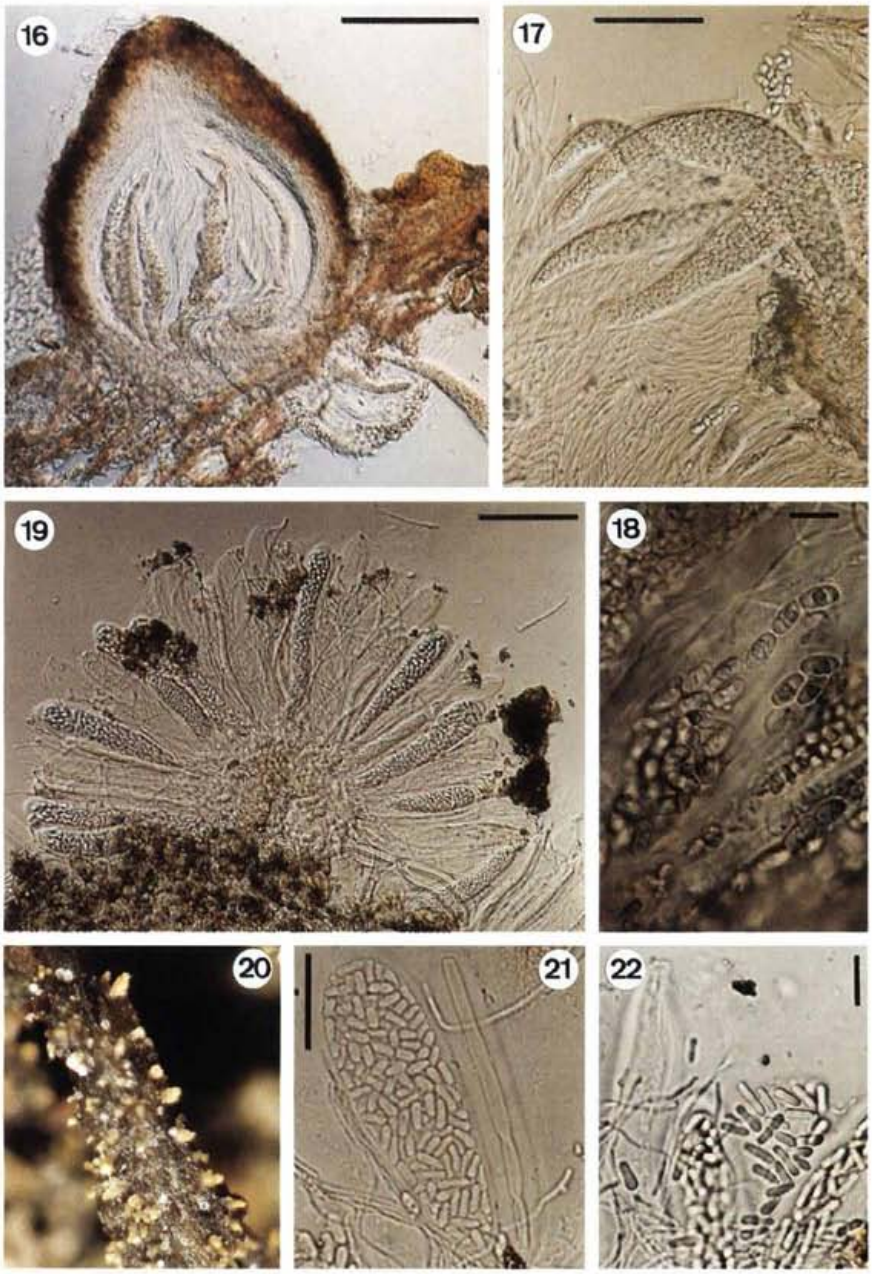
The pycnidia of *Thelocarpon albidum* are described by Salisbury as immersed in the thallus verrucae, irregularly shaped, up to 100 μm across, with conidiophores 25 μm long, up to 2 μm thick at base, tapering towards apex, simple; microconidia are produced apically, oblong, 3–3.5 × 1 μm, colourless, simple.



Figs 4–9. *Thelocarpon epibolum* var. *epibolum*. – **4.** Longitudinal section through immature ascoma. – **5.** Slightly squashed longitudinal section through mature ascoma showing also associated algae at the base. – **6–7.** Mature asci with ascospores and simple paraphyses as long as asci or longer. – **8.** Asci in Lugol's solution showing a typical red reaction of gel matrix. – **9.** Group of ascomata on rotten wood (× 48). (Figs 4–7. Scale = 50 μm; Figs 7–8. Scale = 20 μm; Figs 4–7. Water preparations.).



Figs 10–11. *Thelocarpon intermediellum*. – **10.** Vertical section of ascoma without paraphyses showing prolapsed asci. – **11.** Asci and ascospores. **Figs 12–14.** *Thelocarpon laureri*. **12.** Vertical section of ascoma with algal sheath present. – **13.** Flask-shaped asci and branched paraphyses shorter than asci. **14.** Group of ascomata on withered rests of grass (× 48). **15.** *Thelocarpon superellum*. Ascomata on soil (× 48,5). (Figs 10, 12. Scale = 50 μm; Figs 11, 13. Scale = 20 μm. All preparations in water.)



Figs 16–18. *Thelocarpon superellum*. – **16.** Longitudinal section through ascoma. – **17.** Asci and simple paraphyses. – **18.** Ascospores with occasionally developed pseudoseptum. Scale = 10 μm. – **Figs 19–22.** *Thelocarpon lichenicola*. – **19.** Squash preparation of ascoma. – **20.** Pycnidia in algal layer covering dead plant of *Sphagnum* (× 35) – **21.** Mature ascus with ascospores in squash preparation. Scale = 20 μm. – **22.** Ascospores. Scale = 10 μm. (Figs 16. Scale = 100 μm; Figs 17, 19. Scale = 50 μm. All preparatons in water.)

Thelocarpon olivaceum should form pycnidia sited in the algal sheath of the perithecial wall, and are globose, only 35 μm in diam., wall colourless; microconidia 4.5–5 × 1 μm. No conidiophores were described.

While the pycnidia of *T. lichenicola* were observed rather frequently (see the list of localities), pycnidia of *T. epibolum* and *T. intermediellum* were seen only in single collections.

Conidiomata of *Thelocarpon lichenicola* (Fig. 3a-c):

Conidiomata pycnidia, standing solitarily, dispersed to more or less close together, intermixed with ascomata, sessile, only with their bases slightly immersed in the algal film, sometimes rising from the base of apothecia, obpyriform or lageniform (flask-shaped), with a clearly narrower part below rounded ostiolum, hyaline to pellucid yellow in the lower part and clearly yellow pruinose towards the top, most intensively around the ostiolum; 75–120 μm tall, 50–85 μm wide, in the narrowest part below the ostiolum 0.2–0.4 mm wide. Wall composed of a textura intricata. Conidiophores simply or rarely branched, erect, in the lower part widened and ampuliform up to 2 μm, about 1.5 μm wide in upper part, 22–40 μm long. Conidia holoblastic, solitary, acrogenous, aseptate, rarely 1-septate, hyaline; amerospores oblong to fusiform, with narrower, slightly truncate base, guttulate, 6.5–8 × 1.8–2.1 μm in diam.

Apothecia and pycnidia occur very frequently in the below mentioned specimen of *T. lichenicola* from Hůrecká slať in the Šumava Mts. While the pycnidia are mature, only unmature asci were observed in apothecia.

Pycnidia of *Thelocarpon epibolum* (Fig. 1a-c) differ in having a less narrowed part below the ostiolum, hyaline walls, size 75–105 × 40–60 μm; conidiophores formed only simply, 15–25 μm; conidia aseptate to 2-septate, fusiform, with very slightly indicated truncate base, aguttulate, 5–7 × 1.2–1.6 μm. The pycnidia of *Thelocarpon intermediellum* (Fig. 2a-c) are hyaline or pellucid yellow, with a much less distinct pigmentation of the upper part than in *Thelocarpon lichenicola*, 105–165 × 45–80 μm; conidiophores branched, 18–45 μm; conidia 0–2-septate, oblong to fusiform, aguttulate, conidia fusiform, 4.5–6.5 × 1.1–1.8 (-2.1) μm.

Key to the Czech species:

Paraphyses absent 2
Paraphyses present 4
2 Algal sheath absent or rudimentary, spores oblong, slightly constricted ..... *T. intermediellum*
Algal sheath present, spores oblong-ellipsoid 3
3 Spores (2-)2.5–3.5(-4) × 1.5–2 μm ..... *T. olivaceum*
Spores (6-)7–9(-10) × 3–3.5 μm ..... *T. pallidum*
4 Paraphyses branched 5

Paraphyses simple 6
5 Algal sheath present, one globose apothecium developed in the thallus verruca ..... *T. laureri*
Algal sheath absent, apothecia cylindrical or widened at apex .. *T. lichenicola*
6 Asci I– spores oblong ..... *T. epibolum*
Asci I+ blue 7
7 Asci I+ dark blue, hymenial jelly I+ red, apothecia obpyriform, spores (6-)8–13 × 2.5–6 μm, pseudosepta usually present ..... *T. superellum*
Asci I+ pale blue, hymenial jelly I+ red, apothecia depressed above, spores 6–8 (-11) × 4–4.5 μm, pseudosepta absent ..... *T. impressellum*

Thelocarpon epibolum Nyl. var. **epibolum** (Figs 1, 4–9, 23)

Thelocarpon epibolum var. *epibolum* occurs in rather moist and shaded habitats for example in stream valleys, in peat bogs or near springs. Although the species is considered rather mountainous (Poelt and Vězda 1977), recent collections in the Czech Republic equally cover all altitudes between 190–1360 m above sea level, from the lowlands to the mountains. It was found on a wide range of substrata including soil, more or less rotten wood mostly of broad leaved trees, plant debris, peat (*Sphagnum girgensohnii*), basidiocarps (*Fomes fomentarius*) and thalli of lichens (*Baeomyces rufus, Peltigera* spec., *Omphalina hudsoniana* and *Verrucaria*). The most common substratum seems to be rotten wood. No collection was made directly on stone. Only a single collection was made on an immersed pebble, although on the thallus of an unidentified *Verrucaria* species.

In all Czech specimens *Thelocarpon epibolum* collected on thallus squamules of *Baeomyces rufus* was found to occur together with *Arthrorhaphis grisea*. *Arthrorhaphis grisea* is a parasitic species, which kills the fungus in *Baeomyces rufus*, takes over its alga and forms eventually its own thallus. This observation was recently published by Obermayer in his monography of the genus *Arthrorhaphis* (1994) and it also confirmed the observation that we made while searching for *Thelocarpon* species of *Baeomyces* thalli. Because *Thelocarpon epibolum* was also found to strongly damage host thalli of *Baeomyces rufus* in other revised specimens where *Arthrorhaphis grisea* was not present, the relation between both parasites when occurring together is not clear to us. Squamules of *Omphalina hudsoniana* in both Czech and Slovak specimens were also heavily affected. Therefore we consider *Thelocarpon epibolum* a parasite when lichenicolous. Additionally, the same observations were made when it was overgrowing algae of the genus *Coccomyxa*.

No occurrence of *T. epibolum* var. *epithallinum* (Leight. ex Nyl.) G. Salisb. distinguished by longer spores was established in the Czech Republic, although it was found in the Slovak Republic.

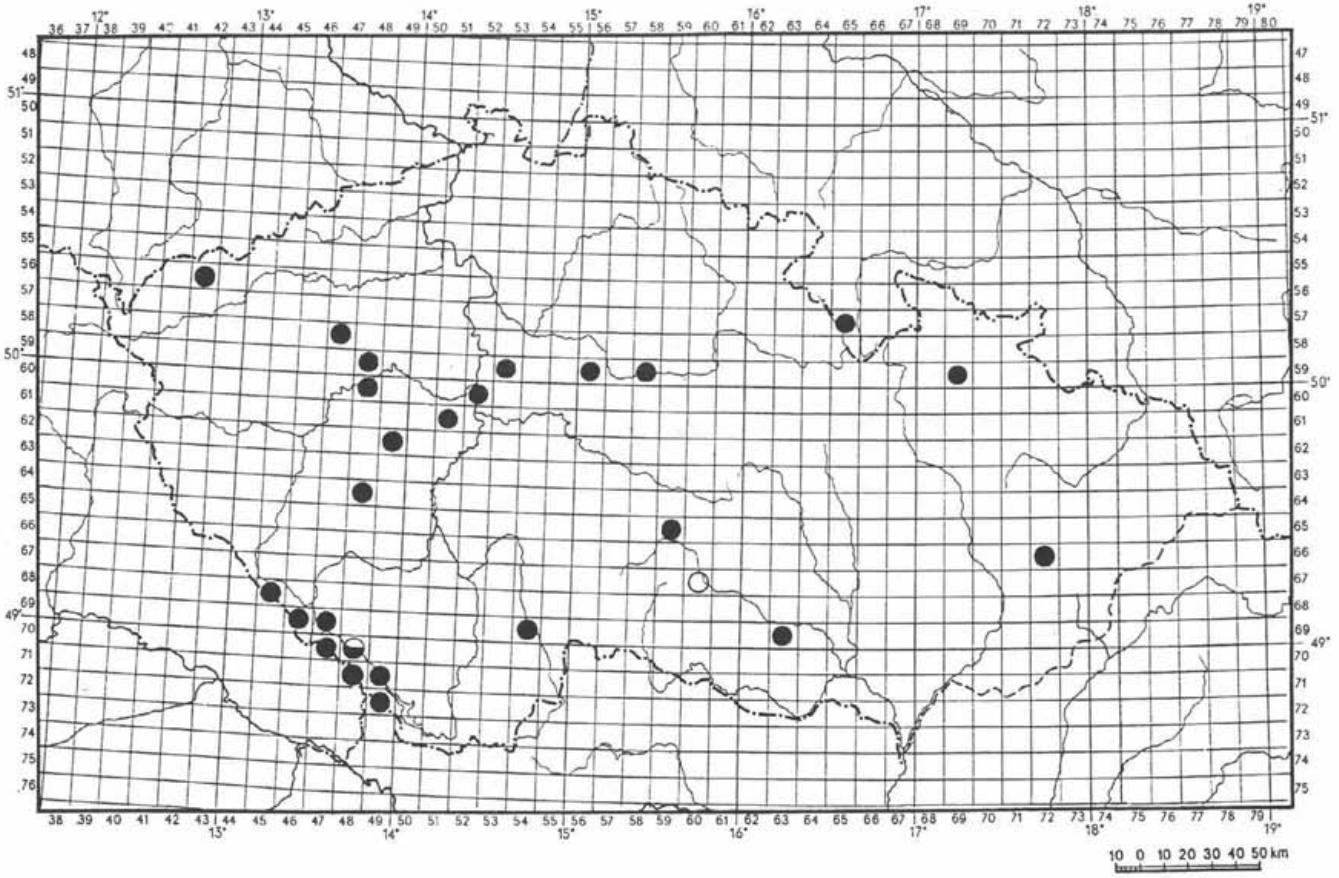


Fig. 23. Distribution of *Thelocarpon epibolum* Nyl. var. *epibolum* in the Czech Republic.

Table 1
Species of lichens and bryophytes accompanying *Thelocarpon epibolum* according to substrata.

substrata	rotten wood	soil	peat	Baeomyces rufus	saxicolous	Fomes fomentarius
lichens	*Absconditella* sp. *Cladonia* sp. *Lepraria* sp. *Micarea prasina* *Placynthiella icmalea* *Steinia geophana* *Thelocarpon lichenicola* *Vezdaea* sp.		*Omphalina hudsoniana* *Thelocarpon lichenicola*	*Arthrorhaphis grisea* *Belonia incarnata* *Bryophagus gloeocapsa*		*Lecania cyrtella*
bryophytes	*Cephalozia bicuspidata* *Cephalozia lunulifolia* *Chiloscyphus profundus* *Hypnum cupressiforme* *Tetraphis pellucida*	*Cephalozia bicuspidata* *Pogonatum aloides* *Pohlia nutans*	*Sphagnum girgensohnii*	*Dicranella heteromalla* *Nardia scalaris*	*Bryum caespiticium* *Ceratodon purpureus*	
algi	*Coccomyxa* sp.		*Coccomyxa* sp.			

Accompanied lichens and bryophytes observed in the Czech localities are the following species of cryptogams growing in the close vicinity of our species. The most frequently observed were *Micarea prasina*, *Placynthiella icmalea, Chiloscyphus profundus, Hypnum cupressiforme* and *Coccomyxa* sp. All species are listed in the Table 1 according to substrata.

Thelocarpon epibolum is reported for the first time from the Czech Republic, but it has been collected in many localities. All the collections concern recent finds with the exception of two earlier finds made by Suza in 1919 and Svrček in 1970.

Specimens examined:

CZECH REPUBLIC: Western Bohemia, Krušné hory Mts., Distr. Karlovy Vary, Nejdek, on slope of the hill Blatenský vrch, near Vlčí jámy ice pits, on stump of *Picea abies*, 1000 m, 5642; 24.6.1993, coll. J. H. (PRM 890489). – Šumava Mts., Distr. Klatovy, Železná Ruda, in glacier cirque of lake Černé jezero – central part, moist siliceous pebbles on the ground, on thallus of *Baeomyces rufus*, about 1200 m, 6845; 11.10.1995, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Klatovy, Modrava, forest track leading through the peat bog Mlynářská slať, on

thallus of *Baeomyces rufus*, 1050 m, 6946; 28.6.1995, coll. Z. Palice (hb. Palice). – Brdy Mts., Distr. Plzeň-South, Míšov, near nature reserve Míšovské buky, by forest track, on decaying wood of *Picea abies*, 750 m, 6448; 12.12.1997, coll. J. Kocourková, Z. Pouzar, Š. Bayerová (PRM 891906). – Central Bohemia, Distr. Rakovník, Přílepy, at a house on old wooden beams, 340 m, 5847; 7.9.1997, coll. J. K. (PRM 891409). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, about 3.5 km SE of Rakovník, near the village of Dolní Chlum, by railway, on a moist granite stone, 5948; 300 m, 3.1.1998, coll. J. K. and P. K. (PRM 891900). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, Skryje, close by the confluence of the brooks Ostrovecký potok and Houpačkový potok, on a fallen decaying trunk of *Picea abies*, together with *T. lichenicola* and *Vezdaea* sp., 449 m, 6048; 21.6.1997, coll. J. K. (PRM 890834). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, nature reserve Týřov, valley of the Úpořský stream, near the confluence of the brooks Úpořský potok and Prostřední potok, on decaying wood, 285 m, 6048; 25.5.1997, coll. J. K. (PRM 890833). – Brdy Mts., Distr. Příbram, Jince, near Ohrazenice, on rotten stump, 550–600 m, 6249; 21.2.1998, coll. Š. Bayerová (hb. Bayerová). – Hřebeny Mts., Distr. Prague-West, Řevnice, on slope of Hvíždinec hill, in forest, on stump, about 400 m, 6151; 3.11.1996, coll. Š. Bayerová and O. Lopata (hb. Bayerová). – Prague, Komořany, right bank of the Vltava river, near railway station, rotten fallen trunk of *Populus nigra*, 190 m, 6052; 16.11.1996, coll. J. Horáková (PRM 890446). – Prague, Uhříněves, in the reserve near a brook, on top of stump, 280 m, 5953; 4.10.1995, coll. J. H. (PRM 887013). – Distr. Kolín, Veltruby, valley of the Labe river, in the floodplain forest "Veltrubský luh", on decaying wood, 190 m, 5956; 26.5.1995, coll. Z. Palice, det. J. H. (hb. Z. Palice.). – Southern Bohemia, Šumava Mts., Distr. Prachatice, Kvilda, in peat bog between the nature reserve Jezerní slať and the stream Hamerský potok, on *Baeomyces rufus*, together with *Arthrorhaphis grisea*, 990 m, 6947; 2.10.1990, coll. J. H. (PRM 887014). – Šumava Mts., Distr. Prachatice, Kvilda, 1 km SE of the village Kvilda, right bank of the Vltava river, on mosses on rocks, 1000 m, 6947; 13.6.1997, coll. Š. Bayerová and Z. Palice, det. Z. Palice (hb. Palice). – Ibid.: on *Sphagnum magellanicum* on squamules of *Omphalina hudsoniana*, 6947; 13.6.1997, coll. Š. Bayerová (hb. Bayerová, together with *T. lichenicola*). – Šumava Mts., Distr. Prachatice, near of the source of the Vltava river, on overhangs by a forest track, on thallus of *Baeomyces rufus*, 1170 m, 7047; 5.5.1993, coll. J. H. (PRM 887015). – Šumava Mts., Distr. Prachatice, in the peat bog "Velká Niva" near Lenora, on trunk of *Betula*, on upper side of basidiocarp of *Fomes fomentarius*, together with *Lecania cyrtella* (Ach.) Th. Fr., 750 m, 7048; 6.9.1970, coll. M. Svrček, det. J. H. (PRM 716208). – Šumava Mts., Distr. Prachatice, Mt. Stožec, nature reserve "Medvědice", rotten fallen trunk of?*Fagus*, about 900 m, 7148; 5.7.1994, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Nové Údolí, valley of the Světlá brook, about 2 km ENE of Mt. Kamenná, on bark of

Sambucus racemosa, 850 m, 7148; 3.6.1995, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, in the village Černý Kříž, yard of gameskeeper's lodge, on wood, 745 m, 7149; 10.1996, coll. and det. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Nová Pec, in glacier cirque of lake Plešné jezero, rock wall in central part, on debris of *Sphagnum girgensohnii*, on algal crust of *Coccomyxa*, about 1300 m, 7249; 15.8.1995, coll. Z. Palice (hb. Palice). – Ibid.: Plešné jezero lake, near bank, on semi-immersed wood, 7249; 1090 m, 11.7.1997, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Nová Pec, Mt. Plechý, climax spruce forest, on dry stump of *Picea*, 1360 m, 7249; 1.10.1995, coll. Z. Palice (PRM 891903, hb. Palice). – Distr. Jindřichův Hradec, Třeboň, between Lomnice nad Lužnicí and Lužnice, near research station of Botanical Institute of Academy of Science, on rotten wood, 420 m, 6954; 22.5.1997, coll. Z. Palice (hb. Palice). – Eastern Bohemia, Distr. Pardubice, Chvaletice, sedimentation basin near power station c. 1 km E of the village, on immersed pebble, on thallus of *Verrucaria* sp., 220 m, 5958; 14.2.1997, coll. Z. Palice (hb. Palice). – Orlické hory Mts., Distr. Rychnov nad Kněžnou, valley of the Divoká Orlice river, Podlesí, at a forest margin, in denudated roadside verges, on soil, on *Baeomyces rufus* together with *Arthrorhaphis grisea*, 550 m, 5765; 19.4.1996, coll. Z. Palice (hb. Palice). – Western Moravia, Distr. Jihlava, below summit of Vysoký Kámen hill, on upper surface of rotten stump, 640 m, 6559; 14.10.1996, coll. Š. Bayerová (hb. Bayerová). – Distr. Třebíč, between the villages Heraltice and Opatov, in ditch by roadside, on soil, about 600 m, 6760; 2.8.1919, coll. J. Suza, det. J. H. (PRM 587610). – Northern Moravia, Hrubý Jeseník Mts., Distr. Bruntál, Malá Kotlina valley, by the brook Kotelný potok, on an old rotten stump, about 900 m, 5969; 12.7.1989, coll. J. H. (PRM 887016). – Eastern Moravia, Hostýnské vrchy Mts., Distr. Zlín, Košovy, Mt. Sochová, below the top, on a rotten fallen trunk, c. 700 m, 6672; 14.5.1995, coll. J. H. (PRM 891899). – Southern Moravia, Distr. Znojmo, Moravský Krumlov, Tábor hill, above the left bank of the Rokytná river, xerothermic slope, on dying lichens of *Peltigera* sp., 350 m, 6963; 19.5.1996, coll. Z. Palice (hb. Palice).

SLOVAK REPUBLIC: Northern Slovakia, High Tatra Mts., valley Temnosmrečinová dolina, near the lake Vyšné Temnosmrečinovské pleso, on *Omphalina hudsoniana*, 1720 m, 22.9.1993, coll. J. Horáková and V. Alstrup (PRM 889695). – Central Slovakia, Carpathians, Muránska planina plateau, Hrdzavá valley, peat bog "V machoch", on upper surface of rotting stumps, 760–800 m, 22.9.1995, coll. Z. Palice and Š. Bayerová, det. Z. Palice (hb. Palice).

Thelocarpon epibolum var. **epithallinum** (Leight. ex Nyl.) G. Salisb.

The collection was already mentioned by Alstrup (1996) together with other lichenicolous fungi collected during field studies of the Bryological-Lichenological

Section of the Czech Botanical Society in the High Tatra Mts. in 1993. If any specimen of this large-spored variety was earlier collected in the Slovak Republic, all lichenicolous finds of *Thelocarpon epibolum* would have to be revised. The occurrence of this taxon in relation to its substrate was more extensively discussed by Ahti (1973). The infected thalli of *Peltigera aphtosa* were not found damaged.

SLOVAK REPUBLIC: Northern Slovakia: High Tatra Mts., valley Temnosmrečinovská dolina, near the lake Vyšné Temnosmrečinovské pleso, on thalli of *Peltigera aphtosa*, 1720 m, 22.9.1993, coll. J. Horáková and V. Alstrup (PRM 889693).

***Thelocarpon impressellum** Nyl. (Fig. 27)

The only specimen known in the Czech Republic is the one collected by A. Vězda and revised by Poelt and Hafellner (1975). No find was made by A. Vězda and me during our visit of this only Czech locality in autumn 1997. Recently the species was found for the first time in the Slovak Republic, in the West Tatra Mountains. The find was made under very humid conditions on wooden trunks in the brook. The finds were made in quite different habitats. No accompanied species were found in neither of specimens.

Specimens examined:

CZECH REPUBLIC: Western Moravia, Distr. Blansko, Tišnov, near Deblín, at margin of forest by a road, on soil, 400 m, 6664; 1974, coll. A. Vězda, (GZU).

SLOVAK REPUBLIC: Western Slovakia, the West Tatra Mts., Oravice, valley Juráňova dolina, on a rotten trunk lying in a tributary of the brook Juráňový potok, 960 m, 6784; 1.6.1990, coll. J. Horáková (PRM 887017).

Thelocarpon intermediellum Nyl. (Figs 2, 10–11, 24)

This species appears to be quite common, but is probably much overlooked. There is one old published record of this species collected on sandstone at Vidoule in Prague (Servít 1930: 31 as *T. intermixtulum*). Unfortunately, the specimen is probably lost, although it should be deposited in Servít's collection in the PRM herbarium. It was neither found in the PRC herbarium, where some of Servít's earlier collections are situated. All the other Czech and Moravian recent collections were made between 1994–1997. The species is at present known from 16 localities in the Czech Republic.

The species occurs at altitudes from the lowlands to the mountains. It has often been collected at the margin of forests or in light deciduous forests. Rotten wood of trunks or stumps of broad-leaved trees was found to be the most common substratum of this species, found in association with *Micarea* species, *Placynthiella icmalea* and algae. A pine stump, peat, siliceous stones and the basidiocarp of

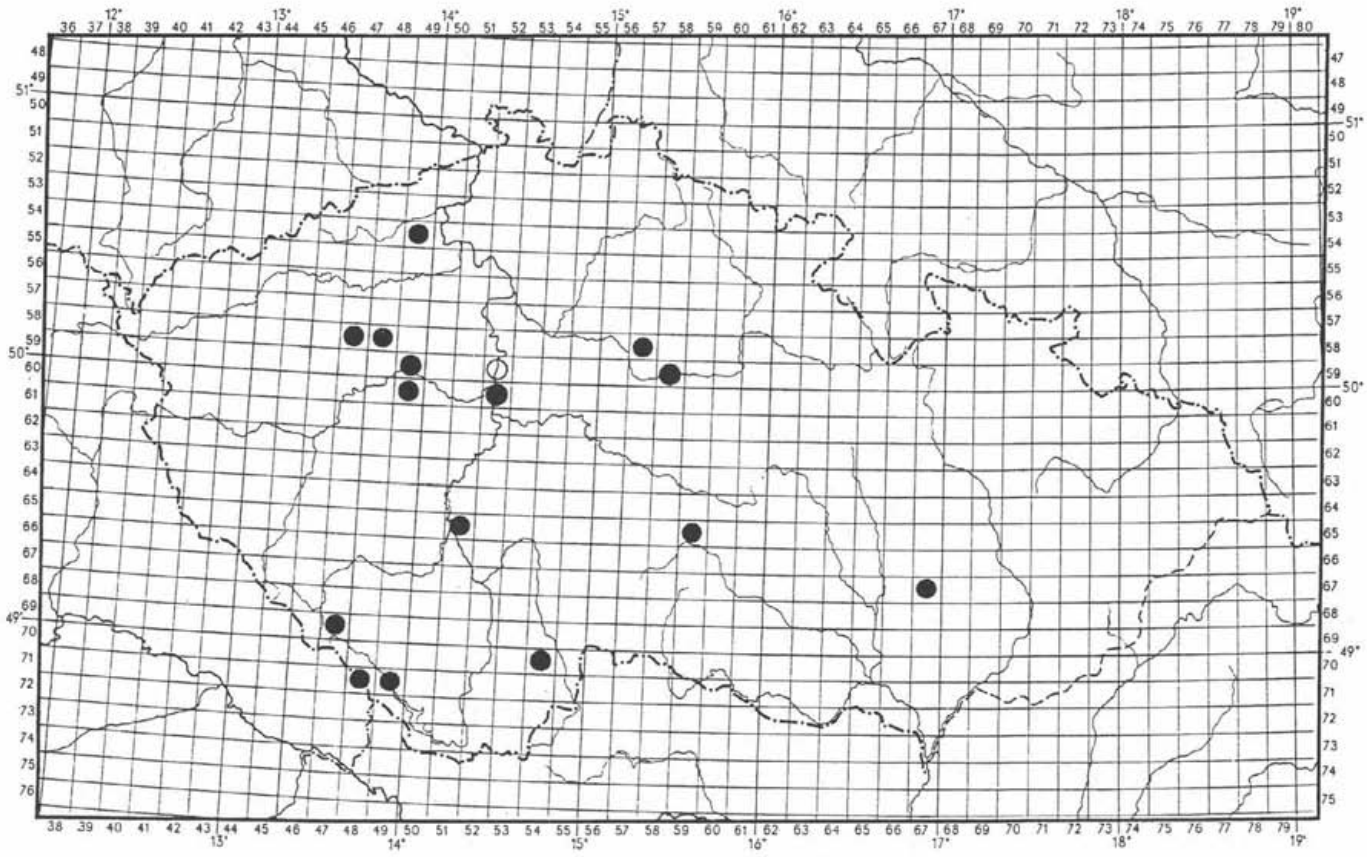


Fig. 24. Distribution of *Thelocarpon intermediellum* Nyl. in the Czech Republic.

Table 2
Species of lichens and bryophytes acompanying *Thelocarpon intermediellum* according to substrata.

substrata	rotten wood	soil	peat	saxicolous	Fomes fomentarius
lichens	*Chaenotheca sp.* *Cladonia sp.* *Hypogymnia physodes* *Lepraria sp.* *Lecanora conizaeoides* *Micarea denigrata* *Micarea prasina* *Placynthiella icmalea* *Placynthiella uliginosa*	*Micarea melaena* *Placynthiella icmalea*	*Cladonia digitata* *Placynthiella icmalea*		
bryophytes		*Ceratodon purpureus* *Tetraphis pellucida*		*Hypnum cupressiforme*	*Hypnum cupressiforme*

Fomes fomentarius were recorded as less common other substrata. One collections was made on a corroded plate of iron, on an algal layer. Accompanied species growing in the close vicinity of *Thelocarpon intermediellum* are given in Table 2.

Pycnidia of *Thelocarpon intermediellum* were discovered at the revision of specimens collected by Z. Palice in the Šumava Mts.

Specimens examined:

CZECH REPUBLIC: Western Bohemia, Šumava Mts., Distr. Klatovy, Zhůří, valley of the brook Pěnivý potok, on vertical side of old stump, growing together with *Chaenotheca* sp., about 750 m, 6947; 4.5.1995, coll. Z. Palice (hb. Palice). – Northern Bohemia, Distr. Litoměřice, České středohoří Mts., Mt. Milešovka, on lying trunk, on wood, 5449; 22.4.1995, coll. Z. Palice (hb. Palice). – Central Bohemia, Distr. Rakovník, Bedlno, 1 km SE of the village near quarry, on a fallen decaying trunk, 485 m, 5847; 4.3.1997, coll. J. H. (PRM 890484). – Distr. Rakovník, Olešná, in peat bog near the village, on peat among roots of fallen trunk, 350 m, 5848; 17.2.1996, coll. J. H. (PRM 887748). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, between Roztoky and Karlova Ves, valley of Klucná brook, on fallen decaying trunk, 310 m, 5949; 3.10. 1996, coll. J. H. (PRM 891902). – Distr. Beroun, 2 km SW of the village Nový Jáchymov, near brook Habrový potok, in glade close to a road, on lignum of stump of *Quercus*, 420 m, 6049; 23.3.1997, coll. J. H. (PRM 890491). – Distr. Prague, Vidoule, on knoll Vidoule,

on decalcified clay slate, 5952; 1920–1926, coll. Servít (PRM?, non vidimus!). – Distr. Prague, Radotín, near the busstop "U cementárny", on piece of wood on bare soil in a quarry, 230 m, 6052; coll. Z. Palice (hb. Palice). – Distr. Nymburk, Libice nad Cidlinou, flood plain forest "Libický luh", NE border of nature reserve, together with *Placynthiella icmalea*, about 190 m, 5857; 18.3.1995, coll. Z. Palice (PRM 887114, hb. Palice). – Southern Bohemia, Šumava Mts., Distr. Prachatice, on S slope of Mt. Stožec near the nature reserve Medvědice, on a rotting trunk (cf. *Fagus sylvatica*), about 800 m, 7148; 22.10.1994, coll. Z. Palice (hb. Palice). – Ibid.: on top of stump (*Picea abies*), about 880 m, 7148; 22.10.1994, coll. Z. Palice (hb. Palice). – Ibid.: near Stožecká kaple chapel, on rotting wood, 930 m, 7148; 26.1.1997, coll. B. Buryová and Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Černý Kříž, ca 200 m from the railway station in direction to České Budčjovice, in pine forest by railway, on top of a rotten pine stump, about 745 m, 7149; 3.12.1994, coll. Z. Palice (hb. Palice, with pycnidia!). – Šumava Mts., Distr. Prachatice, 3 km S of the village Černý Kříž, Mt. Srnčí vrch, in the nature reserve Jelení vrch, on wood of a fallen decaying trunk of *Fagus sylvatica*, about 850 m, 7149; 29.12.1994, coll. Z. Palice (hb. Palice). – Šumava Mts., Černý Kříž, in pine forest by the railway station, on peat, 740 m, 7149; 16.4.1995, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Černý Kříž, near the forest track Tovární cesta, c. 100 m from the forest track Hučicská cesta, siliceous stone overhang, 760–800 m, 7149; 16.12.1995, coll. Z. Palice (hb. Palice). – Distr. Písek, Zvíkovské Podhradí, above the right bank of the Vltava river, near the bridge, on slope in deciduous forest, on stump, about 400 m, 6551; 10.1996, coll. Z. Palice (hb. Z. Palice). – Distr. Jindřichův Hradec, Třeboň, nature reserve Stará řeka, on wood of *Quercus*, 435 m, 7054; 1.4.1997, coll. Z. Palice (hb. Palice). – Eastern Bohemia, Distr. Pardubice, Chvaletice, sedimentation basin near the power station c. 1 km E of the village, on bare soil, 220 m, 5958; 5.11.1995, coll. Z. Palice (hb. Palice). – Ibid.: on plate of corroded iron, 220 m, 5958; 14.4.1997, coll. Z. Palice (hb. Palice). – Western Moravia, Distr. Jihlava, on slope of the hill Vysoký Kámen, in pores of basidiocarp of *Fomes fomentarius*, 640 m, 6559; 14.10.1996, coll. J. H. (PRM 890493). – Southern Moravia, Distr. Vyškov, Olšany, in forest, on rotten stump, 500 m, 6767; 11.5.1996, coll. J. H. (PRM 887018).

Thelocarpon laureri (Flot.) Nyl. (Figs 12–14, 25)

Until the early seventies of this century, this species had been the only one known of the genus in the Czech Republic, except for an unverified specimen of *Thelocarpon intermediellum* collected by M. Servít and one unidentified specimen of *Thelocarpon epibolum* collected by Suza. This is the most common species of the genus.

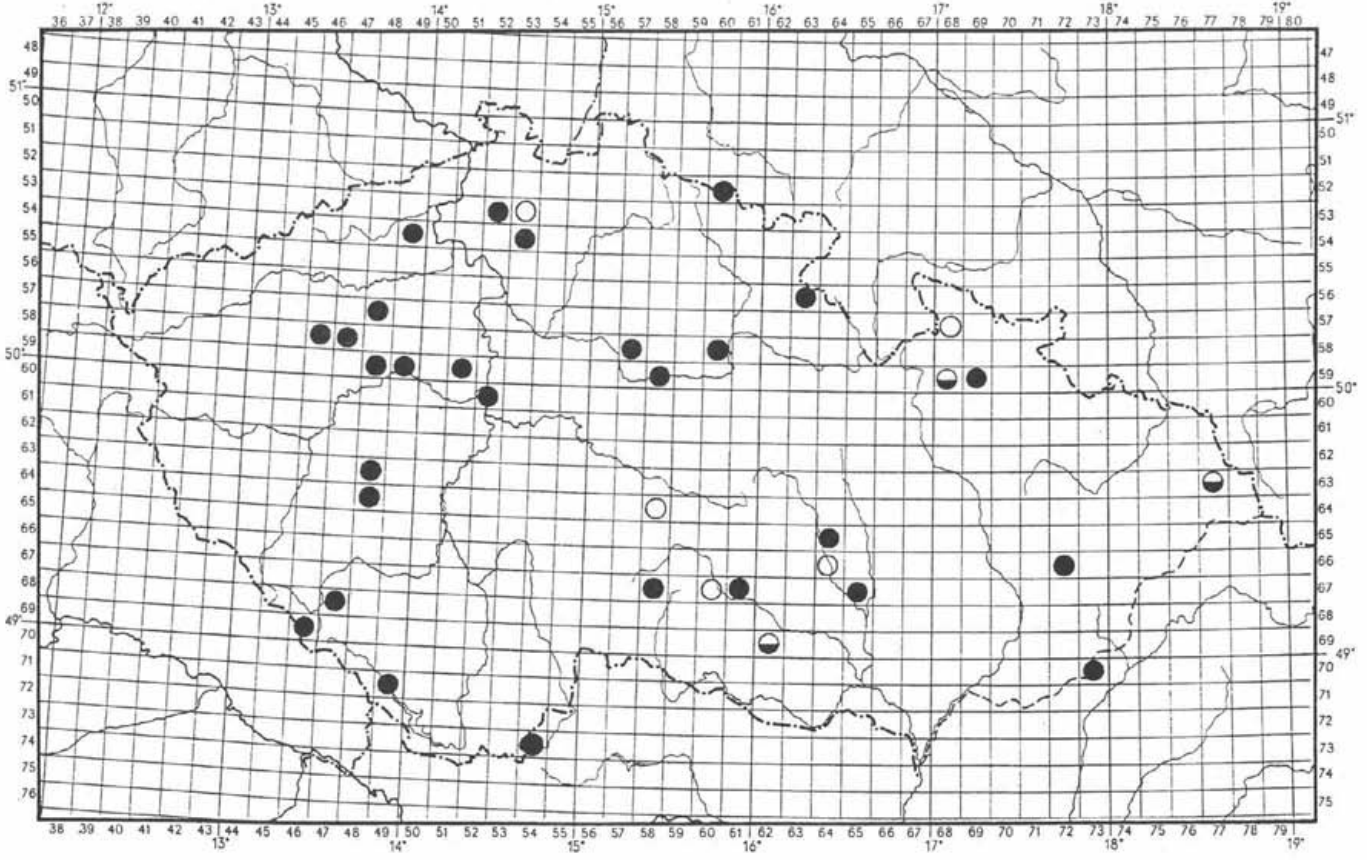


Fig. 25. Distribution of *Thelocarpon laureri* (Flot.) Nyl. in the Czech Republic.

Table 3.
Species of lichens and bryophytes acompanying *Thelocarpon laureri* according to substrata.

substrata	wood	soil	stones	plant debris
lichens	*Absconditella delutula* *Amandinea punctata* *Candelariella vitellina* *Candelaria concolor* *Hypogymnia physodes* *Lecanora conizaeoides* *Lecanora saligna* *Lepraria* sp. *Micarea denigrata* *Parmelia sulcata* *Placynthiella icmalea* *Trapeliopsis flexuosa*	*Steinia geophana*	*Acarospora* sp. *Candelariella vitellina* *Lecidea variegatula* *Micarea lithinella* *Trapelia involuta* *Trapelia* sp.	*Placynthiella icmalea* *Trapeliopsis flexuosa* *Trapeliopsis granulosa*
bryophytes	*Ceratodon purpureus*		*Cephaloziella divaricata*	

Unlike other species of the genus this one occurs rather in open sunny habitats. This phenomenon is probably caused by the photobiont sheath in its ascomawall as an adaptation to excessive exposition and following desiccation. *Thelocarpon laureri* grows on a wide range of substrata in initial states of succession as an rapid coloniser of substrata made or influenced by man, on tops of stumps, worked timber, on wooden fencing and also burnt wood, bricks, or on exposed bark of stumps and lying corticate trunks, often in dusty habitats, and in natural habitats on plant debris, pebbles, loose stones and boulders. The species was found in about 40 localities in different areas of the Czech Republic from the lowlands to mountainous situations.

Species of cryptogams found in the close vicinity of *T. laureri* are given below in the Table 3.

Exsiccata examined:

CZECH REPUBLIC: A. Vězda: Lichenes selecti exsiccati no. 1028 (PRM 721825). A. Vězda: Lichenes selecti exsiccati no. 1640 (PRM 820786, M 10631). J. Suza: Lichenes Bohemoslovakiae, no.164 (sub *T. prasinellum*; hb. Vězda, M 10608, PRC). H. Lojka: Lichenotheca Universalis, fasc. IV., no. 197 sub *T. epilithellum*, PRM 587592, 587594, 587596).

SLOVAK REPUBLIC: J. Suza: Lich. Bohemoslovakiae no. 44. – Southern Slovakia, Kremnica, on old roof, on shingles, about 500 m, 1927, coll. J. Suza (sub *T. prasinellum*; M 10609).

Kryptogamae exs. Vindobonenses no. 373. - Distr. Bratislava (Com. Posoniensis): ad ligna abietina, Sv. Jur (in St. Georgio), 5.1897, coll. Zahlbruckner. (sub *T. prasinellum* Nyl.; M 10666).

Additional specimens examined:

CZECH REPUBLIC: Western Bohemia, Šumava Mts., Srní, S of the village along the yellow marked tourist track, on a siliceous boulder, about 850 m, 6946; 26.6.1995, coll. Z. Palice (hb. Palice). – Šumava Mts., Rejštejn, on stump of *Populus tremula*, 600 m, 6847; 29.5.1989, coll. J. H. (PRM 887021). – Brdy Mts., Distr. Plzeň, near the village Nové Mitrovice, in Chynínské polesí forest, on pebbles on the ground among roots of a fallen tree, with *Steinia geophana*, c. 660 m, 6448, 15.10.1997, coll. Š. Bayerová, det. J. K. (hb. Bayerová). – Ibid.: in forest on the N slope of the hill Nad Maráskem, 675 m, 6448, 16.10.1997, coll. and det. Š. Bayerová. (hb. Bayerová). – Northern Bohemia, České Středohoří Mts., between the village Velemín and Mt. Milešovka, by path, on pebbles and wood, 5449; 22.4.1995, coll. J. Liška and Z. Palice (hb. Palice). – Distr. Česká Lípa, Kravaře, on stone in a wall, 280 m, 5352; 26.9.1995, coll. J. Horáková, A. Vězda and Z. Palice (PRM). – Distr. Česká Lípa, Zahrádky, on sandstone pebbles among *Calluna vulgaris* shrubs, 5353; 2.1921, coll. J. Anders (PRM?, non vidimus!). – Distr. Česká Lípa, near Jestřebí, in peat bog, on wood, 270 m, 5453; 28.9.1995, coll. J. H. (PRM 890492). – Central Bohemia, Distr. Rakovník, Bedlno, on S slope of the hill Tobiášův vrch, on pebbles on the ground among roots of a fallen tree, 485 m s.m., 5846; 19.3.1997, coll. J. H. (PRM 890486). – Distr. Rakovník, Bedlno, on top of Tobiášův vrch hill, on a fallen trunk, 500 m, 5846; 19.3.1997, coll. J. H. (PRM 890487). – Distr. Rakovník, Bukov, foot of the hill Liščí vrch, on a gneissaceous boulder, 390 m, 5847; 1.5.1996, coll. J. H. (PRM 890488). – Distr. Rakovník, Přílepy, at a house, on old wooden beams, together with *Absconditella delutula*, 340 m, 5847; 3.9.1995, coll. J. H. and P. K. (PRM 887746, 887750). – Ibid.: 31.3.1997, coll. J. H. and P. K. (PRM 890824). – Distr. Rakovník, Kněževes, in garden, on stump of *Tilia* sp., 375 m, 5847; 8.4.1996, coll. J. H. and P. K. (PRM 891901). – Distr. Rakovník, near the railway station Mutějovice – Černá hora, on charred stump of *Fagus sylvatica* and on a dead basidiocarp of *Trametes versicolor*, ca 500 m, 5748; 27.1.1995, coll. J. H. (PRM 887751, 887024). – Distr. Rakovník, Kozojedy, Pochválovská stráň, on slope of the hill Dřevíč, on soil by forest track, on withered plant debris, 360 m, 5748; 17.3.1996, coll. J. H. and P. K. (PRM 887749). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, 1.5 km NE of the village Hracholusky, on bark of a stump of *Pinus sylvestris*, 370 m, 5748; 2.8.1997, coll. J. K. and P. K. (PRM 891898). – Distr. Příbram, Brdy Mts., near the village Teslíny, in cut down forest, on bark of fallen tree, 680–690 m, 6348; 15.10.1997, coll. and det. Š. Bayerová (hb. Bayerová). – Distr. Příbram, Brdy Mts., Radošice, on loose siliceous stone in meadow, 570 m, 6448; 15.2.1997, coll. Š. Bayerová and Z. Palice (hb. Palice). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, 1.5 km NE of the village Nezabudice, Nezabudické skály rocks, on stump of *Carpinus betulus*, 370 m, 5949; 13.4.1996, coll. J. H. (PRM 887767). – Prague, Šárka valley, Kozákova skála rock, on withered plant debris, 350 m, 5951; 28.9.1993, coll.

J. H. (PRM 887020, 890485). – Prague, Komořany, on the right bank of the Vltava river, near railway station, on bark of a fallen trunk of *Robinia pseudoacacia*, 190 m, 6052; 16.11.1996, coll. J. H. (PRM 890490). – Distr. Nymburk, Libice nad Cidlinou, flood plain forest Libický luh, at the NE border of the nature reserve, together with *Placynthiella icmalea*, about 190 m, 5857; 18.3.1995, coll. Z. Palice (hb. Palice). – Southern Bohemia, Šumava Mts., Distr. Prachatice, Volary, in the village Černý Kříž, at gamekeeper's lodge on top of wooden post of garden fence, 745 m, 7149; 25.9.1994, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Volary, on the forest track Hučicská cesta, gravel pit, on "fresh" siliceous pebbles and stones, together with *Trapelia* sp., about 770 m, 7149; 29.12.1994, coll. Z. Palice (hb. Palice). – Novohradské hory Mts., Distr. Český Krumlov, 8 km SE of Benešov nad Černou, Žofín, on wooden fence, 750 m, 7354; 3.6.1997, coll. R. Dětinský, det. J. K. (hb. Dětinský). – Distr. Pelhřimov, above Krasoňov, on gneissaceous boulder in a meadow, 620 m, 6458; 9.5.1968, coll. A. Vězda (hb. Vězda). – Eastern Bohemia, Distr. Pardubice, Chvaletice, sedimentation basin near the power station, on a sandstone-shale boulder, 220 m, 5958; 14.10.1994, coll. Z. Soldán (PRC). – Krkonoše Mts., Pec pod Sněžkou, in the valley Obří důl, on stump of *Picea abies*, about 1000 m, 5260; 9.1991, coll. J. Horáková and J. Hubáčková (PRM). – Distr. Pardubice, Opatovice nad Labem, Bukovina nad Labem, sedimentation basin near the power station, on wood and on pebbles, 230 m, 5860; 10.3.1997, coll. and det. Z. Palice (hb. Palice).– Orlické hory Mts., Sedloňov, on wood, about 600 m, 5663; 5.1996, coll. J. Halda (hb. Halda). – Western Moravia, Distr. Jihlava, between Třešť and Horní Cerekev, near Rácov, on a gneissaceous boulder, c. 630 m, 6758; 15.10.1996, coll. J. Halda and B. Gruna (PRM 891437). – Ibid.: sub *Lecidea variegatula* Nyl., matrix: *Thelocarpon laureri*, 6758; 15.10.1996, coll. J. H., det. J. Hafellner (PRM 891436). – Distr. Třebíč, near Heraltice, on a gneissaceous boulder, about 600 m, 6760; 26.3.1929, coll. J. Suza (PRM 587598, 587601, 587602, 587603). – Distr. Třebíč, Vladislav, in forest, on stump of *Robinia pseudoacacia*, about 420 m, 6761; 6.6.1990, coll. E. Lisická (PRM 887025). – Distr. Třebíč, Rouchovany, between Boříkovský dvůr and the brook Mlýnský potok, at forest margin, on gneissaceous pebbles, 380 m, 6962; 14.9.1971, coll. A. Vězda (A. Vězda: Lichenes selecti exsiccati no. 1028; PRM 721825). – Distr. Blansko, Doubravník, in valley of the Svratka river near the village Prudká, about 300 m, 6564; 30.5.1975, coll. A. Vězda (hb. Vězda). – Distr. Žďár nad Sázavou, near Tišnov, between the villages Křížovice and Skorotice, on fence in a meadow, on wood, 500 m, 6564; 18.9.1977, coll. A. Vězda (A. Vězda: Lichenes selecti exsiccati no. 1640; PRM 820786, M 10631). – Distr. Blansko, Tišnov, in the village Borač, on fir wood of a fence at house no. 43, 400 m, 6564; 8.1928, coll. J. Suza (sub *T. prasinellum* – PRM 587577, 587580, 587581, 587583). – Distr. Blansko, near Tišnov, on Květnice hill, on a boulder, c. 450 m, 6664; 12.3.1919, coll. J. Suza. (sub *T. prasinellum* – PRM 587600). – Distr. Blansko,

Tišnov, in the village Borač on wood of an old roof, 400 m, 6664; 1931, coll. J. Suza (J. Suza: Lichenes Bohemoslovakiae, no.164, sub *T. prasinellum*; hb. Vězda, M 10608, PRC). – Distr. Blansko, Tišnov, on wood of an old fence in the village Střemchoví, 300 m, 6664; 8.1929, coll. J. Suza (PRM 587576). – Northern Moravia, Silesia Superior, Rychlebské hory Mts., near Mt. Falkenberg (Sokolí vrch), in pine forest, on basalt stones, 5768; 1884, coll. J. Plosel jr., (PRM 587599, sub *T. epilithellum*). – Silesia Superior, Rychlebské hory Mts., near Mt. Falkenberg (Sokolí vrch), in pine forest, on basalt and granite stones, 5768; 1886, coll. J. Plosel jr., (H. Lojka: Lichenotheca Universalis, no. 197 sub *T. epilithellum*, PRM 587592, 587594, 587596). – Jeseníky Mts., Rýmařov, between Skřítek and Klepáčov, in drain by roadside, on stones, about 800 m, 5968; 3.10.1974, coll. A. Vězda (hb. Vězda). – Jeseníky Mts., in the valley Velká kotlina, on a gneissaceous boulder, 1300 m, 5969; 23.9.1994, coll. J. H. (PRM 887022). – Southern Moravia, Brno, at margin of forest near Mokrá Hora, on wooden fence, 250 m, 6765; 4.1962, coll. A. Vězda (hb. Vězda). – Brno, near Jundrov, in garden, on wood, 270 m, 6765; 3.1991, coll. A. Vězda (hb. Vězda). – Brno, Botanic Garden of Masaryk University, on wooden fence in Kotlářská ul. street, about 280–300 m, 6765; 3.8.1932, coll. J. Suza (sub *T. prasinellum* – PRM 587579). – Eastern Moravia, Hostýnské vrchy Mts., near Košovy-Věletín, among tributary of the Juhyně brook near the cottage "Zálesák", by forest track, on roots of stump of cf. *Alnus* sp., 460 m, 6672; 11.5.1995, coll. J. H. (PRM 890825). – Bílé Karpaty Mts., "Hutě", near Žitková, on wall, on sandstone, 7073; 10.7.1996, coll. B. Gruna and M. Hájek (hb. Gruna). – Beskydy Mts., below Mt. Ropička, on a wooden fence, 800 m, 6377; 10.1956, coll. A. Vězda (hb. Vězda).

SLOVAK REPUBLIC: Northern Slovakia, High Tatra Mts., Tatranská Lomnica, on balcony on the third floor of a hotel, on wood, about 890 m, 22.9.1993, coll. A. Vězda (PRM 890522). – The Low Tatra Mts., Liptovský Mikuláš, near Lazisko, at the gamekeeper's lodge Pod Dobákom, on wooden fence, 750 m, 11.7.1990, coll. J. H. (PRM 887023).

Thelocarpon lichenicola (Fuckel) Poelt et Hafellner (Figs 3, 19–22, 26)

The species is known from many localities in the Czech Republic, where it has been found from the lowlands to the mountains at altitudes between 230–1300 m above sea level. It is recorded for the first time from the Slovak Republic.

Although it is considered a mountain species, it has been found in several localities at altitudes between 230 and 450 m above sea level. All these finds were made at sites of inverse climate conditions mostly in close and deep valleys in the Křivoklátsko area, Hostýnské vrchy Mts. and Český ráj. The inversion of the open area around Jestřebí (230 m), characterized by numerous peat bogs, is also

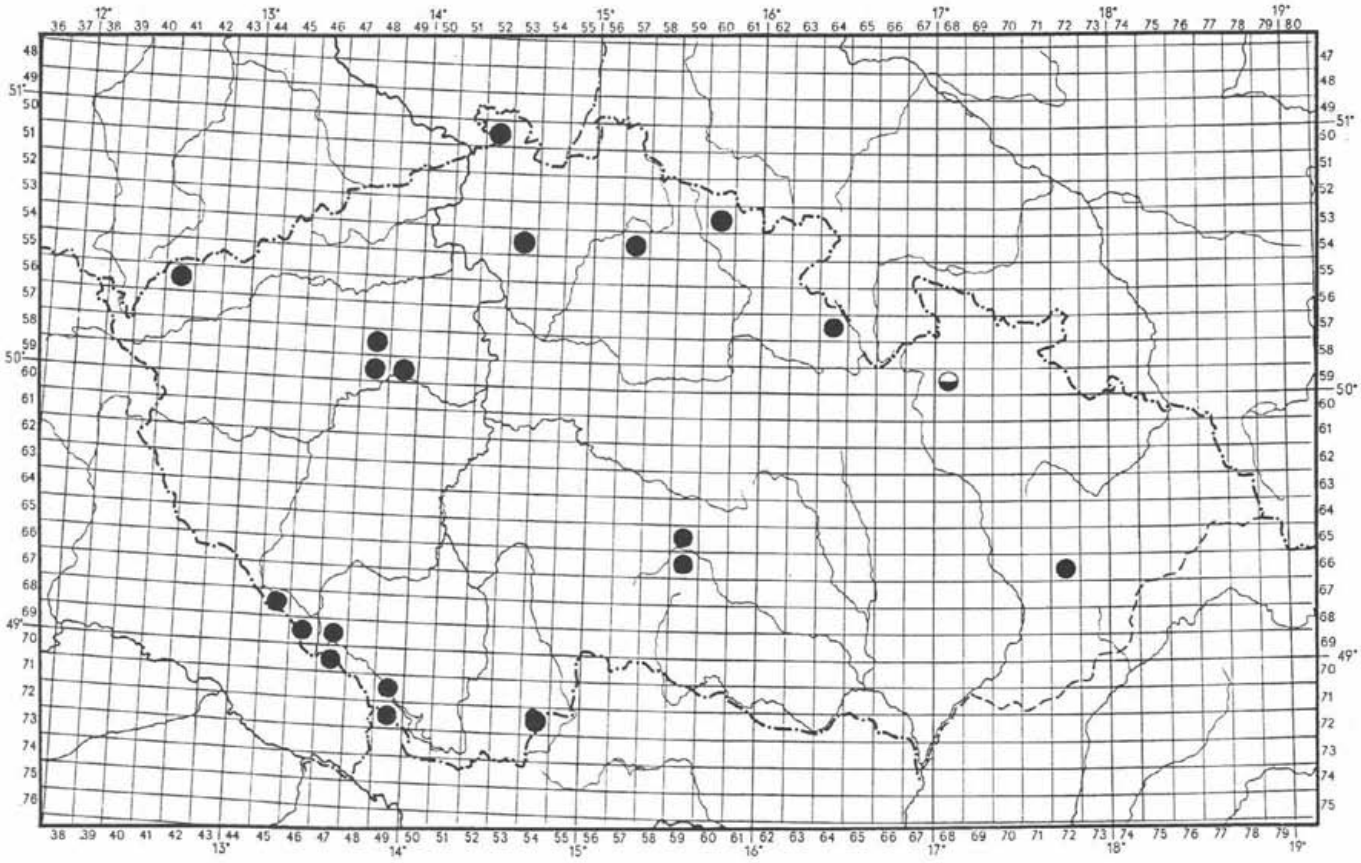


Fig. 26. Distribution of *Thelocarpon lichenicola* (Fuckel) Poelt et Hafellner in the Czech Republic.

Table 4.
Species of lichens and bryophytes accompanying *Thelocarpon lichenicola* according to substrata.

substrata	decaying wood	soil	saxicolous	Osmoporus odoratus	dead bryophytes	peat
lichens	*Absconditella lignicola* *Absconditella* sp. *Cladonia* sp. *Micarea prasina* *Placynthiella icmalea* *Steinia geophana* *Thelocarpon epibolum* *Vezdaea* sp.	*Baeomyces roseus* *Cladonia* sp. *Trapeliopsis granulosa*	cf. *Baeomyces rufus*	*Cladonia* sect. *cocciferae* *Micarea prasina*		*Placynthiella icmalea*
bryophytes	*Cephalozia bicuspidata* *Chiloscyphus profundus* *Hypnum cupressiforme* *Tetraphis pellucida*	*Atrichum undulatum* *Barbula unguiculata* *Ceratodon purpureus*	*Ceratodon purpureus* *Dicranella heteromalla*	*Chiloscyphus profundus* *Lophozia longiflora*	*Dicranum scoparium* *Sphagnum capillifolium*	*Cephalozia connivens* *Cephaloziella divaricata* *Chiloscyphus profundus* *Mylia anomala* *Sphagnum capillifolium* *Sphagnum flexuosum* *Sphagnum magellanicum*

confirmed by recent faunistic investigations and documented by many mountain species of spiders (Kůrka 1997) and insects (Honců and Vonička 1997).

Thelocarpon lichenicola occurs on decaying wood, rocks, stones or soils that are wet for a long time, on peat and dead bryophytes. It was also found on a dead basidiocarp of *Osmoporus odoratus*, on an old cup of acorn and lichenicolous on squamules of *Baeomyces rufus* in initial stage of ontogeny. As accompanied cryptogams the species listed in the Table 4 were found. Most often it was associated with *Absconditella lignicola, Placynthiella icmalea, Chiloscyphus profundus* (syn. *Lophocolea heterophylla*) and *Sphagnum capillifolium*.

Exsiccata examined:

CZECH REPUBLIC: Lichenes Selecti Exsiccati no. 1400 (sub *Ahlesia strasseri* PRM 801993, hb. Vězda).

Additional specimens examined:

CZECH REPUBLIC: Western Bohemia, Krušné hory Mts., Distr. Sokolov, Přebuz, on path leading to "Rolavské" peat bog, on loose siliceous stone, 5641; 920 m, 20.10.1997, coll. Z. Palice and P. Uhlík (hb. Uhlík). – Šumava Mts., Distr. Klatovy, Železná Ruda, in glacier cirque of lake Černé jezero, below of the rock wall, on a loose slimy stone, 1200–1250 m, 6845; 12.10.1995, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Klatovy, Železná Ruda, glacier cirque of the lake Černé jezero, peaty overhangs on the wall, 1200 m, 6845; 24.5.1996, coll. Z. Palice (hb. Palice, with pycnidia!). – Šumava Mts., Distr. Klatovy, in the peat bog Hůrecká slať, on *Sphagnum* sp., 875 m, 6845; 21.7.1996, coll. J. Váňa, det. J. H. (PRM 890828, with pycnidia!). – Šumava Mts., Distr. Klatovy, Modrava, Mt. Smrkový vrch, on decaying wood, 1100 m, 6946; 21.6.1995, coll. Z. Palice (hb. Palice). – Northern Bohemia, Protected Landscape Area Labské pískovce, Distr. Děčín, Kyjov, on sandy bank by roadside, on pebbles, 360 m, 5052; 11.8.1997, coll. J. K. (PRM 891413, 891414). – Distr. Česká Lípa, near Jestřebí, in peat bog, on decaying wood, 230 m, 5453; 28.9.1995, coll. J. H. (PRM 890829). – Central Bohemia, Distr. Rakovník, Olešná, in peat bog near the village, on decaying wood of fallen trunk of *Pinus silvestris*, together with *Absconditella lignicola*, 340 m, 5848; 14.2.1998, coll. J. K. (PRM 891904, with pycnidia!). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, Skryje, near confluence of the brooks Ostrovecký potok and Houpačkový potok, on fallen decaying trunk, together with *T. epibolum*, 6048; 449 m, 21.6.1997, coll. J. K. (PRM 890830, with pycnidia!). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, 2 km SW of Račice, on slope by road, on an old cup of acorn, 420 m, 5949; 10.1.1998, coll. J. K. and P. K. (PRM 891897, with pycnidia!). – Distr. Rakovník, Protected Landscape Area Křivoklátsko, nature reserve Stříbrný luh, below western slope of the hill Hák, in valley of small brook, on decaying trunk of *Fagus*, together with *Vezdaea* sp., 350–370 m, 5949; 21.2.1997, coll. J. K. and P. K. (PRM, with pycnidia!). – Southern Bohemia, Šumava Mts., Distr. Prachatice, Kvilda, in peat bog near the nature reserve Jezerní slať and the stream Hamerský potok, on gneissaceous pebbles, on poorly developed squamules of *Bacomyces rufus*, 1070 m, 6947; 2.10.1990, coll. J. H. (PRM 887026). – Šumava Mts., Distr. Prachatice, Kvilda, 1 km SE of the village, on the right bank of the Vltava river, on mosses on rocks, 1000 m, 6947; 13.6.1997, coll. and det. R. Dětinský (hb. Dětinský). – Ibid.: on *Sphagnum magellanicum*, 6947; 13.6.1997, coll. Š. Bayerová (hb. Bayerová, together with *T. epibolum* on squamules of *Omphalina hudsoniana*). – Šumava Mts., Distr. Prachatice, 1 km N of the source of the Vltava river, in peat bog, on peat,

about 1140 m, 7047; 5.11.1994, coll. Z. Palice and Š. Bayerová, det. J. H. (hb. Palice). – Šumava Mts., Distr. Prachatice, Černý Kříž, in pine forest near railway station, on burned rotting wood, together with *Absconditella lignicola*, 740 m, 7149; 20.4.1995, coll. Z. Palice, det. J. H. (hb. Palice). – Šumava Mts., Distr. Prachatice, Černý Kříž, in pine forest by Hučina stream near railway station, on rotting wood, 745 m, 7149; 30.4.1995, coll. Z. Palice, det. J. H. (hb. Palice). – Šumava Mts., Distr. Prachatice, in valley of the Vltava river, in nature reserve Houska, near the railway station Ovesná, on dying bryophytes, 735 m, 7149; 13.6.1997, coll. and det. R. Dětinský (hb. Dětinský). – Šumava Mts., Distr. Prachatice, on slope of Mt. Medvěd, by forest track, on humus, 1120 m, 7249; 21.6.1995, coll. J. H. (PRM 887033). – Šumava Mts., Distr. Prachatice, near Nová Pec, in glacier cirque of lake Plešné jezero, on plant debris, 1200 m, 7249; 1.6.1996, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, near Nová Pec, in glacier cirque of lake Plešné jezero, on avalanche track, on humus, about 1250 m, 7249; 19.5.1995, coll. Z. Palice (hb. Palice). – Šumava Mts., Distr. Prachatice, Nová Pec, in glacier cirque of the lake Plešné jezero, on a dead basidiocarp of *Osmoporus odoratus*, about 1300 m, 7249; 16.6.1996, coll. Z. Palice (hb. Palice). – Novohradské hory Mts., Distr. České Budějovice, in the valley Liščí důl, c. 3 km of the Černé údolí valley, on humus, 680 m, 7254; 2.9.1997, coll. and det. R. Dětinský (hb. Dětinský, with pycnidia!). – Eastern Bohemia, Distr. Semily, Protected Landscape Area Český ráj, Hrubá Skála, in Čertoryje valley, on rotten wood, about 330 m, 5457; 26.2.1995, coll. Z. Palice and P. Špryňar (hb. Palice). – Krkonoše Mts., Distr. Trutnov, Velká Úpa, in the valley Vavřincův důl, on old bridge of wooden logs over the brook Vavřincův potok, on decaying wood among mosses, 755 m, 5360; 4.5.1997, coll. JK. (PRM 890832, 891905, with pycnidia!). Ibid.: by forest track, on fallen decaying trunk, 810 m, 5360; 4.5.1997, coll. J. K. (PRM 890831). – Orlické hory Mts., Distr. Rychnov nad Kněžnou, between Kačerov and Uhřínov pod Deštnou, in long roadcurve, at roadside on the ground, 575 m, 5764; 18.4.1996, coll. Z. Palice, J. Horáková and Š. Bayerová (PRM 887771, hb. Palice). – Western Moravia, Distr. Jihlava, on slope of the hill Vysoký Kámen, on pebbles on ground among roots of a fallen tree, 640 m, 6559; 14.10.1996, coll. P. K., det. J. H. (PRM 890483). – Ibid.: on a rotten fallen trunk together with *Placynthiella icmalea*, 655 m, 6559; 14.10.1996, coll. J. H. (PRM 890827). – Distr. Jihlava, foot of Špičák hill, near the nature reserve Loučky, on boulder by a forest track, 620 m, 6659; 16.10.1996, coll. Š. Bayerová (hb. Bayerová). – Northern Moravia, Jeseníky Mts., Distr. Šumperk, along road between the peat bogs Skřítek and Klepáčov, on humid mossy ground, 800 m, 5968; 3.10.1974, coll. A. Vězda, Lich. Sel. Exs. no. 1400 sub *Ahlesia strasseri* (Zahlbr.) Keissl. ex H. Magn. (PRM 801993, hb. Vězda). – Eastern Moravia, Hostýnské vrchy Mts., Distr. Kroměříž, below the nature reserve Smrdutá, on stump near the brook Bystřička, 660 m, 6672; 13.5.1995, coll. J. H. (PRM 887027, with pycnidia!). – Hostýnské vrchy Mts., near

Košovy-Věletín, along tributary of the Juhyně brook near cottage "Zálesák", by a forest track, on soil, 460 m, 6672; 11.5.1995, coll. J. H. (PRM 890826).

SLOVAK REPUBLIC: Western Slovakia, West Tatra Mts., Oravice, in the valley Juráňova dolina, on rotten trunk lying in a tributary of the brook Juráňový potok, 960 m, 6784; 29.5.1990, coll. J. H. (PRM 887031). – Northern Slovakia, Low Tatra Mts., in the valley Krížská dolina, on rotten stump, 1160 m, 13.7.1990, coll. J. H. (PRM 887032, 887034). – Carpathians, Muráňská planina plateau, Hrdzavá valley, peat bog "V machoch", on top of rotting stumps, 760–800 m, 22.9.1995, coll. Z. Palice and Š. Bayerová, det. Z. Palice (hb. Palice).

***Thelocarpon olivaceum** B. de Lesdain (Fig. 27)

This sparsely in Europe distributed species was discovered for the first time by Z. Palice in the Czech Republic in the autumn of 1996 in a sedimentation basin of a power station on a siliceous stone. Now it is reported from two localities. According to Salisbury (1966) and Alstrup and Schting (1989) the species is so far known from Austria, France, Germany, Great Britain, Switzerland and Denmark. It is reported predominantly from stones, rocks and old leather; one collection was made on a brick. All the Czech collections were made on stones.

substrata	saxicolous
lichens	*Cladonia* sp.
	Porpidia crustulosa
	Verrucaria sp.
	Xanthoria sp.

Table 5. Species of lichens accompanying *Thelocarpon olivaceum*, arranged according to substrata.

Exsiccata examined:

SWITZERLAND: H. Lojka: Lichenotheca Universalis no. 196. Mettmenstetten (Zürich). 1885, coll. Hegetschweiler (M 10571).

Zwackh: Lichenes exsiccati no. 869. Zwischen Riffersweil and Gossau (Zürich). 1873, coll. Hegetschweiler (M 10572).

GERMANY: F. Arnold: Lichenes exsiccati no. 1406. Bavaria, Pullach. 16.6.1888, coll. F. Arnold (M 10574).

Lichenes Monaccenses no. 261. Bavaria, Laufzorn near Munich. 6.12.1892, coll. F. Arnold (M 10575).

Additional specimens examined:

CZECH REPUBLIC: Central Bohemia, Brdy Mts., Distr. Příbram, on stony bank of the water basin Pilská, on stone, 660 m, 6349, 29.3.1997, coll. and det.

Š. Bayerová (hb. Bayerová). – Eastern Bohemia, valley of the river Labe, Chvaletice near Kolín, sedimentation basin near the power station, E of the village, on a loose siliceous stone, 220 m 5958; 18.10.1996, coll. Z. Palice (hb. Palice). – Ibid.: 14.2.1997, coll. Z. Palice and Š. Bayerová (hb. Palice).

***Thelocarpon pallidum** G. Salisb. (Fig. 27)

Until now the species had been considered endemic on British Isles. It is now also reported from the Czech Republic. No accompanying cryptogams were found in this specimen except of algal films. More detailed information about this collection will be published by the collector, Z. Palice (in prep.).

Specimen examined:

CZECH REPUBLIC: Northern Bohemia, Protected Landscape Area Kokořínsko, a former quarry "Újezd u Chcebuz", N of Újezd settlement, c. 1.5 km SE of Strachaly and 3 km NNE of Chcebuz, on loose stone on soil, 300 m, 5452; 27.11.1997, coll. Z. Palice (hb. Palice).

Additional specimen examined:

BRITISH ISLES: West Sussex, Coldwaltham, Waltham Brooks, 14.9.1978, coll. P. W. James (M).

Thelocarpon superellum Nyl. (Fig. 15–18, 27)

This species seems to be very rare because of the most conspicuous and the largest ascomata of all representatives of the genus. It had not so far been reported from the Czech Republic. Now it is known from three localities. Two specimens were collected on humid sandy soil in road verges, the third untypically on semi-immersed wood. In other countries the species is also known to occur on decaying algae on stones. The abundantly collected specimen in the locality in Northern Bohemia is prepared to be issued in Vězda's exsiccate collection Lichenes Rariores Exsiccati. It was collected there together with the above mentioned *T. lichenicola*, but this species was restricted only to siliceous pebbles. They were not found intermixed. Only accompanied bryophytes were found as listed.

substrata	rotten wood	soil
bryophytes	*Gymnocolea inflata*	*Dicranella rufescens*

Table 6. Species of bryophytes accompanying *Thelocarpon superellum*, according to substrata.

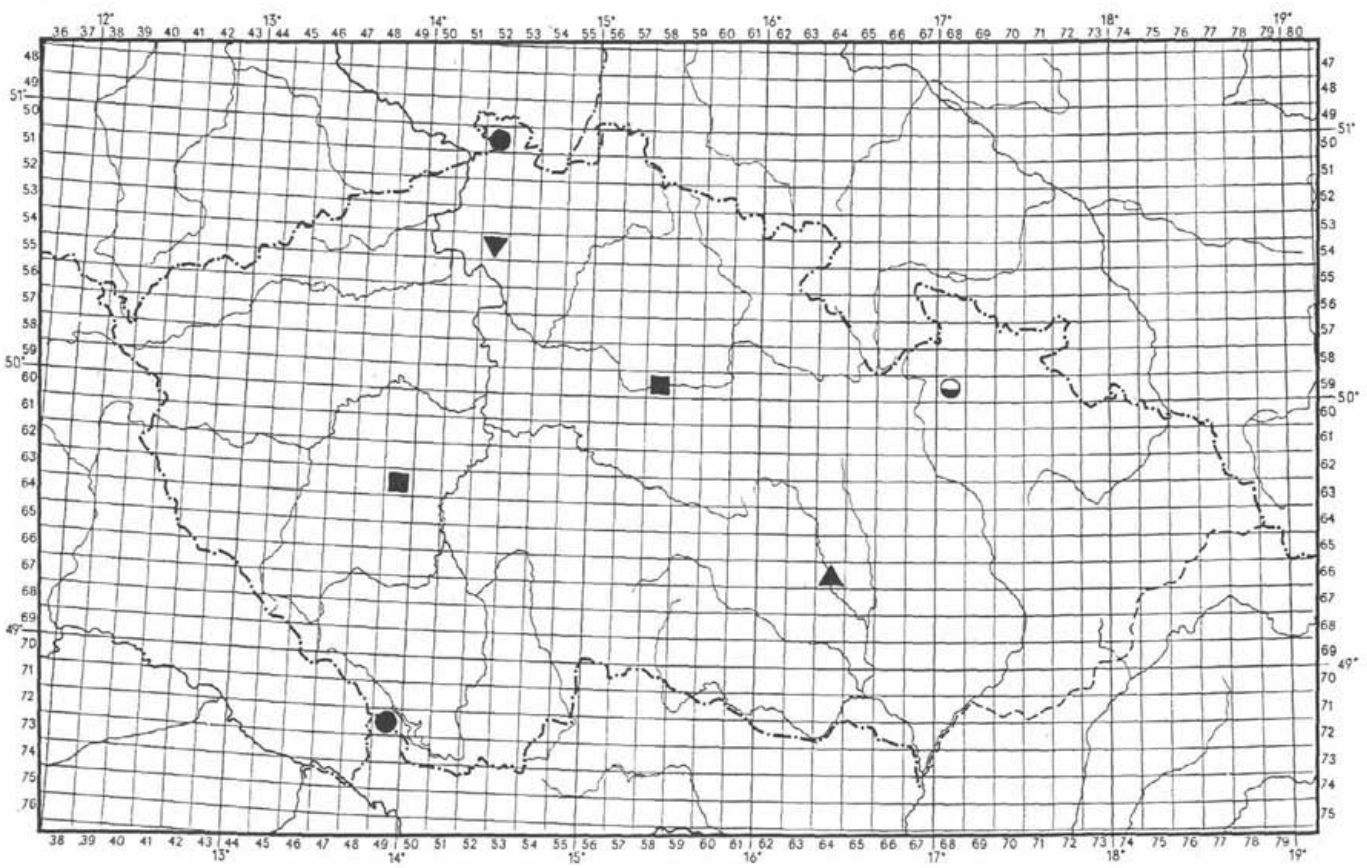


Fig. 27. Distribution of ▲ *Thelocarpon impressellum* Nyl., ■ *Thelocarpon olivaceum* B. de Lesd., ▼ *Thelocarpon pallidum* G. Salisbury and ● and ◒ *Thelocarpon superellum* Nyl. in the Czech Republic.

Specimens examined:

CZECH REPUBLIC: Northern Bohemia, Protected Landscape Area Labské pískovce, Kyjov, in denudated sandy roadverge, on humid soil, 360 m, 5052; 11.8.1997, coll. J. K. (PRM 891408, Vězda Lich. rar. exs. is prepared for distribution). – Southern Bohemia, Šumava Mts., Nová Pec, Plešné jezero lake, on bank beneath rock wall, on semi-immersed hard wood, 1090 m, 7249; 11.7.1997, coll. and det. Z. Palice (hb. Palice). – Northern Moravia, Jeseníky Mts., between the peat bogs Skřítek and Klepáčov, in roadverge, on humid soil, about 800 m, 5868; 3.10.1974, coll. A. Vězda (hb. Vězda).

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