

## Lichenicolous species of *Homostegia* (*Dothideomycetes*), with the description of *H. herтели* sp. nov., a new fungus on *Flavoparmelia* species

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**Abstract:** The lichenicolous species of *Homostegia* are reviewed, and the genus is tentatively referred to the *Dacampiaceae*. Three species are accepted and keyed, of which *H. herтели* is described as new from *Flavoparmelia* species in the U.S.A.; it differs from *H. piggoitii*, which occurs on *Parmelia* s. str. species, in the longer ascospores. Notes on the placement of all other lichenicolous species referred to the genus are provided.

### Introduction

The genus *Homostegia* is well-known to students of lichenicolous fungi from its type species, *H. piggoitii*. That species forms convex black multiloculate stromata on *Parmelia* s. str. species, and has distinctive brown, 3-septate, and often asymmetric ascospores. During studies of North American lichenicolous fungi, COLE & HAWKSWORTH (2001) discovered another species of *Homostegia* growing on *Flavoparmelia caperata*. They identified this as *H. parmeliata*, according to the original descriptions (ELENKIN 1901a, b) and that of VOUAUX (1912), as they were not able to study original material of that species. HAFELNER (2001), however, examined an isotype of *H. parmeliata* in UPS and found it to be quite a different fungus with hyaline-walled perithecia immersed in galls rather than a stroma, and producing 3-septate, narrowly ellipsoid, and hyaline ascospores. Hafellner resurrected Elenkin's generic name *Trematosphaeropsis* for the hyaline-spored species, which appears widespread on *Xanthoparmelia* species, being reported from Asia, Europe, Africa, and North, South and Central America.

HAFELNER (2001) correctly surmised that the fungus on *Flavoparmelia* might represent a further species of *Homostegia*, which indeed is the case. Here we describe the fungus on *Flavoparmelia* as *H. herтели* in honour of Hannes Hertel, a valued colleague and pioneer in the unravelling of the taxonomy of the lecideoid lichenicolous fungi and lichens. The opportunity is also taken to provide a synopsis and key to the lichenicolous species of *Homostegia* which are currently accepted.

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*Homostegia* Fuekel

*Jahrb. Nassauischen Vereins Naturk.* 23:24: 223 (1870) [1869?]. - *Typus generis: H. adusta* Fuekel 1870 [i.e. *H. piggottii* (Berk. & Broome) P. Karst. 1873].

**Descriptions:** KEISLER (1930) and YOUAUX (1912).

**Number of species:** Three lichenicolous species are currently accepted.

**Distribution:** Europe and North America.

**Observations:** The affinities of this genus are unclear. It belongs in the *Doratomyces* and might be referable to the mainly lichenicolous *Dacampiaceae*. No similar stromata are known in the family, but infections by *Clypeococcum* species may be superficially similar but are clypeate with the perithecia linked above by dark brown interwoven hyphae of the fungus mixed with the cortical tissues of the host lichen; the perithecial walls in *Clypeococcum* also differ in being composed of *textura irritata*, and the ascospores are 1- and not 3-septate. The suggestion that *Homostegia* might belong to the same family is made on the basis of the similar *textura angularis* structure of the excipulum to that seen in *Dacampia*, *Polycoccum*, *Pyrenidium*, and *Medellomyces*, the hamathecium, and the ascospore type. The ascospores are septate, constricted at the septa, somewhat asymmetrical, have a characteristic olivaceous colour with frequently paler end cells, and often have conspicuous central pores in the ascospore septa. A more definitive placement will have to await molecular studies.

Two species were included in Fuekel's original description of the genus, *H. adusta* and *H. lichenum*. The first species, under the name *H. adusta* or its correct name *H. piggottii*, has been treated as type (i.e. lectotype) of the generic name by THEISSEN & SYDOW (1918: 29), CLEMENTS & SHEAR (1931: 293) and all subsequent authors - including GREUTER *et al.* (1993: 539); we see no reason to dissent from that view.

**Key to the lichenicolous species**

- 1 Ascospores often somewhat curved
- Ascospores not curved, 22-25 × 6-8 µm; on *Dermatocarpon* *H. dermatocarpi*
- 2 Ascospores (18-)20-23(-26) × (6.5-)7-8.5(-10) µm; on *Parmelia* s. str. *H. piggottii*
- Ascospores (22.5-)25-32(-38) × (7.5-)8-8.5(-9.5) µm; on *Flavoparmelia* *H. herletii*

***Homostegia dermatocarpi* Alstrup & M. Cole**

*Botanist* 101: 225 (1998) [as '*dermatocarpaceae*']. - *Typus:* CANADA. British Columbia: Hill behind Quilchena Hotel, 50° 09' N, 120° 30' W, 625 m alt., on *Dermatocarpon* cf. *reticulatum*, 28 Aug. 1994, M. S. Cole (MIN - holotype).

**Description:** ALSTRUP & COLE (1998: 225).

**Host:** *Dermatocarpon* cf. *reticulatum*; apparently commensalistic.

**Distribution:** Canada (British Columbia); only known from the original collection.

**Observations:** The fleshy species still retained in the genus not occurring on lichens in the *Parmeliaceae*. The asci are rather short (48-55 × 15-18 µm) and the ascospores 3-septate, dark brown, not curved, and 22-25 × 6-8 µm. The generic position of the species merits a more critical study when better material has been collected.

***Homostegia herletii* D. Hawksw., V. Atienza & M. Cole, sp. nov.**

Fig. 1A

Similaris *Homostegiae piggottii* sed differt in ascosporis minusculis, (22.5-)25-32(-38) × (7.5-)8-8.5(-9.5) µm.

*Typus:* U.S.A. Arkansas: Franklin County, Ozark National Forest, Cherry Bend Campground along Ark Highway 23, in deep valley on mixed hardwood forest, on *Flavoparmelia caperata*, 1 June 1966, C. M. Wernone 14058 (MIN 872083 - holotype).

*Stromata* arising on the surface of the host thallus, black, matt to slightly shiny, orbicular to somewhat irregular in surface view, shallowly convex, (0.35-)0.5-1.25(-2) mm diam., surface bullate, raised in mounds over the included perithecial locules, with to 5-10 locules immersed in each stroma; stromata (150-)200-350(-400) µm thick, dark brown to black throughout, composed of thick walled pseudoparenchymatous cells, often occluded with dark contents, ± homogeneous in structure. *Perithecial locules* arising deep in the stroma, ca. 130-170 µm diam. (excluding the excipulum and ostiolar canal), with an immersed elongated ostiolar canal 70-100 µm tall extending to the surface of the stroma. *Excipulum* surrounding the perithecial locules similar in structure to the stromatal tissue, cells pseudoparenchymatous, somewhat angular, thick-walled, often unevenly so, dark brown, mainly 3-5 µm diam., somewhat radially compressed. *Hamathecium* well-developed, persistent, consisting of cellular pseudoparaphyses, regularly septate, branched, and 1.5-2.5 µm wide; centrum tissues 1- (Lugol's after KOH pre-treatment). *Asci* elongate-clavate, binucleate in structure, apex thickened with an internal apical beak, 1- (Lugol's after KOH pre-treatment), 59-83 × 15-16 µm, (6-)8-spored. *Ascospores* monostichously to distichously arranged in the asci, 3-septate, a central pore sometimes conspicuous in the septa, generally strongly constricted at the septa, broadly fusiform, often slightly curved, rounded at the apices, olivaceous brown, the tips of the end cells often somewhat paler to subhyaline, smooth-walled, (22.5-)25-32(-38) × (7.5-)8-8.5(-9.5) µm. *Conidiomata* pycnidial, 70 µm diam., included in the stroma near the perithecial locules; dark brown to black, wall composed of 4-5 layers of pseudoparenchymatous cells, cells brown, irregularly polyhedral, 3-6.5 µm diam. *Conidiophores* absent. *Conidiogenous cells* hyaline, short-ampulliform. *Conidia* arising singly, hyaline, simple, mostly cylindrical, sometimes ellipsoid, rounded at the apices, 3 × 1.5 µm.

**Hosts:** *Flavoparmelia baltimorensis* and *F. caperata* (thallus). The infected thalli appear blotched due to the numerous black stromata, but areas around the infections retain their normal yellow-green colour; in section, algal cells in the immediate proximity of the stromata appear healthy in microscopic sections and there is no evidence of invasive hyphae penetrating the medullary tissues. The species therefore appears to be essentially commensalistic or weakly parasitic with respect to entire thalli.



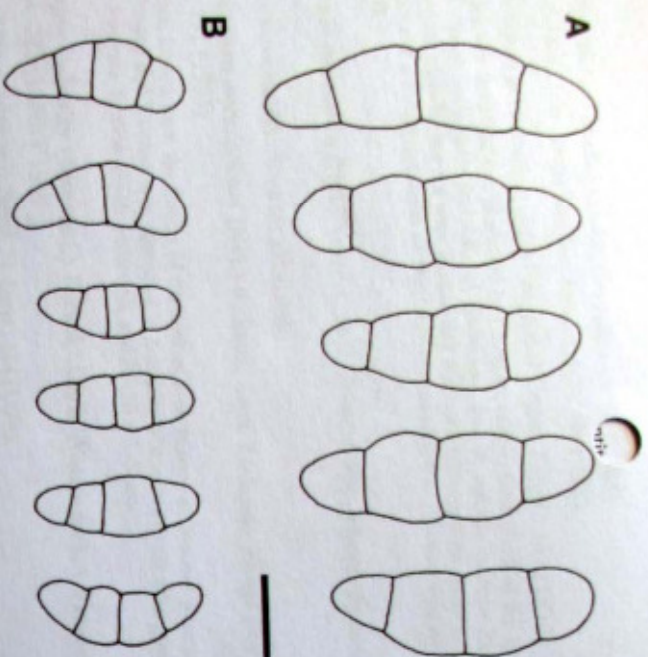


Fig. 1. Ascospore outlines. A. *Homostegia herveyi* (holotype, MIN 872083). B. *H. piggotii* (lectotype, K) (bar = 10 µm).

**Distribution:** North America (U.S.A., Arkansas); known from three collections, all from the same state. The fungus should be searched for in Europe, where *F. caperata* is especially widespread, as well as in other parts of North America.

**Observations:** This new species is distinguished from *Homostegia piggotii* by the longer ascospores as well as occurring on a different genus of host lichens.

**Additional specimens examined:** U.S.A. *Arkansas:* Garland County, Hot Springs National Park, North slope of SW peak of Music Mtn, 34° 30' 07" N, 93° 06' 08" W, 1270 ft alt., on *Flavoparmelia baltimorensis* on rock, 26 May 2001, C. M. Wetmore 86411 (MIN 874893); *ibid.*, W of Black Snake Rd on Sunset Trail at level area on ridge, 34° 30' 42" N, 93° 05' 56" W, 1060 ft alt., on *F. baltimorensis* on rock, 26 May 2001, C. M. Wetmore 86471 (MIN 874871).

***Homostegia piggotii* (Berk. & Broome) P. Karst.**

Fig. 1B

*Not. Sillik. Fauna Fl. Fern. Forh.* 13: 222 (1873). – *Dorhiden piggotii* Berk. & Broome, *Ann. Mag. Nat. Hist.*, ser. 2, 9: 385 (1852). – *Typus:* UNITED KINGDOM, *Wales:* Caernarvonshire, Beddgelert, on *Parmelia saxatilis* (thallus), Aug. 1849, H. Piggot (K – lectotype, here designated).

*Syn:* *Sphaeria homostegia* Nyl., *Flora* 40: 688 (1857).

*Syn:* *Homostegia adusta* Fückel, *Jahrb. Nassauischen Vereins Naturk.* 23/24: 224 (1870) [1869].

A detailed description of the fungus with figures was provided by SCHACHTELIN & WEBER (1928). See also KEISSLER (1930: 298–302, Figs 62–63) and VOUAUX (1912: 197). See KEISSLER (loc. cit.) for further synonyms.

**Hosts:** *Parmelia* s. str. spp., including *P. omphalodes*, *P. saxatilis*, and *P. sulcata*. Heavily infected thalli may eventually become bleached in parts so the species can be regarded as parasitic.

**Distribution:** Europe and North America. Widespread and often abundant.

**Observations:** When introducing the new generic name, Fückel used the new binomial *Homostegia adusta* in order to avoid the creation of a tautonym based on Nylander's *Sphaeria homostegia*. He was aware of Berkeley & Broome's name, but was unsure if the taxa were the same as the description of those authors was very terse.

In the original account of this species, BERKELEY & BROOME (1852) give the locality as 'Beddgelert and Capel Curig, Aug. 1849, H. Piggot, Esq.'. The single specimen in K is selected as lectotype also has the locality given as 'Beddgelert and Capel Curig'; the implication is that there was also material seen from Capel Curig, although whether that was even collected or is preserved elsewhere is unclear. We therefore assume that the specimen in K was from Beddgelert and regard it as a lectotype in case additional material clearly from Capel Curig is subsequently discovered in some other herbarium. These two sites are about 20 km apart by road and so could well have been visited on the same excursion.

**Selected specimens examined:** SWEDEN. *Västergötland:* Mt. Hunneberg, V. Tunham Parish, Prästkielev, on *P. saxatilis* on a diabas boulder, 13 June 1944, R. Samesson; Samesson, *Fungi Lichenicolii* Exs. n° 82 (IMI). – UNITED KINGDOM. *Scotland:* Argyllshire, Glen Ouchy, S of Arichostich, on *P. saxatilis*, 5 Aug. 1972, B. J. Coppins (E). *England:* North Devon, Witheridge Moor, on *P. saxatilis* on *Fagus*, 21/854161, 10 June 1972, D. L. Hawksworth 2903 (IMI 166667); South Devon, Bovey Valley, Lustleigh Cleave, on *P. omphalodes* on granite, 31 March 1979, D. L. Hawksworth 4911 (IMI 236896). *Wales:* Caernarvonshire, Coed Hafod, on *P. saxatilis*, 26 May 1980, M. R. D. Seaward (hb. Seaward 103392). – IRELAND. *County Kerry:* Sween, on *P. saxatilis*, July 1878, J. Carroll (CRK). – CANADA. *Quebec:* Quebec County, Stoneham, Mont Wright Parc de Conservatio Municipal, 47° 00' 42" N, 71° 20' 45" W, 230 m alt., on *Parmelia sulcata*, 7 Aug. 1997, M. S. Cole 7054 (MIN 870332). – U.S.A. *Maine:* Hancock Co., Acadia National Park, Mt. Desert Island, Eagles Crag (0.75 mi NW of Otter Creek), on *P. saxatilis*, 3 July 1985, T. J. Sullivant 5502 (MIN 872851).

**Excluded species**

Here we enumerate the lichenicolous species so far referred to the genus and their current placements. The non-lichenicolous species, of which 34 are known (P. M. Kirk *et al.*, <http://www.indexfungorum.org>; 3 March 2003), are not considered here. Those names belong to fungi on various plants, and are either drawn from a diverse range of ascomycetes or are in need of reassessment; a task beyond the scope of the present study.

\* The surname of Horatio Piggot (1821–1913) is given as 'Piggot' by BRITTEN & BOLLGER (1931: 244) and this was copied by DERMOND (1977: 495). We have found no third-party confirmation, but if correct, the species epithet would need changing to '*piggottii*'.



*Homostegia dubia* (Linds.) Cooke, *Grevillea* 13: 6 (1885).  
*Celidium dubium* Linds., *Trans. Roy. Soc. Edinburgh* 24: 449 (1866).

= *Plectocarpus pseudostictia* (Fée) Fée, *Essai Crypt., Suppl.*: 147 (1837).

This species was described and illustrated by LINDSAY (1866) from thalli of the species now known as *Pseudocyphellaria favosata*, *P. granulata*, and *P. rubella* in New Zealand. Although original material has not been located and the name lectotypified, there is little doubt that the name is a further synonym of *Plectocarpus pseudostictia* (HAWKSWORTH & GALLOWAY 1984).

*Homostegia encausitica* (Nyl.) Vouaux, *Bull. Trimest. Soc. Mycol. France* 28: 108 (1912).

*Epiphora encausitica* Nyl., *Flora* 59: 238 (1876).

= *Plectocarpus encausiticum* (Nyl.) R. Santl., *Lich. Lichenic. Fungi Sweden Norw.* 171 (1993).

This species, known from the thallus of the species now known as *Brodia intestinaliformis* in France, Norway and Sweden, was described in detail by VOUAUX (1912) who gave the ascospores as 3-septate, hyaline to pale yellowish, and 22–30 × 3–5 µm.

*Homostegia lichenum* (Sommerf.) Fückel, *Jahrb. Nassauischen Vereins Naturk.* 23/24: 223 (1870) [‘1869’].

*Dothidea lichenum* Sommerf., *Suppl. Fl. Lapp.*: 224 (1826).

= *Plectocarpus lichenum* (Sommerf.) D. Hawksw., in Hawksworth & Galloway, *Lichenologist* 16: 86 (1984).

Fückel misapplied this name in *Homostegia* to a fungus growing on *Peltigera* so it is sometimes attributed to him alone. However, although he used a ‘?’ by Sommerfelt’s name, he did not definitely exclude it and used Sommerfelt’s epithet so the name is correctly cited and synonymized as above. A modern description of this species is provided by DIEDERICH & ETAYO (1994).

*Homostegia parmeliana* (Jacq.) Vouaux, *Bull. Trimest. Soc. Mycol. France* 28: 108 (1912).

*Trematosphaeria parmeliana* Jacq., in Elenkin, *Acta Horti Petropolitani* 19(1): 22 (1901).

= *Trematosphaeriopsis parmeliana* (Jacq.) Elenkin, *Izv. Imp. S.-Peterb. Bot. Sada* 1(4): 146 (1901).

See HAFELLNER (2001) for a detailed description, illustrations, and discussion of this fungus which appears to be restricted to *Xanthoparmelia* species.

*Homostegia pelvetii* (Hepp) Cooke, *Grevillea* 13: 66 (1885).

*Celidium pelvetii* Hepp, *Flecht. Eur.* 10: pl. 67 no. 589 (1860) [as ‘pelvetii’].

= *Arthonia pelvetii* (Hepp) Almq., *Kongl. Svenska Vetensk. Akad. Handl.* 17: 57 (1880).

The original spelling of the epithet was ‘pelvetii’, but this was based on the name of the collector Pelvet, also honoured in the name of the algal genus *Pelvetia*, and so has to be corrected to ‘pelveti’. No detailed modern description is available of this fungus, which was first described on *Pseudocyphellaria aurata*. It is also reported from species of *Cladonia*, *Pannaria*, *Peltigera*, and *Solorina*, but some of these reports surely refer to other species; a photograph of an ascus with ascospores is included in ALSTRUP & HAWKSWORTH (1990: 18).

*Homostegia piggottii* var. *peltigerae* Rehm, *Ann. Mycol.* 6: 524 (1908).

This variety, which was first reported and described by KEISSLER (1930: 302), is reported from *Peltigera canina* in Austria and Germany. The name does not appear to have been restudied in recent years, but is most probably a synonym either of one of the lichenicolous species of *Arthonia* occurring on *Peltigera*, or of *Pyrenidium actinellum* which has not dissimilar ascospores and is well-known on that host genus (HAWKSWORTH 1983).

*Homostegia stictarum* (De Not.) Mussat, in Saccardo, *Syll. Fung.* 15: 166 (1901) [as ‘Fueket’]; nom. inval. (Art. 34.1).

*Sphaeria stictarum* De Not., *Mem. Acad. Torino*, ser. 2, 12: 20 (1851).

= *Plectocarpus lichenum* (Sommerf.) D. Hawksw., in Hawksworth & Galloway, *Lichenologist* 16: 86 (1984).

This ‘name’ seems to have arisen as an indexing error as the binomial is not cited in the place indicated (SACCARDO 1889: 743) where only the citation ‘*Homostegia* Fück. Symb. p. 224’ appears in the synonymy of *Celidium stictarum*. The synonymy of *Sphaeria stictarum* with the species now known as *Plectocarpus lichenum* has long been accepted (e.g. VOUAUX 1914: 168; KEISSLER 1930: 89).

#### Acknowledgements

We are especially indebted to Dr Clifford M. Wetmore for allowing us to study his rich collections of lichenicolous fungi in MIN, and also to other collectors and curators of herbaria cited in the text. This study was undertaken while D. L. H. was in receipt of an award under the Programa Ramón y Cajal of the Ministerio de Ciencia y Tecnología of Spain held at the Universidad Complutense de Madrid.

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*Contributions to Lichenology* (Festschrift in Honour of Hannes Hertel, P. Döbbeler & G. Rambold (eds): *Bibliotheca Lichenologica* **88**: 195–200. J. Cramer in der Gebroder Borntraeger Verlagbuchhandlung, Berlin · Stuttgart, 2004.

## *Hertella neozelandica* and *Zahlbrucknerella compacta* (*Ascomycotina*), two new cyanophilic lichens from the Southern Hemisphere

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**Abstract:** The new lichen species *Hertella neozelandica* Henssen and *Zahlbrucknerella compacta* Henssen are described from New Zealand. *Z. compacta* is related to *Z. calcarea* (Hertel) Herre for which localities are reported from New Zealand and Australia.

### Introduction

The genus *Hertella* is known from the Southern Hemisphere with two species: *H. subantarctica* from the Prince Edward and Kerguelen Islands and *H. chilensis* from southern Chile (HENSSEN 1985a). On account of the hemiangiocarpous development of the apothecia, *Hertella* was placed in the *Peltigerales*. The new species described in the presented paper enlarges considerably the distribution area of the genus. *Zahlbrucknerella*, a genus of the *Lichinales*, has a world-wide distribution with five of the eight species known occurring in the Southern Hemisphere (HENSSEN 1963, 1977, 1985b). The new *Zahlbrucknerella* species has been found so far only in New Zealand while the closely related *Z. calcarea* occurs in New Zealand and Australia. The species of *Hertella* and *Zahlbrucknerella* have a minutely filamentous thallus derived from the morphology of the photobionts: *Scytonema* in *Zahlbrucknerella*, and *Scytonema* or *Tolyphorix* in *Hertella*. The apothecia are surrounded by a thick proper excipulum in *Hertella* but by a thallose margin in *Zahlbrucknerella*.

### Material and methods

**Selected specimens studied:** *Zahlbrucknerella calcarea*: AUSTRALIA. Tasmania: Mole Creek, outcrop in pasture, on limestone, 350 m alt., 1984, G. Kamrillas 365/84, 366/84 (hb. Henssen). — NEW ZEALAND. South Island: Northwest Nelson Ecological Region, Arthur Ecological District, Mount Arthur, 0.3 km west of Mount Arthur Hut, 1340 m alt., 1993, L. Tibell 19644 (AK 210816); Canterbury, Cave Stream, limestone cliffs and outcrops in tussock grassland, 710–800 m alt., 1981, A. Henssen 27360a, 27362a (hb. Henssen, MB); Mt. Somers, inclined limestone outcrops in pasture, 1985, A. Henssen 30267, 30270 & H. T. Lumbsch (hb. Henssen, MB); Otago, Awamoko stream near Oamaru, seepage limestone cliffs, 1985, A. Henssen 30344e & H. T. Lumbsch (hb. Henssen, MB).

Freezing microscope sections were mounted in lactic acid/glycerine with cottonblue (LB). For studying the iodine reaction, Lugol's solution was added without pretreatment of KOH.