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A new foliicolous *Fellhaneropsis* (*Pilocarpaceae*) from the Netherlands

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Abstract: The new species *Fellhaneropsis rhododendri* is described from living *Rhododendron* leaves in the Netherlands. It is characterized by pyriform pycnidia with stiff, septate hairs at the mouth. It is doubtlessly due to recent global warming that an obligately foliicolous lichen can be described from a temperate area in Europe.

Key words: *Bacidia*, *Fellhanera*, global warming, lichen new species, *Rhododendron*, taxonomy

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Introduction

Fellhaneropsis is a small genus currently comprising six species. Most species are obligately or facultatively foliicolous. Two species are restricted to Australia, one is only known from East Asia and two are known from Europe, one of which extends to North America. The two European species are treated by Aptroot & Edwards (2009). They have been rapidly expanding north during recent decades, just as the related *Fellhanera* species. A good illustration is the situation in Great Britain: in the first edition of the British Lichen Flora (Purvis *et al.* 1992) only two species of *Fellhanera* and one of *Fellhaneropsis* were treated, whereas in the second edition (Smith *et al.* 2009) six species of *Fellhanera* and two species of *Fellhaneropsis* are treated. The situation is similar in the Netherlands; the current four species of *Fellhanera* and two of *Fellhaneropsis* have mostly arrived recently and are spreading, not only into new areas but also onto new substrata. *Fellhanera viridisorediata* Aptroot *et al.*, which was only described as recently as 1998, is now locally the most abundant lichen species, for example, on reed mats, fences, or on sheltered bark. In all lichen monitoring in the Netherlands, whether on trees or on rock, it has increased. It was absent before the 1980s and has appeared everywhere since (van Herk *et al.* 2002; Sparrius & Aptroot 2003). Moreover, it has recently become common on living *Rhododendron* leaves.

Obligately foliicolous lichens are largely a tropical phenomenon. There are over 800 species known worldwide (Lücking 2008), but less than a dozen are known from Europe; these are mostly species of *Strigula* (Roux & Sérusiaux 2004) occurring on *Buxus* leaves in the Mediterranean. In the past decades there has been a dramatic increase in the occurrence of foliicolous lichens in temperate western Europe (e.g. van den Boom & Sérusiaux 1996; Aptroot & Edwards 2009; Lücking *et al.* 2009), especially species of *Bacidia* and *Fellhanera* including *Fellhanera bouteillei* (Desm.) Vězda, one of the two species that was already known to occur on living leaves in western and central Europe in the first half of the last century. The enormous increase of the occurrence of foliicolous lichens in temperate Europe is doubtlessly due to global warming, which has made the climate in these parts warmer and wetter, that is more often humid and for more prolonged periods. This fact has already been recognized for a decade (van Oldenborgh & Komen 2001; Heijboer & Nellestijn 2002), currently

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continues (Zorita *et al.* 2008) and was also seen a decade ago in changes in epiphytic lichens (van Herk *et al.* 2002). It is this humid microclimate that allows the growth of species on substrata with a very low water capacity such as living smooth leaves, which could not be colonized under the climatic conditions of only two decades ago. By now, foliicolous lichens are no longer even rare in countries like Germany (Lücking *et al.* 2009) or The Netherlands. They are present in most forests and nature reserves, and even in many gardens. The hosts are mostly non-native trees and shrubs; there are very few indigenous trees and shrubs with suitably evergreen leaves (chiefly *Ilex aquifolium*, *Juniperus communis* and *Vaccinium vitis-idaea*). It is doubtless due to the recent global warming that an obligately foliicolous lichen can be described that is currently only known from a temperate area in Europe. The potential use of foliicolous lichens in central and western Europe as indicators of global climatic change is also stressed by Lücking *et al.* (2009). Admittedly other factors, such as eutrophication and acid rain, have caused changes in the lichen flora over the past decades, but statistical methods have shown that the effects of these other factors started much earlier than the appearance of foliicolous lichens in NW Europe (van Herk *et al.* 2002). Acid deposition (especially sulphur dioxide) is thought not to be responsible for recent changes, though its historical pattern is still responsible for regional differences, so that areas which were once subject to heavy pollution still show a poorer lichen flora.

In the nature reserve Witte Veen in The Netherlands, only 300 m from the border with Germany, five foliicolous lichens were found on the living leaves of planted *Rhododendron ponticum*: *Bacidia chloroticula* (Nyl.) A.L. Sm., *B. delicata* (Larbal. ex Leight.) Coppins, *B. sulphurella* Samp., *Fellhanera viridisorediata*, and a *Fellhaneropsis* species. The latter was dominant on the leaves it was growing on, suggesting that it grows rapidly, while the other species present often co-occurred on the same leaves. The *Fellhaneropsis* differs from all other known species in the genus by the vertically elongated to tubular pycnidia that are fringed with straight, multiseptate hairs. It is described as new to science below.

Material and Methods

Identification and descriptive work was carried out using an Olympus SZX7 stereomicroscope and an Olympus BX50 compound microscope with interference contrast, connected to a Nikon Coolpix digital camera. The materials are preserved in ABL and BR.

The Species

Fellhaneropsis rhododendri Aptroot sp. nov.

MycoBank No: MB 563671

Fellhaneropsis pycnidiis rectociliatis.

Typus: The Netherlands, Overijssel, Enschede, Witte Veen, on living leaves of *Rhododendron ponticum*, 18 August 2011, *A. Aptroot* 69866 (BR—holotypus; ABL—isotypus).

(Fig. 1)

Thallus thin, dull, starting as isolated granules of *c.* 50 μm, soon aggregating to form a nearly continuous crust covering the whole leaf, greenish grey. *Algae* green, *c.* 7 × 5 μm.

Apothecia appressed, up to 0·5 mm diam., disc flat, pinkish brown. *Hymenium* hyaline; *hypothecium* blackish brown; *excipulum* with black-walled hyphae. *Ascospores* immature.

Pycnidia grey, mostly superficial, pyriform, with globose feet and short tubular necks, *c.* 0·06–0·2 mm wide and 0·2–0·3 mm high, mouth fringed with stiff straight, multiseptate, *c.* 2·5–3·5 μm wide hairs with blunt tips. *Conidia* hyaline, aseptate, needle-shaped, irregularly curved and bent, 35–45 × 1·0–1·5 μm.

Secondary chemistry. Thallus C−, K−, KC−, P−. No substances detected.

Ecology and distribution. So far only known from the type, on living *Rhododendron* leaves in a moss-covered pine forest close to a raised bog.

Notes. This species is close in overall appearance and ecology to *F. kurokawana* G. Thor, Lücking & Tat. Matsumoto (2000), which is known from Japan and Taiwan, but

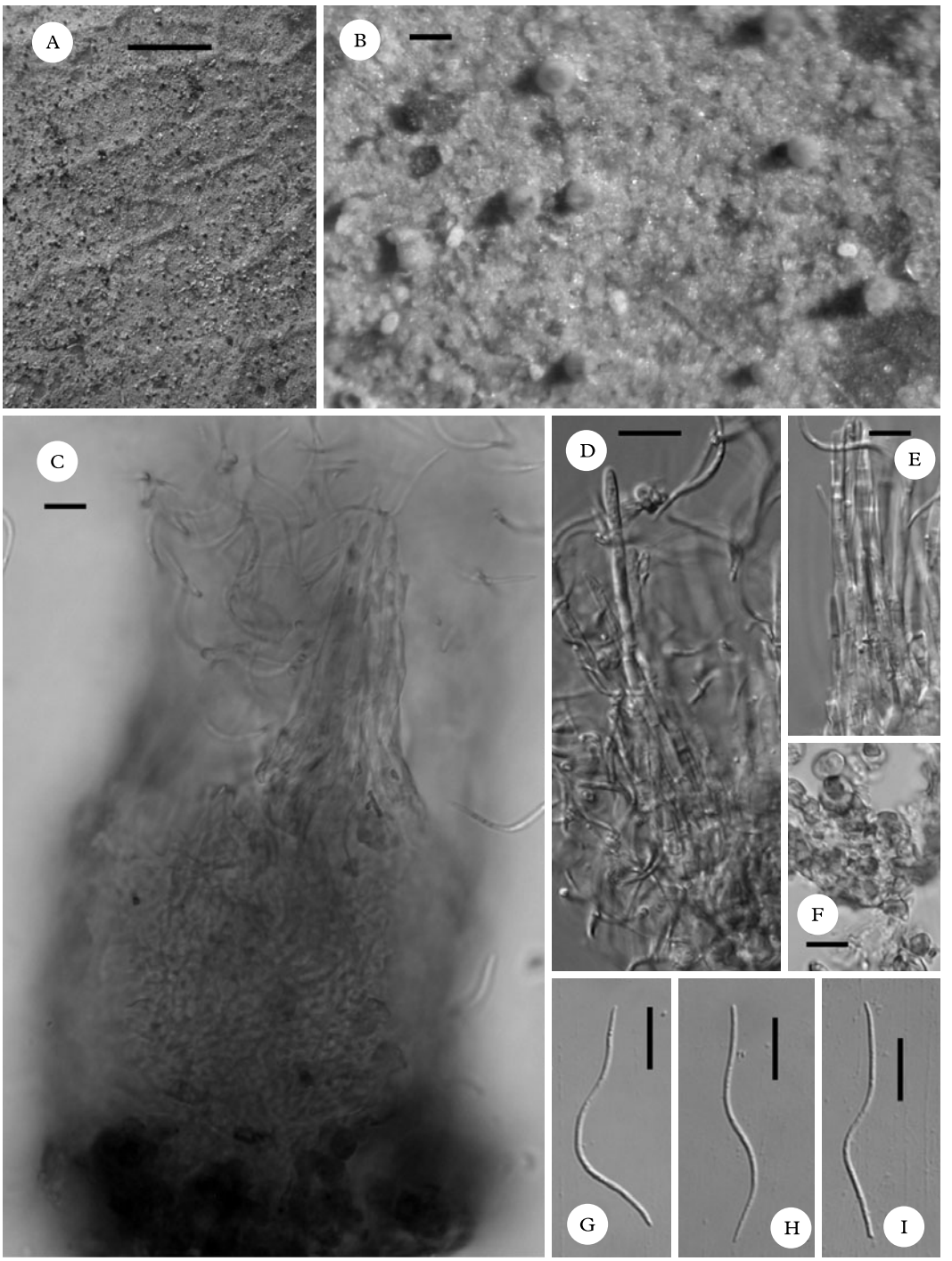

FIG. 1. *Fellhaneropsis rhododendri* (holotype). A, thallus; B, pycnidia; C, pycnidium; D & E, hairs of pycnidial mouth; F, photobiont; G–I, conidia. Scales: A = 1 mm; B = 0·1 mm; C–I = 10 µm.

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differs by the wavy and non-septate hairs at the mouth of the pycnidia. The new species differs from *F. vezdae* (Coppins & P. James) Sérus. & Coppins by the dark apothecia and slender pycnidia with hairs, and from *F. myrtillicola* (Erichsen) Sérus. & Coppins by the sparse apothecia, and pycnidia that are sessile and with hairs (Aptroot & Edwards 2009). The three other species described in the genus are not at all close to, and cannot be confused easily with, the new species. Pycnidia similar to the new species are unknown in other lichen groups; the long wavy conidia in the sessile pyriform pycnidia are unique.

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