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Two corticolous species of *Ophioparma* (Lecanorales) from East Asia

Christian PRINTZEN & Gerhard RAMBOLD

Zusammenfassung: PRINTZEN, C. & RAMBOLD, G. 1996. Two corticolous species of *Ophioparma* (Lecanorales) from East Asia. - Herzogia *12*: 23 - 29.

Zwei ostasiatische, ursprünglich unter dem Gattungsnamen *Lecidea* beschriebene Arten werden zu *Ophioparma* (Lecanorales, Ophioparmaceae) gestellt. Neben einer Beschreibung der Arten wird die systematische Stellung der Familie Ophioparmaceae kurz diskutiert. Die Gattung *Ophioparma* wird emendiert und umfaßt nun auch Arten mit unseptierten Ascosporen. *Ophioparma handelii* und *Ophioparma pseudohandelii* werden als Neukombinationen vorgeschlagen.

Abstract: PRINTZEN, C. & RAMBOLD, G. 1996. Two corticolous species of *Ophioparma* (Lecanorales) from East Asia. - Herzogia *12*: 23 - 29.

Two East Asian species, originally described as belonging to *Lecidea*, are placed in *Ophioparma* (Lecanorales, Ophioparmaceae). Descriptions are given and the systematic position of the family Ophioparmaceae is briefly discussed. The genus *Ophioparma* is emended to accommodate species with non-septate ascospores. The following new combinations are made: *Ophioparma handelii* and *Ophioparma pseudohandelii*.

Key words: Lecanorales, *Lecidea*, *Ophioparma*, Teloschistineae, Ascomycotina.

Introduction

The genus *Ophioparma* was first described by NORMAN (1853) to include the three species *O. ventosa* (L.) Norman, *O. haematomma* (Ehrh.) Norman [= *Haematomma ochroleucum* (Neck.) J. R. Laundon], and *O. punicea* (Sm. ex Ach.) Norman [= *Haematomma puniceum* (Sm. ex Ach.) A. Massal.], which have been regarded as belonging to *Haematomma* until ROGERS & HAFELLNER (1988) emended the family Haematommataceae and placed *Ophioparma* in a family of its own, the Ophioparmaceae. The genus was lectotypified by HAFELLNER (1984) on *Ophioparma ventosa* (L.) Norman.

Until now the genus included the three saxicolous taxa *O. ventosa* (L.) Norman, *O. ventosa* var. *cuprigena* (Poelt) Hafellner & R.W. Rogers, and *O. lapponica* (Räsänen) Hafellner & R.W. Rogers and the two corticolous or lignicolous species, *O. araucariae* (Follmann) Kalb & Staiger and *O. herrei* (Zahlbr.) Kalb & Staiger, which have recently been recognized as belonging here by KALB & STAIGER (1995). These species are characterized by *Ophioparma*-type asci, transversely septate ascospores and the content of haemoventosin as incrustation of the epihymenium.

During the investigation of corticolous species published under the name of *Lecidea*, three East Asian taxa, *L. handelii* Zahlbr., *L. pseudohaematomma* Asahina, and *L. pseudo-*

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handelii Asahina came to our attention, which obviously have to be placed in *Ophioparma* in spite of being corticolous and although they have one-celled ascospores. In his original description of *L. pseudohaematomma*, ASAHINA (1954a) already pointed out the resemblance between this species and the genus *Haematomma*. The non-septate ascospores obviously misled him to place the species in *Lecidea* rather than in that genus.

Taxonomy

By the inclusion of the two species portrayed in this paper, the circumscription of *Ophioparma* changes and the genus has to be emended to accomodate these species.

Lichenized ascomycetes with trebouxioid photobionts. Thallus crustose to subsquamulose. Apothecia sessile; margin distinct; proper exciple well developed, thalline exciple present or absent. Hypothecium hyaline, incrusted by lichen substances in the lower parts. Paraphyses mostly simple. Asci eight-spored, of "*Ophioparma*-type" sensu ROGERS & HAFELLNER 1988, with an entirely amyloid tholus, exhibiting no ocular chamber. Ascospores hyaline, simple to transversely multiple-septate, irregularly ellipsoid to broadly fusiform, not halonate. Pycnidia immersed in the thallus, with dark green or orange-red ostiolar pigmentation. Conidiophores of type VI sensu VOBIS (1980). Pycnospores bacilliform. Chemistry: haemoventosin as incrustation of the epihymenium and (in *O. handelii*) of the ostioles of pycnidia, lecanoric acid, siphulin, divaricatic acid (and thamnolic acid) and constipatic acid and related substances as compounds of thallus and excipulum, and usnic acid as cortical substance.

Ophioparma handelii (Zahlbr.) Printzen & Rambold comb. nov.

= *Lecidea handelii* Zahlbr., Symbol. Sinic. *3*: 111 (1903).

Type: China: Prov. Yünnan, in lateris occid. montis Piepun ad austro-orient. pagi Dschungdien ('Chungtien') regione frigide temperata, alt. c. 3800 m, truncis abietis, 12 August 1914, H. v. Handel-Mazzetti (diary no. 753), Holotype (W!, holotype, E!, isotype [containing constipatic acid, protoconstipatic acid, dehydroconstipatic acid and siphulin; apothecia additionally with haemoventosin]).

= *Lecidea pseudohaematomma* Asahina, J. Jap. Bot. *29(8)*: 225 - 226 (1954).

Type: Japan: Ohsumi, Hananoego, Yakushima Island, 27 July 1933, F. Fujikawa, Holotype (TNS!). [This taxon has already been recognized as synonymous with *O. handelii* by Y. ASAHINA (1954b); containing siphulin, haemoventosin].

Thallus bullate to subsquamulose, up to more than 10 cm in diam., ochre, orange-brown; central part of areoles often greenish, K-. Young areoles flat and scattered, older areoles convex and contiguous; margins partly becoming elevated and thallus ± squamulose; areoles (rounded or) mostly irregularly indented and flexuose, to 1.3 mm diam., matt, rarely glossy. In section, thallus up to c. 400 µm thick. Epinecral layer c. 20 µm, colourless or sometimes grey due to minute, colourless granules. Cortex 10 - 15 µm, with numerous, colourless granules, composed of densely entangled, ± anticlinally arranged, unpigmented hyphae with lumina of 1 - 2 µm. Algal layer well delimited, 40 - 55 (-140) µm; photobiont trebouxioid. Medulla 180 - 250 µm, of loosely entangled, unpigmented hyphae of 2.5 - 3 µm, that become more dense near the algal layer. Hypothallus white, between the areoles and around apothecia, mainly endophloeodic. Apothecia sessile, 1.4 - 3.2 mm diam.,

round to strongly flexuose, single or in groups of up to 15, 10 - 30/cm², ± regularly distributed on the thallus. Disc flat to convex, brick red, with a matt, non-pruinose surface. Margin whitish to rose, weakly prominent, mostly persistent but excluded in convex apothecia. Thalline exciple of irregular hyphae, often indistinct. True exciple laterally 70 - 80 µm, basally ± 110 µm, pseudoparenchymatic; outer zone greyish with orange-brown patches due to the presence of different granules, K+ violet; inner zone greyish; hyphae irregularly swollen, with lumina of 1.5 - 2.5 µm; apical cells with lumina of 2 - 2.5 µm. Hypothecium ± colourless, up to 350 µm, composed of loosely interwoven hyphae, with complexes of crystals of up to 35 x 15 µm. Subhymenium c. 50 µm, ± colourless, with scattered patches of orange-brown granules, K+ violet. Hymenium basally colourless, apically with orange-brown granules, I_{Lugol}+ blue, K+ violet, 50 - 85 µm. Epihymenium poorly delimited, with orange-brown granules, K+ violet. Paraphyses simple, rarely anastomosing, with lumina of 1 - 1.5 µm; apical cells unpigmented, with lumina of 1.5 - 2 µm. Asci of *Ophioparma*-type (Fig. 1A), 50 - 65 x 11 - 15 µm; amyloid wall layer 0.5 µm thick, I_{Lugol}+ blue; non-amyloid wall layer 0.5 - 0.8 µm thick; tholus dark blue. Ascospores broadly ellipsoid to ovoid, or broadly fusiform, often of somewhat irregular shape, colourless, non-septate (Fig. 2), (9-) 11.9 - 12.9 (-16.5) x (5-) 6 - 7.8 (-9) µm; av. length-width-index 2.2 : 1; wall 0.5 µm thick. Pycnidia sessile, with orange-red ostiole due to incrustations of haemoventosin; pycnospores colourless, bacilliform, 8 - 11 x 1 µm. Chemistry: Thallus: siphulin and the fatty acids: constipatic acid, protoconstipatic acid and dehydroconstipatic acid; apothecia additionally with haemoventosin.

Ophioparma handelii is easily identified as a species of *Ophioparma* by the external appearence of its flexuose apothecia, the simple paraphyses, the colourless hypothecium, and the distinctive asci of the *Ophioparma*-type. Within *Ophioparma* the species is characterized by the non-septate hyaline, ellipsoid to broadly fusiform, often irregularly shaped ascospores, and by the content of siphulin, constipatic acid and related substances. The species resembles *O. pseudohandelii*, which differs in having much longer ascospores with a length-width-index of ± 3 : 1 and which contains lecanoric acid.

Lecidea haematommoides Zahlbr., when being compared with *L. pseudohaematomma* by ASAHINA (1954a), was regarded by HAFELLNER (1993) as a synonym of *Pyrrhospora griseococcinea* (Nyl.) Hafellner.

Ecology and distribution: The species is known from the two type localities of *L. handelii* and *L. pseudohaematomma* from China (at c. 3800 m altitude) and Japan (Yakushima Island) and, according to ASAHINA (1957: 359) from Hondo (Honshu), Prov. Yamato (Prov. Okayama), Mt. O-mine. The species has been collected on trunks of *Abies* sp. and *Cryptomeria japonica*.

Ophioparma pseudohandelii (Asahina) Printzen & Rambold comb. nov.

= *Lecidea pseudohandelii* Asahina, J. Jap. Bot. *32(12)*: 7 - 8 (1957).

Type: Japan, Yamato, Mt. Kongo, alt. c. 1120 m, on bark of *Cryptomeria japonica*, 7 October 1956, Y. Tanaka, Holotype (TNS!).

Thallus crustose to subsquamulose, up to more than 15 cm in diam., ochre; K-. Young areoles subconvex and scattered, older areoles convex and contiguous; margins partly becoming elevated and thallus ± squamulose; areoles (rounded or) mostly irregularly indented and flexuose, to 0.8 mm diam., matt. In section thallus up to ± 200 µm thick. Epinecral layer not distinct. Cortex ± 20 µm, grey due to inspersed crystals of lecanoric

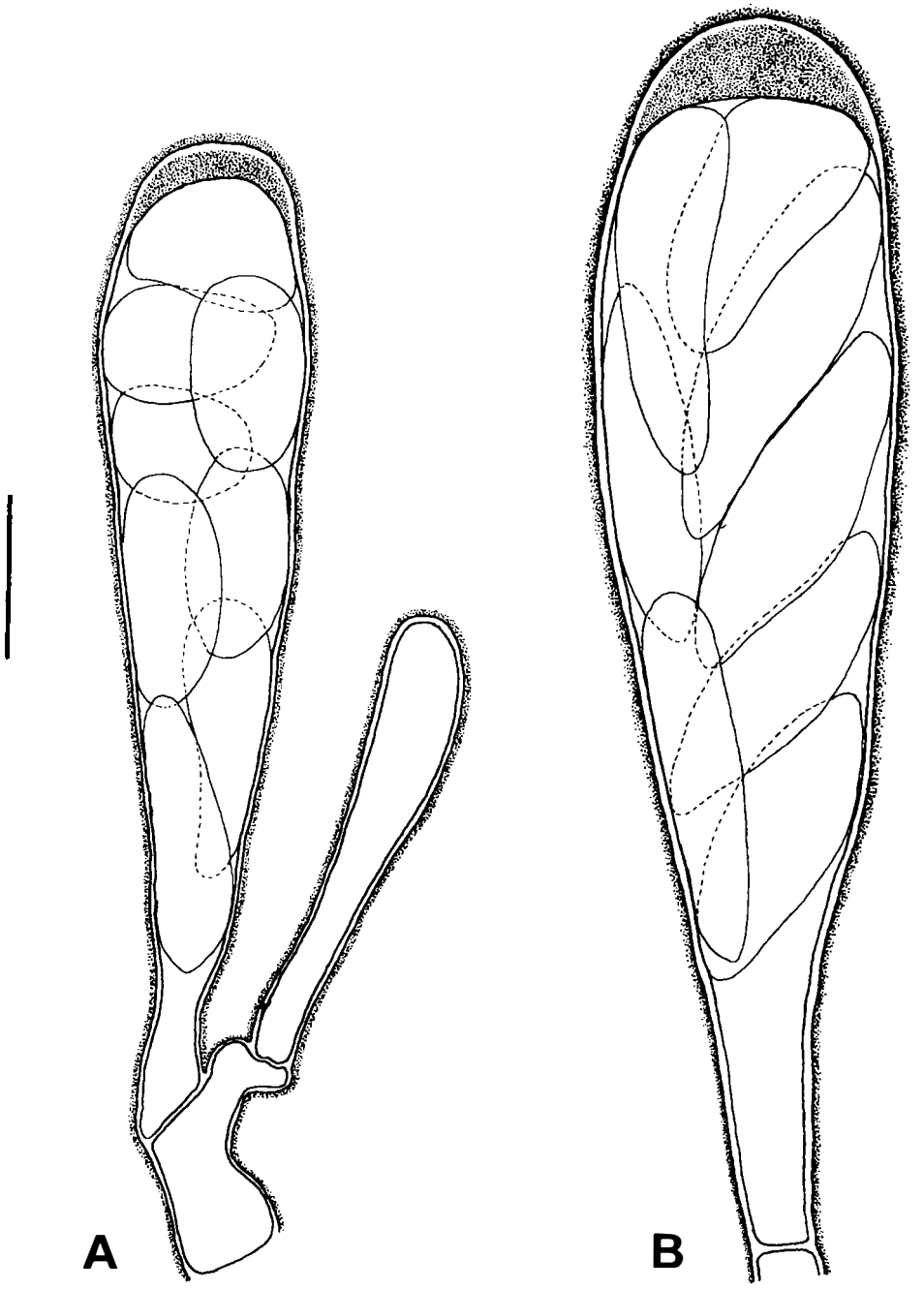

Fig. 1: Asci in dilute Lugol's solution and ascospores. A: *Ophioparma handelii* (W, holotype); B: *Ophioparma pseudohandelii* (TNS, holotype). Scale: 10 µm.

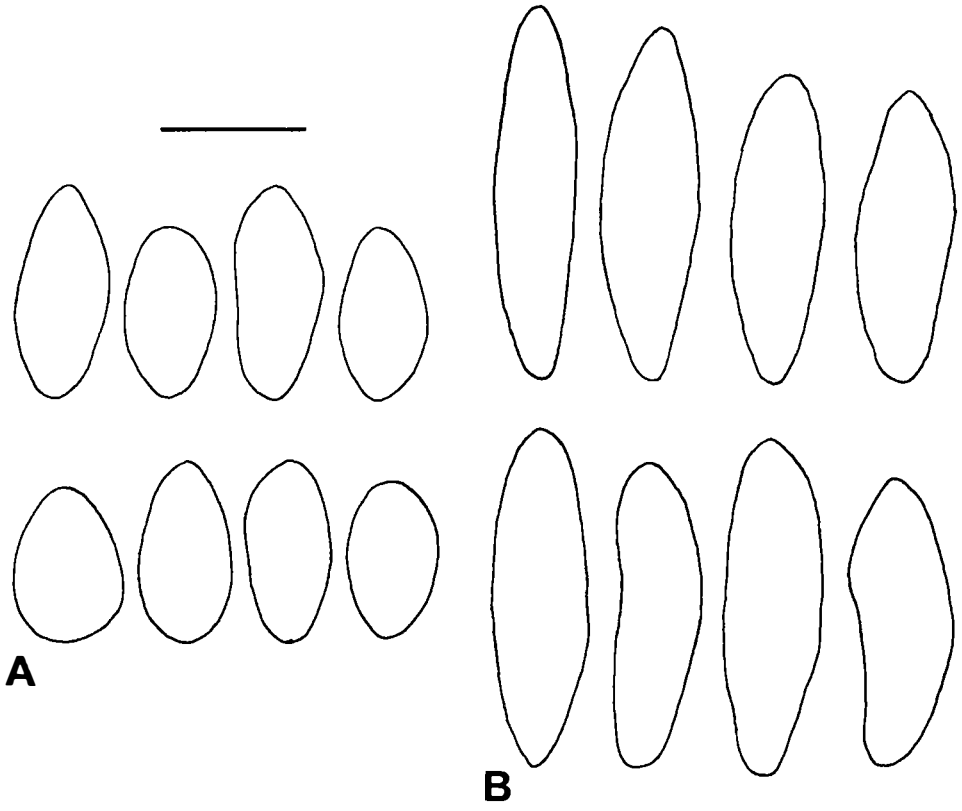

Fig. 2: Ascospores. A: *Ophioparma handelii* (W, holotype); B: *Ophioparma pseudo-handelii* (TNS, holotype). Scale: 10 µm.

acid, composed of irregularly arranged, unpigmented hyphae with lumina of 1 - 2 µm. Algal layer well delimited, 30 - 50 µm; photobiont trebouxioid. Medulla 80 - 110 µm, of loosely entangled, unpigmented hyphae of 3 - 4 µm. Hypothallus white, between the areoles, mainly endophloeodic. Apothecia sessile, 1.5 - 2.0 mm diam., round to strongly flexuose, single or in groups of up to 12, 10 - 40/cm², ± regularly distributed on the thallus. Disc flat to convex, brick red, with a matt, non-pruinose surface. Margin whitish to rose, weakly prominent, persistent. Thalline exciple of ± radially orientated hyphae. True exciple laterally 100 - 170 µm, prosoplectenchymatic; outer zone greyish due to the presence of granules; inner zone greyish; hyphae with lumina of 1.5 - 3 µm; apical cells with lumina up to ± 3 µm. Hypothecium ± colourless, up to 200 µm, composed of ± loosely interwoven hyphae. Subhymenium 50 - 70 µm, ± colourless. Hymenium basally colourless, apically without granules, I_{Lugol}+ blue, K+ violet (soon fading), ± 70 µm. Epihymenium poorly delimited, with orange-brown granules, K+ violet. Paraphyses simple, rarely anastomosing, with lumina of 1.5 - 2.0 µm; apical cells unpigmented, with lumina of 1.5 - 2 µm. Asci of *Ophioparma*-type (Fig. 1B), 70 - 80 x 12 - 18 µm; amyloid wall layer c. 1.0 µm thick, I_{Lugol}+ blue; non-amyloid wall layer ± 0.8 µm thick; tholus dark blue. Ascospores

ellipsoid-fusiform, colourless, non-septate (Fig. 2), (17-) 22.1 (-24) x (6.5-) 7.4 (-8) µm; av. length-width-index 3.0 : 1; wall ± 0.3 µm thick. Pycnidia not observed. Chemistry: Thallus: lecanoric acid; apothecia: lecanoric acid, haemoventosin.

Within the genus, *Ophioparma pseudohandelii* is characterized by the non-septate hyaline, ellipsoid-fusiform ascospores, and the production of lecanoric acid besides haemoventosin.

Ecology and distribution: The species is known from the type locality in Japan growing on bark of *Cryptomeria japonica*, at c. 1120 m altitude, and from Hananoe-go, Yakushima Island.

Conclusions

Beside the non-septate ascospores and their substratum, no anatomical and chemical characters are found to distinguish *Lecidea handelii* and *L. pseudohandelii* generically from the saxicolous species of *Ophioparma*. This concerns e. g., the *Ophioparma*-type asci, bacilliform pycnospores, the occurrence of simple paraphyses, the development of a thick exciple, an unpigmented hypothecium, the absence of atranorin as cortical compound and the presence of the naphthoquinone haemoventosin in the epihymenial layer, as well as the extra-tropical distribution. The ellipsoid to ovoid ascospores of *O. handelii* look rather untypical for *Ophioparma*. The spores of *O. pseudohandelii*, however, exhibit an intermediate shape between those of *O. ventosum* and the latter species.

Lecidea handelii has been characterized in detail by SCHNEIDER (1979: 191), being compared with *Hypocenomyce friesii* (Ach.) P. James & G. Schneider. The ascus anatomy and thallus morphology of these two species show some similarities, but beside these, there are hardly any other correlating features to be found. The squamules of *H. friesii* are smaller than those of *O. handelii*, the apothecia are black, persistently plane and mostly strongly flexuose to gyrose. They bear no resemblances to the red apothecia found in all species of *Ophioparma*. Also no thalline exciple is present. The true exciple ("type 2" of TIMDAL, 1984: 86), as well as the hypothecium, is strongly pigmented. No distinct colour reaction was achieved by spot test with K, C or N, in *H. friesii* and haemoventosin is definitely absent. Pycnidia are bacilliform in both *O. handelii* and in the type species of *Ophioparma*, *O. ventosa*. In *H. friesii* they are more or less ellipsoid.

The asci of the Ophioparmaceae show some similarities with those of the families Brigantiaeaceae, Ropalosporaceae, or Sarrameanaceae, exhibiting an entirely amyloid tholus without further differentiations of the amyloid structures. It still remains to be clarified whether these families (partly as "group no. 10" in HAFELLNER 1984: 259) are a natural group within Lecanorales or are related with the Teloschistineae. According to HAFELLNER et al. (1993), this suborder actually includes the families Fuscideaceae, Letrouitiaceae, Teloschistaceae, and probably also Peltulaceae. Their members exhibit asci of the '*Teloschistes*-type' with a more or less strongly amyloid tholus and a well developed amyloid external wall layer. Probably some of the families mentioned above may be related to the Teloschistineae and *Ophioparma*-type asci are interpretable as variation of the *Teloschistes*-type with a less developed or reduced amyloid external wall layer. To decide this, however, further anatomical and ontogenetical studies remain to be done.

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Addresses of the authors

Dr. Christian Printzen, Institut für Naturwissenschaften und ihre Didaktik, Universität Köln, Gronewaldstraße 2, D-50931 Köln, Germany.

Dr. Gerhard Rambold, Botanische Staatssammlung München, Menzinger Straße 67, D-80638 München, Germany.