



## ***Immersaria* and *Koerberiella*, two new generic records to India**

**Pandit GS**

*Agharkar Research Institute, G.G. Agarkar Road, Pune 411 004 Email: gargee.pandit@gmail.com*

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### **Abstract**

The crustose lichen genera *Koerberiella* and *Immersaria* were discovered from the North-Western ghats of India and represents new generic records for the lichen flora of the Indian continent. The genus *Koerberiella* is represented here by a sterile isidiate morphotype of *K. wimmeriana* from the rocky outcrops of Kas and *Immersaria* by a species closely related to *I. olivacea* from the Panchgani plateau.

**Key words** – lichen – outcrops – *Porpidiaceae* – taxonomy

### **Introduction**

The Western Ghats is an imposing north-south hill range that forms the western edge of the Deccan plateau. The Western Ghats hilltops are characteristically flat tabletops or mesas. The toposheets of the region often mark these rocky plateaus as “rocky scrub” or “rocky waste” or simply as sheet rock. Owing to the scarcity of woody species or forest cover, the plateaus appear devoid of vegetation in the Remote Sensing images. Despite the fact that rock outcrop habitats form striking landscape elements throughout India and often have an immense cultural and religious importance, very few have been studied for their biodiversity (Aparna Watve 2013). This study is based on surveys and collection of lichens on the Kas and Panchgani plateaus in India. This article gives an account of two species in the genera *Koerberiella* Stein. and *Immersaria* Rambold & Pietschm newly found in the Satara district, Maharashtra. Generic characters are given in Table 1.

In recent years, several crustose lichens with aspicilioid apothecia have been recognized as members of the family *Porpidiaceae*. This family is represented with twenty-one genera at the world level ([http://zipcodezoo.com/Key/Fungi/Porpidiaceae\\_Family.asp](http://zipcodezoo.com/Key/Fungi/Porpidiaceae_Family.asp)) and, in India, it is represented by only one genus *Porpidia* Körb. and its three species and their varieties (Upreti & Chatterjee 2002). *Porpidiaceae* family is mainly characterized by asci with a tube-like amyloid structure in the tholus and non septate, typically halonate ascospores. Hafellner (1984) established the family *Porpidiaceae* and designated *Porpidia* as its largest genus. Most members of the *Porpidiaceae* are lecideoid although a few are more or less aspicilioid or lecanoroid (Rambold et al. 1990). Lecanorine apothecia occur constantly in the lichen genus *Koerberiella*, which is the only true lecanorine member of the family *Porpidiaceae* (Hafellner 1984).

Molecular studies (Buschbom & Barker 2006) indicates that *Porpidia* is not monophyletic as some smaller genera (*Amygdalaria*, *Immersaria*, *Stenhammarella* and *Stephanocyclos*) of the *Porpidiaceae* and probably also the genus *Lecidea* (*Lecideaceae*), are nested within it. (Li Bo et al. 2014).

*Koerberiella* is represented by twenty six species and *Immersaria* is represented by seven species at the world level ([www.indexfungorum.org](http://www.indexfungorum.org)) and in India they form the first generic records.

## Materials & Methods

The study is based on the collection made at Kas and Panchgani rocky outcrops, Satara district, Maharashtra. The specimens are deposited in the Ajrekar Mycological Herbarium (AMH). Sections of the thalli and ascomata were mounted in water, 10 % KOH (K), Lugol's solution (I), and lactophenol cotton blue (LPCB). All measurements were made on material mounted in water. Secondary products were identified by thin-layer chromatography using standards methods (Culberson & Kristinsson 1970; Culberson 1972; White & James 1985) with the solvent systems toluene-dioxane-acetic acid (180:45:5) and toluene-ethyl acetate-formic acid (139:83:8). The plates were examined under UV light (365 nm).

## The Species

### *Immersaria cf. olivacea* Calatayud & Rambold

Fig. 1

*Lichenologist* 30(3): 234 (1998).

Thallus crustose, saxicolous, areolate, whitish to off white, sometimes creamish, cracked, non sorediate, non isidiate, epruinose; hypothallus indistinct or not seen. Upper cortex hyaline, paraplectenchymatous; medulla with crystals. Lower cortex paraplectenchymatous. Ascomata black, apothecioid, flush with the thallus to immersed, 1–4 (-5) per areolate, up to 1 cm wide. Areoles up to 0.5 mm in diam. Disc shiny black, convex, epruinose, lecanorine, with margin epruinose, concolorous with the thallus. Proper exciple prosoplectenchymatous. Epithecium greenish, 12.5–20 µm tall, anastomosed and branched. Hymenium hyaline, 100–125 µm tall. Hypothecium hyaline, 100–125 µm tall. Asci 8-spored. Ascospores hyaline, 1-septate, 9–11 × 5–6 µm.

Chemistry – Thallus UV-, atranorin, gyrophoric acid and traces of unknown substances present.

Remarks – The specimen from India resembles *Immersaria olivacea* in having 1-septate ascospores and an epihymenium greenish in colour, but differs from this species in the thallus colour (olivaceous in *I. olivacea*) and the chemistry: *Immersaria olivacea* either lacks lichen substances or has traces of stictic acid, whereas the specimen from India has atranorin, gyrophoric acid and traces of unknown compounds. Because I have only a single collection from the area and further collection could reveal variations in chemistry and thallus colour, I am here recording this species as *Immersaria cf. olivacea*. The studied specimen has been collected on exposed volcanic rocky outcrops in a disturbed habitat at an altitude of approximately 1200 m. The specimen has been found growing on the East-facing side of the rock from Panchgani. However, this species is known from Spain at a low altitude not exceeding 700 m.

The specimen from India is similar to *Immersaria usbekica* (Hertel) M. Barbero, Nav.-Ros. & Cl. Roux and *Immersaria cupreatra* (Nyl.) Calatayud & Rambold an Eurasian species in having gyrophoric acid, but otherwise differs in many other characters (e.g., spore septation). (Calatayud & Rambold 1998).

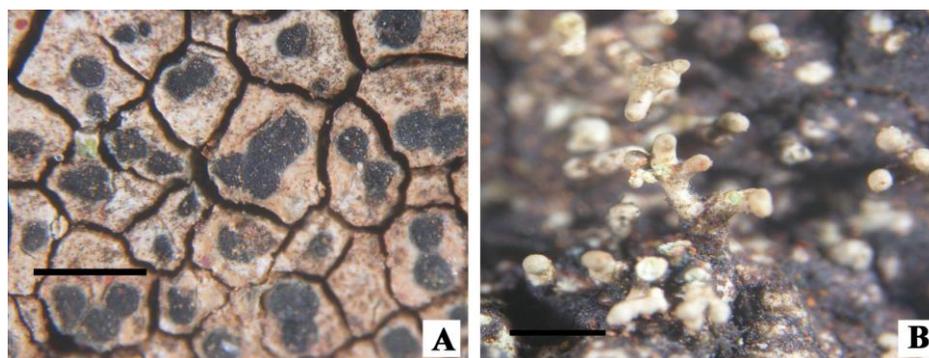
Specimen examined (AMH) – India, *Maharashtra*: Satara District, Panchgani plateau, 15.10.2013, about 1200 m elevation, 2013, *G.S. Pandit*, 13.67.

### *Koerberiella wimmeriana* (Körber) B. Stein

Fig. 1B

In Cohn, *Krypt. Fl. Schlesien* 2(2): 143 (1879).

Thallus crustose, saxicolous, greenish grey to bluish-green, isidiate, scars of the fallen isidia visible. Isidia globular initially, later cylindrical, 25–37.5 µm tall. Upper cortex reddish-brown, parenchymatous, (12.5) –20–30 µm tall. Algal layer more or less uniform, 37.5–50 µm thick, with dark green algae, unicellular, roundish, 5–7.5 µm in diameter. Medulla white, cellular, 25–30 µm.



**Fig.1** – Habitus. A. *Immersaria olivacea*; B. *Koerberiella wimmeriana* (AMH). Bars =1 mm.

Lower cortex dark reddish-brown, 25–37.5 (50)  $\mu\text{m}$  tall, sometimes rhizoid like structures seen centrally, bushy and dark chocolate colour, embedded in rock. Hypothallus black. Apothecia not seen.

Chemistry –Thallus UV- ; atranorin and an unknown greenish substance at Rf 4.

*Remarks* – The sterile morphotype is the most common form seen in Europe (Rambold et al. 1990). *Koerberiella wimmeriana* is the only isidiate taxon in the *Porpidiaceae* family. Greenish grey to bluish-green, isidiate patches were found on the more exposed somewhat disturbed parts of the same rock surface as well as in the crevices of the boulders. Indian specimens match with the photographs of (Sharnoff S ([http://www.sharnoffphotos.com/lichensH/lichen\\_mysteries\\_11.html](http://www.sharnoffphotos.com/lichensH/lichen_mysteries_11.html))) and resemble the common European morph, with both the dispersed-areolate, verrucose to “isidioid” patches, and the more or less smooth rimose-areolate patches.

Found growing directly on the exposed rocky lateritic plateaus at an altitude of about 1227 m and in the disturbed area of the Kas plateau, where there is disturbance by tourism. It was also collected near the rock crevices at 17°.72486' N to 73°.82729' E. A single collection was also made in the undisturbed area of the plateau.

*Distribution* – India (Maharashtra), North-America, Western Europe and Eastern Asia.

*Specimens examined* (AMH) – India, *Maharashtra*: Satara District, Kas plateau, undisturbed area, about 1200 m elevation, 2013, G.S. Pandit & S. Gaikwad, 13.02; disturbed area, C1L3, 2013, G.S. Pandit & S. Gaikwad, 13.18; disturbed area, in crevices, 17°.72486'N – 73 °.82729'E, G.S. Pandit & S. Gaikwad, 13.19; disturbed C area, G.S. Pandit & S. Gaikwad 13.23, 13.24.

**Table 1** Characters of *Immersaria* and *Koerberiella*

Characters	<i>Immersaria</i> Rambold & Pietschm	<i>Koerberiella</i> B. Stein
Thallus	Thallus brown, areoles with a flat to concave surface.	Thallus crustose, areolate, mostly isidiate, with coccoid trebouxoid green algae, and containing paradesides of the orcinol-type.
Apothecia	Apothecia, immersed with a more or less strongly reduced proper margin and with a greenish-blackish pigmented parathecial crown, which is mostly separated by a fissure from the areole from which it originates. Exciple lecanorine, prosoplectenchymatous. Hymenium hyaline. Hypothecium hyaline.	Apothecia sessile, roundish, with lecanorine margin. Disc pale red-brown to dark brown. Ectal excipulum $\pm$ pseudoparenchymatous, medullary zone of the excipulum partly containing algal cells. Hymenium colourless, I + (bluish) brown and I <sub>conc.</sub> + bluish brown to orange. Hypothecium colourless (partly with brownish to dark brown pigment towards the subhypothecial medulla).
Asci	<i>Porpidia</i> -type, non-amyloid.	Asci with amyloid tub-like structure in the tholus.
Ascospores	Ascospores hyaline, simple to 1-septate.	Ascospores hyaline, simple, halonate.

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