

# New distributional records of two species of *Pertusaria* DC. (lichenized *Ascomycota*) from India

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## ABSTRACT

Gupta S. & Singh K.P. 2022. New distributional records of two species of *Pertusaria* DC. (lichenized *Ascomycota*) from India. *Geophytology* 52(1&2): 147–151.

The paper reports two species of *Pertusaria* DC., viz. *P. astomoides* Nyl. and *P. mendax* Müll. Arg. as new records for the Indian lichenized *Ascomycota*. *Pertusaria astomoides* is characterized by its saxicolous habit, verruciform apothecia, 2-spored asci and the presence of atranorin, norstictic and stictic acids, while *Pertusaria mendax* is distinguished by its corticolous habit, 2-spored asci and presence of norstictic acid. Both species are briefly described to facilitate their identification.

**Keywords:** Lichenized fungi, *Ascomycota*, *Lecanoromycetes*, Arunachal Pradesh, Sikkim, India.

## INTRODUCTION

The genus *Pertusaria* DC. is widely distributed in almost all habitats from high arctic to wet tropics. It is characterized by crustose thallus with *Trebouxia*, a green alga as photobiont, apothecoid or perithecioid ascomata immersed in thalline verrucae, branched and anastomosing paraphysoids, 1–8-spored asci and large, simple, hyaline, thick walled ascospores. As such, there is no world monograph of the genus. However, some significant taxonomic accounts of the genus have been published from Australia (Archer 2012), China (Zhao & al. 2004), Japan (Oshio 1968), Greater Sonoran Desert region (Nash III & al. 2002) and North America (Dibben 1980). Awasthi (1991) worked out on the species of Indian Subcontinent and presented a key of 49 species. Currently, the genus is represented by c. 61 species (Gupta & Singh 2013) in India, out of c. 517 species (Archer & Elix 2013, 2014a, b,

Jariangprasert 2013, Ren & Kou 2013, Ren & Zhao 2014) known from the World. While studying further collections of Indian *Pertusariaceae* two more species, viz. *Pertusaria astomoides* Nyl. and *P. mendax* Müll. Arg. have been discovered as new distributional records for the Indian lichenized *Ascomycota*. The identity of both the taxa was confirmed by authenticating these with the type specimens of the species. These are briefly described to facilitate their identification.

## MATERIALS AND METHODS

Materials of *Pertusaria* from Botanical Survey of India, Allahabad herbarium (BSA) were investigated using standard light microscope Nikon ECLIPSE 50i with photo camera Nikon DS-Fi1 and sections were examined after mounting in water or 10% KOH solution. For morphological studies stereomicroscope MOTIC SMZ-168 SERIES was used. All anatomical

measurements refer to sections mounted in 10% KOH solution. Chemical analysis was carried out using standard methods of Thin Layer Chromatography (Orange & al. 2001). Identification was carried out by comparing own observations with descriptions of type specimens, taken on loan from Botanical Museum, University of Helsinki, Finland (H) and Cryptogamic herbarium, Genève, Switzerland (G).

### NEW ADDITIONS TO INDIAN LICHENIZED ASCOMYCOTA

The following two species of genus *Pertusaria* DC., viz. *P. astomoides* Nyl. and *P. mendax* Müll. Arg., are described below. These species are new additions to the Indian lichenized *Ascomycota*.

**Phylum:** *Ascomycota* Caval.-Sm.

**Class:** *Lecanoromycetes* O.E. Erikss. & Winka

**Order:** *Pertusariales* M. Choisy ex D. Hawksw. & O.E. Erikss.

**Family:** *Pertusariaceae* Körb.

**Genus:** *Pertusaria* DC.

*Pertusaria astomoides* Nyl., Lich. Jap. 51.1890.

Figure 1.a, 2.a–d

**Type:** Japan: Takashima, on rock, 1879, E. Almquist s.n. (Holotype—H-Nyl.!)

**Description:** Thallus in investigated specimens is saxicolous, crustose, 200–235 µm thick; margins entire, unzonated; prothallus absent; upper surface greenish to blackish-grey, verrucose, lacking isidia or soredia; upper cortex 28–49 µm thick; photobiont layer horizontally continuous, 48–78 µm thick; photobiont a green alga *Trebouxia*; algal cells spherical, 8.78–9.71 µm diam. Fertile verrucae pertusariate, concolorous with thallus, spherical to flattened, hemispherical, numerous, contiguous to fused, 1.43–1.80 mm diam., 0.79–1.0 mm high; ostioles indistinct; apothecia 2–3 per verrucae, hemispherical, 0.26–0.38 mm diam., 0.28–0.44 mm high; hymenium hyaline to brown, K/I–; epithecium K+ violet, 40–53 µm thick; paraphyses branched and richly anastomosing, 1.69–1.80 µm thick; asci 2-spored, 196–210 × 29–33 µm, cylindrical, K/I+ blue;

ascospores hyaline, oblong, 84–134 × 23–29 µm; ascospore wall 2-layered; outer spore wall 1.90–2.60 µm thick; inner spore wall 1.60–3.0 µm thick, smooth.

**Chemistry:** Medulla K+ red, C–, Pd+ yellow-orange, UV–. TLC: atranorin, norstictic and stictic acids.

**Taxonomic remarks:** *Pertusaria astomoides* Nyl. is characterized by its saxicolous habit, verruciform apothecia, 2-spored asci, and presence of norstictic acid. In presence of norstictic acid it resembles *Pertusaria praetervisa* var. *expallens* which has smaller, 97–105 µm long ascospores (Archer & Elix 2011) and distinct morphology. In 2-spored condition and saxicolous habit it also resembles *Pertusaria indica* which has methylperlatolic acid. The species grows on siliceous rocks in dry shady places and was known earlier from Japan.

**Specimens examined: Arunachal Pradesh:** Lower Debang valley district, Mehao Wild Life Sanctuary, Roing Mini Zoo, alt. c. 400 m, on rock, Singh & Dixit 521A, 515B, 526B (BSA); **Sikkim:** West Sikkim district, Yuksom village, Yamling, on sand stone, Gupta & Singh 7590, 7592 (BSA). North Sikkim district, Lachung, Government Veterinary Hospital campus, alt. c. 2764 m, on rock, Gupta & Singh 7527 (BSA).

*Pertusaria mendax* Müll. Arg., Flora, 64:  
517.1881

Figure 1.b, 2.e–h

**Type:** Japan: Oji, Tokyo, on bark, 1881, Braus, s.n. (Holotype—G!)

**Description:** Thallus corticolous, crustose, 204–257 µm thick; margins entire, unzonated; prothallus absent; upper surface dull, rough, blackish-grey, lacking isidia or soredia; upper cortex 20–48 µm thick; photobiont layer horizontally continuous, 40–68 µm thick; photobiont a green alga *Trebouxia*; algal cells spherical, 9–11 µm diam. Fertile verrucae pertusariate, concolorous with thallus, spherical to flattened hemispherical, numerous, contiguous to fused, 1.80–2.40 mm diam., 1.0–1.20 mm high; ostioles inconspicuous, black, numerous up to 16 per verrucae, 1.26–2.00 µm diam.; apothecia 2–4(–6) per verruca,

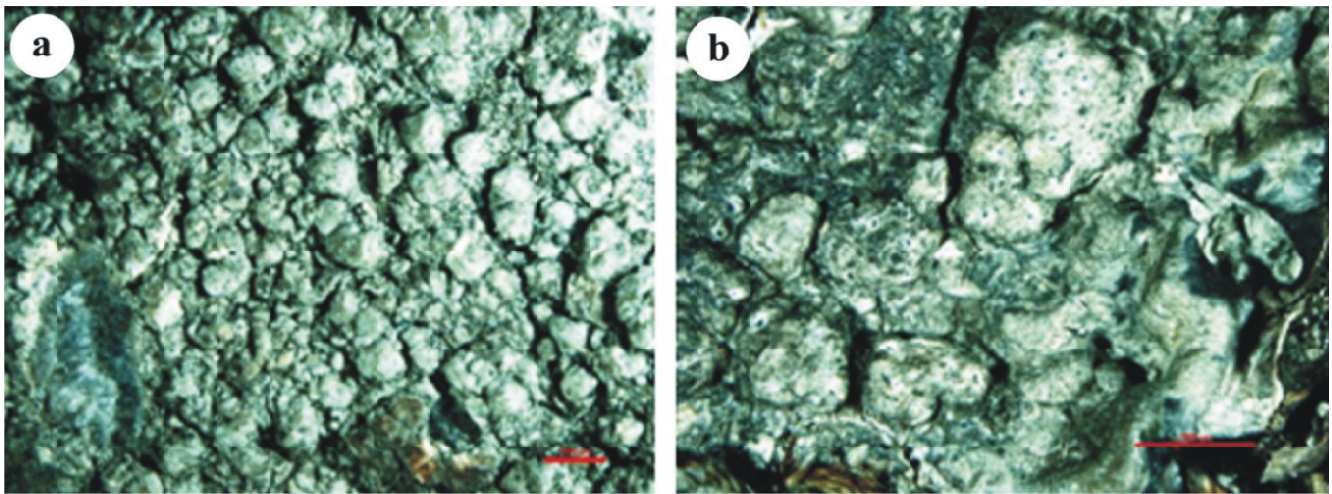


Figure 1. a-b. Habit. a. *Pertusaria astomoides* Nyl. b. *Pertusaria mendax* Müll. Arg. Scale = 1 mm

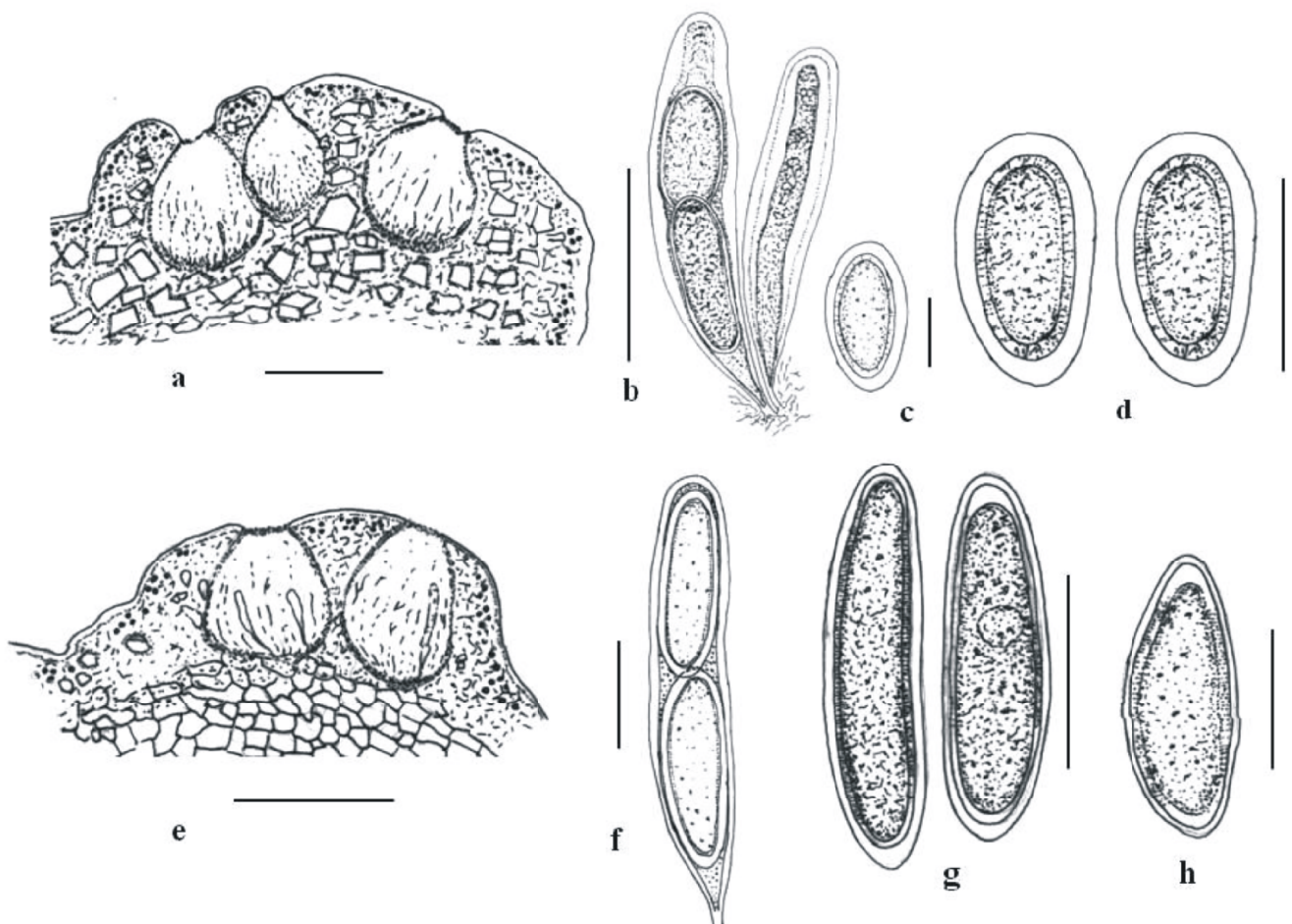


Figure 2. a-d. *Pertusaria astomoides* Nyl., a. Vertical section through verrucae (scale = 500  $\mu$ m). b. 2-spored asci (scale = 100  $\mu$ m). c. Ascospores (scale = 50  $\mu$ m). d. Ascospores (scale = 100  $\mu$ m). e-h. *Pertusaria mendax* Müll. Arg., e. Vertical section through verrucae (scale = 500  $\mu$ m). f. 2-spored asci (scale = 100  $\mu$ m). g. Ascospores (scale = 75  $\mu$ m). h. Ascospore.

spherical to hemispherical, 0.48–0.52 mm high, 0.50–0.64 mm diam.; hymenium hyaline to brown, K/I–; epithecium hyaline to brown, K–; paraphyses branched and richly anastomosing, 1.20–1.78  $\mu\text{m}$  thick; asci broadly cylindrical, 2-spored, 380–412  $\times$  48–56  $\mu\text{m}$ , K/I+ blue; ascospores hyaline, oblong to broadly ellipsoid, 132–162  $\times$  37–39  $\mu\text{m}$ ; ascospore wall 2-layered; outer spore wall 2.26–3.00  $\mu\text{m}$  thick; inner spore wall 2.13–2.80  $\mu\text{m}$  thick, smooth.

**Chemistry:** Medulla K+ blood red, C–, Pd+ yellow to orange, UV–. TLC: norstictic acid.

**Taxonomic remarks:** *Pertusaria mendax* is characterized by its corticolous habit, verruciform apothecia, 2-spored asci, numerous inconspicuous ostioles and presence of norstictic acid. In 2-spored condition it resembles *Pertusaria hartmannii* and *Pertusaria subobductans* but both later species contain additional methylperlatolic acid. The species grows at high altitude along the river side in moist shady places. Outside India it is distributed in Japan.

**Specimens examined: Sikkim:** North Sikkim district, Lachung, at 5 km point on Dombiyong road, alt. c. 3034 m, on fallen twigs of *Rhododendron*, Gupta & Singh 7566, 7576, 7578 (BSA).

## DISCUSSION

Lichens constitute one of the important components of Indian flora and occur almost in all habitats where suitable environmental conditions are available. Many areas of the country are still unexplored or under-explored and exploration of such areas results in the discovery of interesting information, like new records for the country/state or new species to science. The continuous addition of lichen species (Gupta & Sinha 2014, Jagadeesh Ram & Singh 2014, Joseph & al. 2014, Singh & Singh 2014a, b) to Indian lichen flora is an indication that the country has enormous undiscovered lichen biodiversity. This is further justified by the discovery of two above mentioned *Pertusaria* species from under explored areas of north-eastern India. Since lichens play a significant role in air pollution monitoring (Showman 1988, Wirth 1988), climate change studies (van Herk & al. 2002, Elix & al. 2007),

ecosystem functioning (Slack 1988) and pharmaceutical industry (Kumar & Muller 1999, Shahi & al. 2001) besides many other uses (Saklani & Upreti 1992, Singh & Sinha 1997) their documentation from different parts of the country is an essential task before us.

## CONCLUSION

The present study adds two more species in the knowledge of lichen wealth of India. This knowledge will be utilized for the conservation of species, identification of taxa occurring in other parts of the country and the secondary metabolites present can be utilized for the bioactivities.

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