

---

## Two remarkable xylariaceous ascomycetes associated with elephant dung

---

Deepna Latha KP and Manimohan P\*

Department of Botany, University of Calicut, Kerala, 673 635, India

Deepna Latha KP, Manimohan P 2012 – Two remarkable xylariaceous ascomycetes associated with elephant dung. Mycosphere 3(2), 261–265, Doi 10.5943 /mycosphere/3/2/10

A continuing survey of coprophilous fungi associated with elephant dung in Kerala State, India has resulted in the discovery of two lesser known xylariaceous fungi. This forms the second record worldwide of *Podosordaria elephantii* and the first record of *Poronia pileiformis* on elephant dung. Both fungi are described, illustrated and discussed based on the Kerala collections.

**Key words** – Ascomycota – coprophilous fungi – new records– Xylariaceae

---

### Article Information

Received 20 April 2012

Accepted 23 April 2012

Published online 30 April 2012

\*Corresponding author: P. Manimohan – e-mail – pmanimohan@gmail.com

---

### Introduction

Most xylariaceous species produce stromata on decaying dicot wood, although some fruit on decaying monocot wood, fallen fruits and seeds, fallen leaves and petioles and termite nests (Hsieh et al. 2010). However, several genera of the Xylariaceae such as *Areolospora*, *Hypocopa*, *Podosordaria*, *Poronia* and *Wawelia* are coprophilous. *Podosordaria* and *Poronia* are closely related genera containing species that are sometimes considered as belonging to *Xylaria* but are differentiated from the latter by their capitate stromata and coprophilous nature. While *Poronia* has a rather flattened, nailhead-like fertile part, *Podosordaria* has a subglobose head (Dennis 1957). According to Rogers et al. (1998), *Podosordaria* has anamorphs assignable to *Geniculosporium* while *Poronia* has *Lindquistia* anamorphs.

During our studies on fungi associated with elephant dung in Kerala State, India, we came across, on several occasions, two remarkable species of *Podosordaria* and *Poronia*, which are described, illustrated and discussed here. This is the second instalment of our observations on fungi associated with elephant

dung, the first being an account of agarics on this substratum (Manimohan et al. 2007).

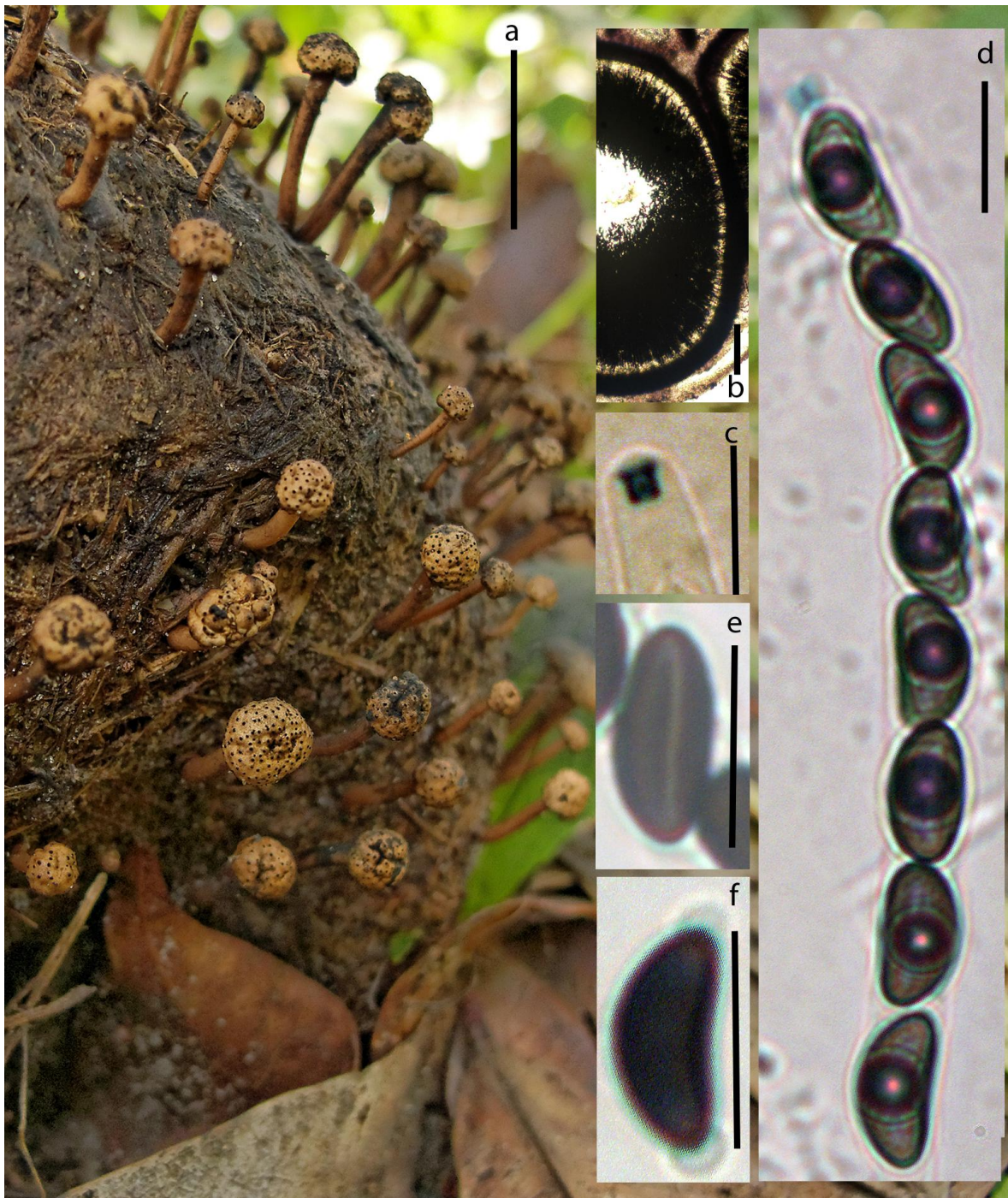
### Methods

Stromata were collected from natural forests (wildlife sanctuaries and national parks) of Kerala State, India. Conventional morphology based mycological methods were employed to examine the material. Microscopic examinations were carried out on specimens mounted in water, Congo red, and Melzer's reagent. Ascospore length and width were calculated on twenty ascospores discharged from mature asci. The examined collections are deposited at Kew (Mycology) Herbarium and the Kew accession numbers (e.g., K(M) 175512) are indicated.

### Results and Discussion

*Podosordaria elephantii* J.D. Rogers, Y.-M. Ju, Mycotaxon 67: 64 (1998) Fig. 1

Stromata stipitate, unbranched, soft-textured; fertile part 2–6 mm wide, terminal, subglobose, pale yellow, studded with black papillate ostioles of numerous protruding



**Fig. 1** – *Podosordaria elephantii*. **a** stromata on elephant dung. **b** section of perithecia. **c** apical apparatus of ascus. **d** ascospores. **e** germ-slit on ascospore. **f** polar appendages on ascospore. Bars: a = 1 mm b = 100 µm c–f = 10 µm.

perithecia stipe 0.6–1.7 cm × 0.5–2 mm, often striate, yellowish brown, abrupt, firmly attached and difficult to separate from the substratum; stromatal interior solid throughout, cream coloured.

Perithecia uniformly distributed throughout the fertile portion of the stroma, 700–1060 × 690–890 µm, fully immersed, subglobose or globose, with papillate ostioles. Peridium

50–65 µm wide, multilayered; outer wall darker, becoming paler towards the interior. Periphyses not observed. Paraphyses 3.5–5.5 µm wide, filiform, copious, septate, unbranched, hyaline, gradually tapering towards the tip, exceeding the length of the asci. Asci 66–111 × 4.5–5.5 µm, cylindrico-clavate, pedicellate, thin-walled, unitunicate, spore-bearing part 66–76 µm long, with an apical apparatus

(about  $2\text{--}2.5 \times 1.5\text{--}2 \mu\text{m}$ ) bluing in Melzer's reagent, 8-spored. Ascospores uniseriately arranged with slightly overlapping ends,  $8.5\text{--}11.5 \times 4\text{--}5$  ( $9.7 \pm 0.8 \times 4.5 \pm 0.3$ )  $\mu\text{m}$ ,  $Q = 1.8\text{--}2.6$ ,  $Q_m = 2.1$ , inequilaterally ellipsoid or subphaseoliform, dark brown, one-celled, thick walled, smooth, with gelatinous sheath extending to polar pad-like gelatinous appendages, with 1–2 guttules and a straight germ slit.

Habitat – On elephant dung, scattered.

Known distribution – Thailand, India.

Material examined – India, Kerala State, Wayanad District, Muthanga Wildlife Sanctuary, 5 September 2011, K.P. Deepna Latha DKP23 (K(M) 175512).

Notes – The present collection is in remarkable agreement with the description of *Podosordaria elephantii* (Rogers et al. 1998) in the general morphology of the stromata, in most microscopic features such as the size and shape of both asci and ascospores and in occurring on elephant dung. The Kerala collection, however, had ascospores with pad-like gelatinous appendages on both ends and abundant paraphyses. Anamorph of the present Indian collection was not observed. After the original description based on a collection made in Thailand, no other record of *P. elephantii* seems to have been published. Hence, this is the second record worldwide of the species.

***Poronia pileiformis*** (Berk.) Fr., Nova Acta R. Soc. Scient. upsal., Ser. 3 1: 129 (1851) Fig. 2

Stromata long,  $10.5\text{--}24.5 \text{ cm} \times 2\text{--}8 \text{ mm}$ ; fertile part initially convex, becoming subglobose with incurved margin on drying, 3–8 mm wide, lower part of head dark brown and upper surface whitish to pale yellow, studded with black papillate ostioles of numerous embedded perithecia; stipe long, slender,  $10.5\text{--}21.5 \text{ cm} \times 2\text{--}5 \text{ mm}$ , smooth, dark brown to black, with a distinctly bulbous base deeply rooted in the substrate, simple or sparingly branched. Stromatal interior solid throughout, cream coloured.

Perithecia uniformly distributed throughout the fertile portion of the stroma,  $450\text{--}1930 \times 310\text{--}1080 \mu\text{m}$ , fully immersed, with a protruding ostiolar region up to  $320 \mu\text{m}$  long, versiform. Peridium  $20\text{--}140 \mu\text{m}$  wide, composed of dark, narrow, densely interwoven hyphae. Paraphyses not observed. Paraphyses

$2\text{--}6 \mu\text{m}$  wide, sinuoso-filiform, copious, septate, unbranched, hyaline, gradually tapering towards the tip, exceeding the asci in length. Asci  $43\text{--}92.5 \times 4\text{--}6 \mu\text{m}$ , cylindric-clavate, somewhat pedicellate, thin-walled, unitunicate, spore-bearing part  $49\text{--}71 \mu\text{m}$  long, with an apical apparatus (about  $1.5\text{--}3.5 \times 2\text{--}3 \mu\text{m}$ ) bluing in Melzer's reagent, 8-spored. Ascospores uniseriately arranged with slightly overlapping ends,  $8\text{--}11 \times 4\text{--}5$  ( $9.1 \pm 0.6 \times 4.4 \pm 0.3$ )  $\mu\text{m}$ ,  $Q = 1.6\text{--}2.5$ ,  $Q_m = 2.06$ , inequilaterally ellipsoid to fusiform, brown or brownish black, one-celled, thick-walled, smooth, with a faint mucilaginous sheath, with 1–2 guttules and a straight germ slit.

Habitat – On elephant dung, scattered, singly or in small groups.

Known distribution –Philippine Islands, Peru, Costa Rica, Taiwan, India.

Material examined – India, Kerala State, Palakkad District, Silent Valley National Park, 9 November 2010, Deepna Latha K. P. DKP5 (K(M) 175517); Wayanad District, Muthanga Wildlife Sanctuary, 5 September 2011, K.P. Deepna Latha DKP22 (K(M) 175516).

Notes – *Poronia pileiformis* was first described from the Philippine Islands by Berkeley (1842) and subsequently it has been recorded from Peru and Costa Rica (Paden 1978) and Taiwan (Ju & Rogers 2001). Because the type of *P. pileiformis* from the Philippines is immature, Ju & Rogers (2001) designated the Taiwan material as epitype for the species. Although *Poronia* species are known to have anamorphs belonging to *Lindquistia*, Paden (1978) observed an entirely different anamorph when ascospores from the Costa Rican collection of *P. pileiformis* were cultured and this remains to be verified. Anamorph of the present Indian collections was not observed. Features such as the long stromata with a convex to hemispherical fertile part studded with black perithecial ostioles, dark brown or black stipe with a bulbous base, and the dark-coloured ascospores with straight germ slits are characteristic of this species. This species has already been reported from India by Rawla & Narula (1983) from Meghalaya State, although they did not specify the type of dung on which it grew. This is the first record of this species on elephant dung; all other records are on cow dung. This fungus





**Fig. 2** – *Poronia pileiformis*. **a** stromata on elephant dung. **b**, **c** close-up views of upper and lower sides of fertile head. **d** bulbous base of the stroma. **e** section of perithecia. **f**. apical apparatus of ascus. **g** ascospores. Bars: a = 10 mm b–d = 5 mm e = 100 µm f, g = 10 µm.

seems to be fairly widely distributed in the forests of Kerala always growing on elephant dung.

#### Acknowledgements

We are thankful to Messrs V. Adnaan Farook, S. Shabeer Khan and K.N. Anil Raj for their help in collecting the material reported here.

#### References

- Berkeley MJ. 1842 – Enumeration of fungi, collected by H. Cuming, Esq., F.L.S., in the Philippine Islands. The London Journal of Botany 1, 142–157.
- Dennis RWG. 1957 – Further notes on tropical American Xylariaceae. Kew Bulletin 12, 297–332.

- Hsieh H, Lin C, Fang M, Rogers JD, Fournier J, Lechat C, Ju Y. 2010 – Phylogenetic status of *Xylaria* subgenus *Pseudoxylaria* among taxa of the subfamily Xylarioideae (Xylariaceae) and phylogeny of the taxa involved in the subfamily. *Molecular Phylogenetics and Evolution* 54, 957–969.
- Ju Y-M, Rogers JD. 2001 – *Xylaria cranioides* and *Poronia pileiformis* and their anamorphs in culture, and implications for the status of *Penzigia*. *Mycological Research* 105, 1134–1136.
- Manimohan P, Thomas KA, Nisha VS. 2007 – Agarics on elephant dung in Kerala State, India. *Mycotaxon* 99, 147–157.
- Paden JW. 1978 – Morphology, growth in culture, and conidium formation in *Poronia pileiformis*. *Canadian Journal of Botany* 56, 1774–1776.
- Rawla GS, Narula AM. 1983 – *Poronia pileiformis* (Berk.)Fr.: a new record from India. *Current Science* 52, 990.
- Rogers JD, Ju Y-M, Martin FS. 1998 – *Podosordaria*: a redefinition based on cultural studies of the type species, *P. mexicana*, and two new species. *Mycotaxon* 67, 61–72.