



***Pholiota polychroa* and *Porodisculus orientalis*: two new additions to wood-rotting fungi of India**

Chuzho K* and Dkhar MS

Microbial Ecology Laboratory, Department of Botany, North-Eastern Hill University, Shillong – 793022, Meghalaya, India

Chuzho K, Dkhar MS 2020 – *Pholiota polychroa* and *Porodisculus orientalis*: two new additions to wood-rotting fungi of India. *Studies in Fungi* 5(1), 447–451, Doi 10.5943/sif/5/1/25

Abstract

Pholiota polychroa, collected from Rusoma community forest and *Porodisculus orientalis*, collected from Puliebadze reserved forest stand, Kohima are reported as new additions to wood-rotting fungi of India. The genus *Porodisculus* is new to India as well. Furthermore, ecological, taxonomic and morphological descriptions of the two species are discussed in this paper.

Key words – ecology – Nagaland – Puliebadze – Rusoma – taxonomy

Introduction

Northeast India is well known for its high biodiversity and is considered as a home to diverse group of wood-rotting fungi. From the past research works from Meghalaya and Nagaland, many wood-rotting fungal species, new to India have been reported from Northeast India (Sailo 2010, Lyngdoh & Dkhar 2014a, b, Chuzho & Dkhar 2018, 2019, Pongen et al. 2018). A number of advance studies on these fungi have been undertaken in other parts of India in the past decades but in contrast, not much study have been conducted from Northeast India. Many forests of Northeast India still remained inaccessible and unexplored.

Pholiota was first introduced as a tribe by Fries (1821) along with the tribe *Flammula* by differentiating them only on the basis of veil characters. Kummer (1871) was the first to assign a generic status for the two groups and since then, mycologists have maintained separate genera for the two groups. The genus *Pholiota* is characterized by colored sporocarps with scaly and slimy caps. *Pholiota* species are known to give rusty-brown to yellowish-brown basidiospore deposits. The species are microscopically distinct in having smooth basidiospores with at least one minute germ pore, present at the pore apex. *Pholiota* has been critically studied and documented from North America by Overholts (1927) and Smith & Hesler (1968). Molecular studies on the phylogenetic position of *Pholiota* species, *P. nameko* through restriction analysis of ribosomal DNA has been undertaken by Motsumoto et al. (2003) however, an intensive DNA studies on the genus is yet to be conducted. Molecular information obtained from rDNA studies will be useful to reconstruct taxa within *Pholiota* that have been classified mostly on the basis of external morphological and microscopic characters (Motsumoto et al. 2003). A complete documentation on *Pholiota* and the species under the same genera from India is so far not reported.

The genus *Porodisculus* was circumscribed by Murrill (1907) with only one species *P. pendulus*. The genus *Panellus* is closest to *Porodisculus* in terms of similarity however, *Porodisculus* species have non-amyloid basidiospores and generative hyphae without clamp connection (Corner 1986). *Porodisculus* is quite unique and is characterized by tiny, pendant

basidiocarps with the central stipe attached to the upper surface of the pilus. *Porodisculus orientalis* was first reported as new to science in 2008 by Lee and Jung from East Asia (Japan and Korea). At present, the genus contains only two species (*P. orientalis* and *P. pendulus* as type species). These two species were earlier assumed to be identical but phylogenetic analysis by Lee & Jung (2008) revealed that both specimens represented different independent lineages. *Porodisculus orientalis* differs from the type species *Porodisculus pendulus* in number of pores per mm and size of basidiospores. The two species are assumed to have cyhelloid origin becoming poroid as the tubes fused to form a tubular hymenophore (Lee & Jung 2008).

Materials & Methods

The specimens were collected from Rusoma forest stand and Puliebadze reserved forest located at altitudes of 890.01 msl (meters above sea level) and 2027.52 msl with geographical coordinates at 25°44.88'N, 094° 08.35'E and 25°38.71' N, 094° 04.12'E, respectively. Both the forest stands are located in Kohima district, Nagaland. Identification was done referring standard macroscopic and microscopic descriptions following the monographs of Smith & Hesler (1968), Kuo (2012) and www.mycobank.org. The sections were observed using the reagents 4% KOH, lacto-phenol cotton blue and Melzer's reagent. Micro-photographs were captured using Digital Labovision AXL. The specimens were preserved and deposited at the herbarium Microbial Ecology Laboratory, Department of Botany, North-Eastern Hill University, Shillong – 793022 (Meghalaya). Facesoffungi (FoF) numbers were obtained as described by Jayasiri et al. (2015).

Results

Species descriptions

Pholiota polychroa (Berk.) A.H. Sm. & H.J. Brodie, Bot. Gaz. 96: 533 (1935) Fig. 1A–D

Index Fungorum number: IF 446025; Facesoffungi number: FoF 08680

Basidiocarp solitary or in cluster, 2–3.5 cm broad, slimy, cuticle peeling with ease, colored usually mottled with pinkish- purple shades when young, margin usually hung with veil remnants. Gills attached to the stem, whitish to yellowish and covered by partial veil at early stage. Stipe 2–4.4 cm long, up to 0.6 cm thick, dry or sticky near the base and slimy near the apex, covered with veil patch below, ring zone present. Pleurocystidia fusoid-ventricose. Clamp connections present. Basidiospores smooth, ellipsoid, brownish to slightly purplish brown, 5.5–6.5 × 3.6–4.5 µm. Odor and taste indistinct, cap turns slightly green when treated with 4% KOH.

Specimen examined: Ru15Sp 020 (NEHU, Shillong campus), on decaying bamboo culm from Rusoma forest stand located at an elevation of 890.01msl with geographical coordinates at 25°44.88'N, 094° 08.35'E.

The species was sampled during pre-monsoon season (April), immediately after precipitation and was not recorded again thereafter in subsequent visits. The species was found growing on a decaying culm of *Bambusa* species which is at intermediate stage of decay. The field photograph and microphotographs of the species are shown in Fig. 1A–D.

Porodisculus orientalis (J. S. Lee & H. S. Jung) Mycotaxon, 104:220 (2008) Fig. 1E–H

Index Fungorum number: IF 5511434; Facesoffungi number: FoF 08681

Basidiocarp solitary, tiny, 0.2–0.4 cm, pendant, more or less centrally stipitate, whitish to pale brown, hard when dry. Stipe bent at the point of attachment. Pore surface off white to pale brown, pores very small, 6–8 per mm. Context hard and very dense. Hyphal system monomitic, generative hyphae with simple septa. Coralloid like structure present. Clamp connections and cystidia absent. Basidia clavate, basidiospores cylindrical, non-amyloid and thin walled, 4.8–5.4 × 1.0–1.2 µm.

Specimen examined: Pu16Au014 (NEHU, Shillong campus), on decaying twig from Puliebadze reserved forest located at an altitude of 2027.52 msl with geographical coordinates at

25°38.71' N, 094° 04.12'E.

The specimen was sampled only from one twig. The specimen was found growing on the bark of the decaying hardwood twig which is at intermediated stage of decay. The specimen was sampled during post monsoon (October). The field photograph and microphotographs of the species are shown in Fig. 1E–H. The genus *Porodisculus* is new to India.



Fig. 1 – A Habit of *Pholiota polychroa*. B Pleurocystidia. C Basidiospores. D Herbarium despit. E Habit of *Porodisculus orientalis*. F Close-up photograph. G Monomitic hyphae. H Herbarium deposit.

Discussion

According to Index Fungorum (2020), a total of 646 species of *Pholiota* have been recognized under the Family Strophariaceae, however, only 14 species of *Pholiota* has been recorded from India (Thomas & Manomohan 2001, Natarajan & Ravindran 2003, Farook et al. 2013 and Fungi from India database 2016). *Pholiota polychroa* has been reported from North America (Smith & Hesler 1968, Bates et al. 2017) and Central and South America (Coimbra 2015).

This is the first report of *P. polychroa* from India. Kuo (2012) reported the occurrence of *P. polychroa* on other decomposed hardwood hosts from the Great Plains of the east.

Porodisculus is one of the smallest generic taxa and contains only two species (*P. orientalis* and *P. pendulus*). Because of its tiny fruiting body, there is a high chance for the specimen to be overlooked during sampling. The only available literature on *P. orientalis* is from that of Lee & Jung (2008) in which they introduced *P. orientalis* as new to science through phylogenetic studies. *Porodisculus orientalis* is first reported from Japan and Korea by Lee & Jung (2008) whereas *P. pendulus* is reported from North America and Canada (Ryvarden & Johanson 1980 and Ginns 1997). *Porodisculus pendulus* is also reported from temperate regions of USA and Asia (China, Japan and Taiwan) and in the Southern Hemisphere (Nunez & Ryvarden 2001). According to Ginns (1997), the basidiomes of *P. pendulus* are found in xeric habitat, on dead branches and is an early colonizer in the fungal succession in dead branches. Our finding suggests that *P. orientalis* colonize wood at intermediated stage of decay.

With rapid loss in forest cover and change in global climate pattern, many wood-rotting fungi may have gone extinct without being documented and investigated therefore, studies in wood-rotting fungi, particularly in the field of taxonomy, diversity and ecology will yield beneficial results.

Conclusion

Pholiota polychroa and *Porodisculus orientalis* are reported for the first time from India. We encourage further intensive studies on wood-rotting fungi of other forests in Nagaland and other states of Northeast India.

Acknowledgements

The first author thanked University Grants Commission and Ministry of Tribal Affairs, Government of India for financial support in the form of NFHE-ST fellowship.

References

- Bates ST, Golday J, Kunnen RL, Pilla NJ. 2017 – Checklist of Indiana fungi 1: Macrofungi. Proceedings in Indiana Academy of Science 126(1), 12–34.
- Chuzho K, Dkhar MS. 2018 – Ecological determinant of wood-rotting fungal diversity and first report of *Favolaschia calocera*, an invasive species from India. Proc. Natl. Acad. Sci., India, Sect. B: Biol. Sci. 89(4), 1177-1188.
- Chuzho K, Dkhar MS. 2019 – Diversity of Ascomycetous wood-rotting fungi along an altitudinal gradient in forests of Nagaland and first report of *Jackrogersella minutela* from India. Journal of Indian Academy of wood Sciences 16(1), 36–43.
- Coimbra VRM. 2015 – Checklist of Central and South American agaricales (Basidiomycota II: Strophariceae). Mycosphere 6, 441–458.
- Corner EJH. 1986 – The Agaric genus *Panellus* Karst (including *Dictyopanus* Pat.) in Malaysia. Gard. Bull. 39, 103–147.
- Farook AV, Khan SS, Manimohan P. 2013 – Checklist of agarics (gilled mushrooms) of Kerala state. Mycosphere 4(1), 97–131.
- Fries EM. 1821 – Systema Mycologicum 1, 1–508.
- Fungi of India Databases. 2019 – Retrieved August 5, 2019 from www.fungifromindia.com/fungifromindia/buildPage.php?page=databases
- Ginns P. 1997 – *Porodisculus pendulus*: Systematics, cultural characters and Canadian records. Canadian Journal of Botany 75, 220–227.
- Index Fungorum. 2019 – Retrieved August 25, 2019 from www.indexfungorum.org

- Jayasiri SC, Hyde KD, Ariyawansa HA, Bhat J et al. 2015 – The Faces of Fungi database: fungal names linked with morphology, phylogeny and human impacts. *Fungal diversity* 74:3–18. Kummer P. 1871 – *Der Fuhrer in die Pilzkunde*, 1–146.
- Kuo M. 2012 – *Pholiota polychroa*, Retrieved October 30, 2019 from Mushroomexpert.com: http://www.mushroomexpert.com/Pholiota_polychroa.html
- Lee JS, Jung HS. 2008 – *Porodisculus orientalis* sp. nov. (Schizophyllaceae, Agaricales) from East Asia. *Mycotaxon* 104, 215–222.
- Lyngdoh A, Dkhar MS. 2014a – First report of two wood-rotting fungi, *Cyclomyces fuscus* and *Humphreya coffeatum*, from India. *Journal of New Biological Reports* 3, 25–28.
- Lyngdoh A, Dkhar MS. 2014b – Wood-rotting fungi in East Khasi Hills of Meghalaya, Northeast India, with special reference to *Heterobasidion perplexa* (a rare species – new to India). *Current Research in Environmental & Applied Mycology* 4, 117–124.
- Motsumoto T, Fukumasa-Nakai Y, Nagasawa E, Obatake Y. 2003 – Phylogenetic position of *Pholiota nemeko* in the genus *Pholiota* inferred from restriction analysis of ribosomal DNA. *Mycoscience* 44(3), 197–202.
- Murrill WA. 1907 – Polyporaceae N. Am. Flora, 1–72.
- Mycobank. 2019 – Species Description, Retrieved October 30, 2019 from www.mycobank.org
- Natarajan K, Ravindran C. 2003 – Two new species of the genus *Pholiota* from South India, Tamil Nadu. *Mycotaxon* 85, 271–275.
- Nunez M, Ryvarde L. 2001 – East Asian Polypores – Volume 2 (Polyporaceae). *Synopsis fungorum* 14. Fungiflora, Oslo. pp. 170–522.
- Overholts LO. 1927 – A monograph of the genus *Pholiota* in the United States. *Annals of Missouri Botanical Garden* 14, 87–211.
- Pongen AS, Chuzho K, Harsh NSK, Dkhar MS, Kumar M. 2018 – *Coltriciella dependens* (Berk. & M.A. Curtis) Murrill, a new addition to wood-rotting fungi of India. *Journal of Threatened Taxa* 10(8), 12140–12143.
- Ryvarde L, Johansen I. 1980 – A Preliminary Polypore Flora of East Africa. *Fungiflora*, Oslo. pp. 1–636.
- Sailo JZ. 2010 – Studies on the wood rotting fungi of Meghalaya. Ph.D. Thesis. North-Eastern Hill University, Shillong, India.
- Smith AH, Hesler LR. 1968 – The North American species of *Pholiota*. Hafner Publishing Company Inc. 31 East, 10th Street, New York, NY. 10003. pp. 1–349.
- Thomas KA, Manimohan P. 2001 – A new species of *Pholiota* from India. *Mycotaxon* 78, 181–184.