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RESEARCH

NIDULA SHINGBAENSIS: A NEW GENERIC RECORD FOR ARUNACHAL PRADESH, INDIA

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Abstract: *Nidula shingbaensis* an interesting species of Bird's nest fungi is reported for the first time from the state of Arunachal Pradesh, India. It is also a first record of Genus *Nidula* from this State. Detailed Macro and Micromorphological characterization coupled with illustrations is provided.

Keywords: Arunachal Pradesh, Bird's nest fungi, New Record, Nidula, Taxonomy

INTRODUCTION

Bird's nest fungi, is a group of fungi belonging to the phylum Basidiomycota and order Agaricales. These interesting fungi are members of an artificial group "gasteromycetes" (Wilson *et al*., 2011). The mature basidiomata of this group of fungi are characterized by globose to cup-shaped structures known as peridia, which resemblance to a bird's nest. Each peridium, contains many oval- or round-shaped structures, resembling seeds or miniature eggs, which are called peridioles. Members of this fungal group exhibit a saprotrophic lifestyle, commonly colonizing substrates such as animal dung and decaying wood logs. Functioning as decomposers, they contribute significantly to nutrient recycling and organic matter breakdown within the ecosystem. (Wicklow et al. 1984). Bird's nest fungi are cosmopolitan in nature and found to grow on various habitats on all continents except Antarctica (White, 1902). Currently, there are six described genera of bird's nest fungi exist: *Cyathus* Haller (Haller 1768), *Crucibulum* Tul. & C. Tul. (Tulasne & Tulasne 1844), *Nidula* V.S. White (White, 1902), *Nidularia* Fr. (Fries & Nordholm, 1830), *Mycocalia* J. T. Palmer (Brodie 1975; Palmer 1961) and *Retiperidiolia* Kraisit., Cheoyklin, Boonprat. & M.E. Sm. (Palmer 1961; Zhou *et al*., 2004; Cruz & Baseia 2014; Sharma 2016; Kraisitudomsook *et al*., 2022). Nidula, is a distinct genus and is characterized by the cup-shaped to vase-shaped basidiomata. These structures contain brown-colored peridioles, surrounded by a unique six-layered peridium. The apical region of the basidiomata is sealed by a lid-like structure, and the peridioles themselves are enveloped by a tunica layer, further distinguishing Nidula from other closely related genera. The basidiospores of Nidula are broadly ellipsoid to elongate in shape, with smooth walls and hyaline appearance under microscopic observation. Combination of above features are charectwerstic for the Genus Nidula. (Niranjan & Singh 2021). Other distinguishing features includes: absence of cord like funiculi and peridiole embedded in mucilaginous gel in the peridium. The Genus *Nidula* currently represented by seven valid species worldwide (www.indexfungorum.org). In India this Genus is represented by three species. (Berkeley 1854; Brodie, 1975; Cunningham 1924; Das & Zhao 2012, 2013) In the state of Arunachal Pradesh this interesting and important Genus is not reported till date. (Roy et al. 2022). Genus *Nidula* is first time reported and now represented by *Nidula shingbaensis*f or Arunachal Pradesh. Macro and Micromorphological characterization with coloured illustrations showing important morphological characters are provided here in details.

MATERIALS AND METHODS

Macro-morphological characteristics of the basidiomata were meticulously recorded both in situ, in the field, and at the base camp. Field photographs of fresh basidiomata were captured using a camera (Nikon P950) and with mobile. The colour codes and terminologies follow Methuen Handbook of Colour (Kornerup & Wancher 1978). After recording the macromorphological features, the basidiomata were desiccated usinga field dryer. Subsequently, in the laboratory, the macromorphological features were re-examined utilizing a stereo zoom dissecting microscope (Olympus SZ61) and further photographs were taken showing important macromorphological features with the help of a dedicated camera attached with the microscope. Detailed observations of micromorphological structures, including

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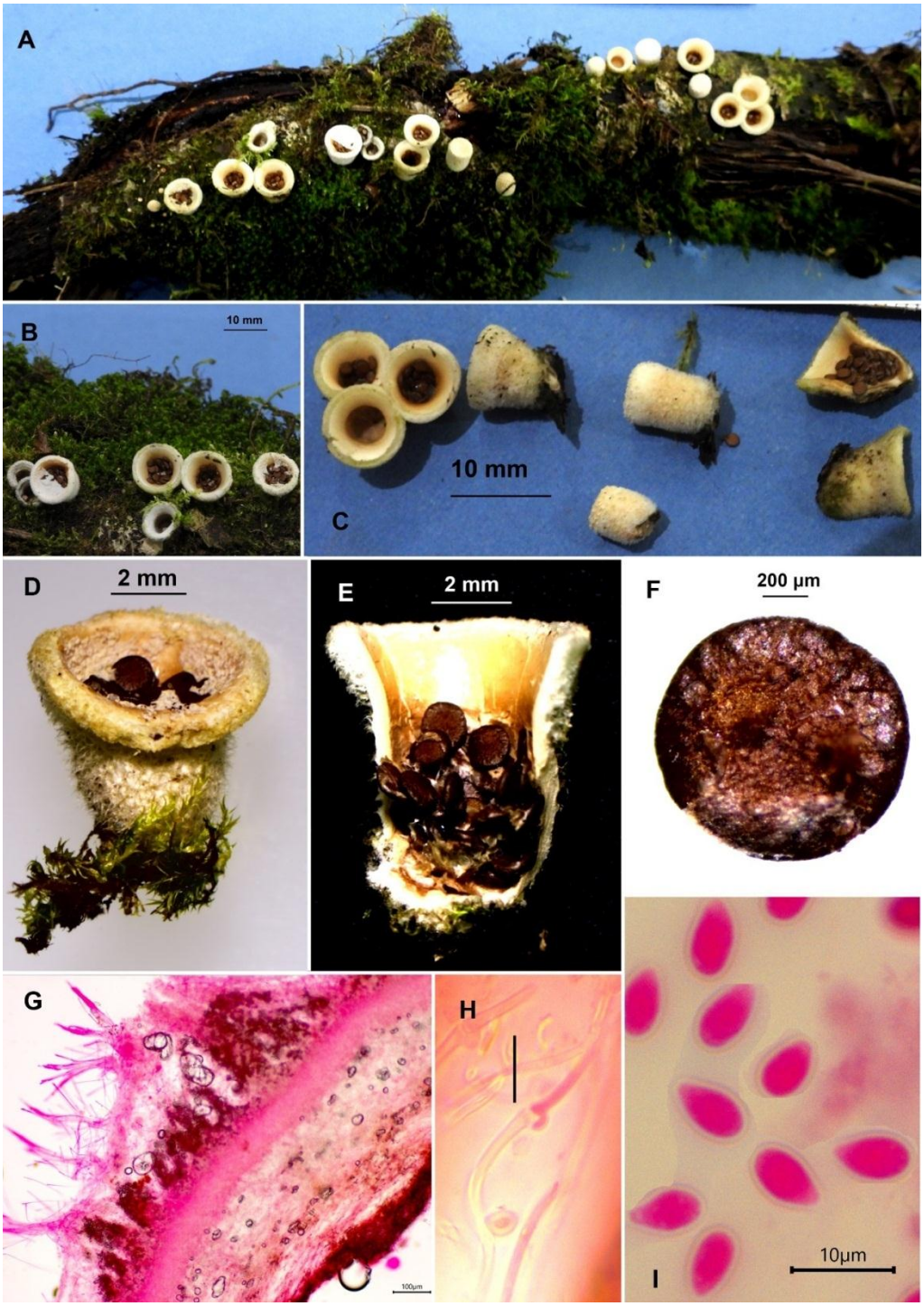
basidiospores, cross-sections of the peridium, and peridiole, were done using a light microscope (Olympus CX43). Photographs of these structures were obtained through an attached dedicated camera, with the free-hand sections of desiccated samples mounted in a solution comprising 5% potassium hydroxide (KOH), 30% glycerol, phloxine, and cotton blue either separately or together. Measurement of basidiospores was done for twenty basidiospores. The dimensions of the basidiospores, along with their length/width ratios (Q), are presented as minimum, mean, and maximum values. The nomenclature of herbaria is referenced following the standard guidelines (Holmgren et al. 1990).

LEGENDS FOR FIGURE 1: *Nidula shingbaensis* K. Das & R.L. Zhao: A. Habitat of the basidiomata; B & C. Habit of basidiomata with scale; D. Basidiomata showing hairs on the outer surface; E. Inner layer of peridium showing peridioles; F. Single Peridiole; G. Section of peridium showing different layers; H. Clamped hyphae of peridium; I. Basidiospores. Scale Bars: B & C =10 mm; D & E = 2 mm; F = 200 µm; G = 100 µm; H = 10 µm.



RESULTS AND DISCUSSION

Taxonomy

***Nidula shingbaensis* K. Das & R.L. Zhao**

Basidiomata urn- or vase-shaped, 6–9.5 mm high (≤10 mm high with epiphragm/lid), 6–8 mm wide at mouth, gradually tapering towards base (up to 5 mm wide), sessile. Epiphragm operculate, white to yellowish white (2A1–2A2), rupturing at maturity. Exterior of the peridium distinctly matted fibrillose to villose, or wooly, hairs mostly in tufts (≤220 µm high), yellowish white (3A2–4A2) to pale yellow (4A3); mouth slightly flared, margin straight to recurved, fringed, yellowish white (2A2), entire, smooth. Interior of the peridium smooth (never plicate), never shining, grayish yellow (2B3) near margin, pale orange (5A3) to light orange (5A4) towards base. Peridioles numerous (≤60), 0.8–1.3 mm in diam., lenticular, surface irregularly wrinkled, very sticky, embedded in transparent mucilaginous gel when moist, dark brown (7A5–7A6); funiculus absent.

Peridium 530–700 µm thick (excluding hair), comprising six layers. Four outer layers composed of loose hyphal mats; each layered separated by a cord of grouped hyphae; the four layers are 250 µm, 87µm, <80 µm, and <160 µm thick (from the outermost); hyphae 2.5–3.5µm wide, thick-walled (wall up to1.5µm thick), with clamp connections, hyaline. Peridioles three layered (cortex, subcortex and hymenium), covered with tunica (up to 37 µm thick); cortex up to 48 µm thick, two layered, consisting of an exocortex with hyphal tips, hyphae ≤2.2 µm wide, projecting in tunica, and an endocortex with branched aseptate slightly to very thick-walled (up to 4 µm thick) yellowish brown hyphae (up to 10 µm wide); subcortex thick (≤130 µm), yellowish brown, subhyaline towards hymenium, hymenium ≤135 µm thick, containing spore mass and hyphae. Basidiospores 6.9–(8.2)–10.2 × 3.9–(5.3)–6.2µm, broadly ellipsoid to elongate (Q = 1.44–(1.64)–2.04), mostly rounded at one ends and narrow towards other end, thick-walled, hyaline, inamyloid.

Specimens Examined: India, Arunachal Pradesh, Upper Dibang Valley District, Mehao Wildlife Sanctuary, alt. 1570 m 28º51'41.91" N, 95º48'58.71"E, 27.08.2024, A. Parihar AP 24-169 (ARUN F 38)

Notes: The present specimen exhibits distinct morphological features, including urn- to vase-shaped basidiomata containing brown-colored peridioles, a multi-layered peridium, and an apical region sealed by a lid-like structure. Additionally, the presence of a tunica layer surrounding the peridioles and the broadly ellipsoid to elongate basidiospores further support its taxonomic placement. Notably, the absence of cord-like funiculi, combined with the embedding of peridioles in a mucilaginous gel within the peridium, provides critical diagnostic characteristics unique to the genus *Nidula*. Both macroscopic and microscopic observations of this specimen strongly allign with the detailed morphological description previously documented by (Das & Zhao 2013.

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