

Taxonomic studies on two interesting species of *Auricularia* (Wood Ear Mushroom) from Arunachal Pradesh, India

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ABSTRACT

Auricularia, a genus of macrofungi with broad geographical distribution, is highly valued for its edible and medicinal properties. It ranks as the third most extensively cultivated mushroom worldwide due to its remarkable nutritional and bioactive attributes. This article provides detailed descriptions and colour illustrations of two notable *Auricularia* species from Arunachal Pradesh, India. Specifically, *Auricularia australiana* has been newly documented for the Indian mycobiota.

Keywords: Mushroom, *Auricularia australiana*, taxonomy Arunachal Pradesh.

Arunachal Pradesh, located in the north-eastern part of India, is famous for its rich and diverse flora, because of its unique geographical position and varying climatic conditions. This state encompasses dense tropical forests ranging from the eastern Himalayan region to the Brahmaputra valley. This condition provide a suitable condition for the growth and development of various species of Macrofungi. Despite the global significance of edible and medicinal mushrooms, there remains a significant gap in research concerning both the cultivation and taxonomy of these genera, including *Auricularia* Bull., within India and specifically in Arunachal Pradesh, however few studies on the Genus *Auricularia* in north-eastern part of India has been carried out (Roy *et al.* 2022), but any detailed study about taxonomic position of the Genus *Auricularia* could not be traced. Recently some fungal explorations survey tours were carried out by authors in order to explore and document the diversity of Macrofungi from this state.

Members of the genus *Auricularia* (Auriculariaceae, Auriculariales), typified by *Auricularia mesenterica* (Dicks.) Pers. [Dickson, 1785], are widely distributed and recognized for their ecological, economic, and medicinal significance (Wu *et al.* 2021). These species play a crucial role in the degradation of forest ecosystems, particularly in tropical forests, typically colonizing angiosperm wood, such as dead trees, stumps, fallen trunks, branches, and decayed wood, with a few species also inhabiting gymnosperm wood (Dai and Bao, 2007; Baldrian and Lindahl, 2011). Several species are extensively utilized as important edible and medicinal mushrooms in China and other East Asian countries (Wu *et al.* 2021). The most known species of this genus (except the species belonging to *Auricularia mesenterica* complex) are used as edible and medicinal species worldwide (Jahedi *et al.* 2024). Morphologically, *Auricularia* is distinguished by its gelatinous, resupinate to substipitate basidiomata with pilose upper surfaces, cylindrical to

clavate and transversely three-septate basidia containing oil guttules, and hyaline thin-walled allantoid basidiospores (Lowy, 1951; Kobayasi, 1981). Although *Auricularia* can be differentiated from other genera within the family Auriculariaceae, but species identification based on macromorphological features, such as size of abhymenial hair, size of basidiospores, and the presence or absence of a medulla, remains challenging (Lowy 1952; Kobayasi 1981). However few species are very distinct and can be identified based on their morphological features. As per as per the morphological examinations and phylogenetic analyses conducted by Wu *et al.* (2021), 37 species of *Auricularia* are recognized worldwide. During the present survey several specimens of Genus *Auricularia* were collected. After thorough macro and micromorphological characterization two species are identified as *Auricularia delicata* (Mont. ex Fr.) Henn. And *Auricularia Australiana* Y.C. Dai & F. Wu.

MATERIALS AND METHODS

Regular Survey and exploration tours to different districts of Arunachal Pradesh were conducted during the monsoon seasons of 2023–2024 and specimens of macro fungi were collected. Specimens were photographed with the help of a Camera (Nikon P950) and also with the mobile showing their important morphological features in the field and also in the base camp before drying. After recording important macromorphological features of collected samples, specimens were dried with the help of drier for future study. Colour codes and terminology followed Kornerup and Wanscher (1978). To study the microscopic features, a piece of basidiomata was soaked in water and photographs of microscopic structures were taken 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. Detailed observations of micromorphological structures, like cross-sections of the basidiomata, basidiospores, abhymenial hairs, hymenium was done using a light microscope (Olympus CX43 and Olympus BX 52). Measurements 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 guidelines of Holmgren *et al.* (1990).

RESULT AND DISCUSSION

Auricularia australiana Y.C. Dai & F. Wu (Fig. 1)

Basidiomata 35–55×30–45 mm Gelatinous, fleshy, soft, caespitose, imbricate sessile or substipitate, brownish orange (6C6–6C7); pileus projecting up to 55mm, 1–2 mm thick, discoid or auriculate, margin entire, and light brown (6D4–6D5) when dry; upper surface pilose, sometimes with a few folds; hymenophore surface conspicuously porose-reticulate greyish orange (5B3–6B4).

Medulla absent; crystals absent; abhymenial hairs 70–115 × 7–9 µm with slightly swollen base or centre, thick-walled, with a wide or narrow septate lumen, apical tips acute or obtuse, single, hyaline; hyphae 2–4 µm in dia with clamp connections; basidia 40–55 × 4–5 µm, clavate, transversely 3-septate with oil guttules; cystidioles absent; Basidiospores 8.06–(9.10)–11.74×3.96–(4.77)–5.81 µm, Q = 1.65–(1.80)–2.13, allantoid, thin-walled, smooth, usually with one to two large guttules, hyaline.

Specimens Examined: India, Arunachal Pradesh, Namdapha Biosphere Reserve Forest, alt. 380 m 27°29'49.05" N, 96°23'24.72"E, 11.06.2024, on a dead wood log, A. Parihar AP 24-18 (ARUN F 40).

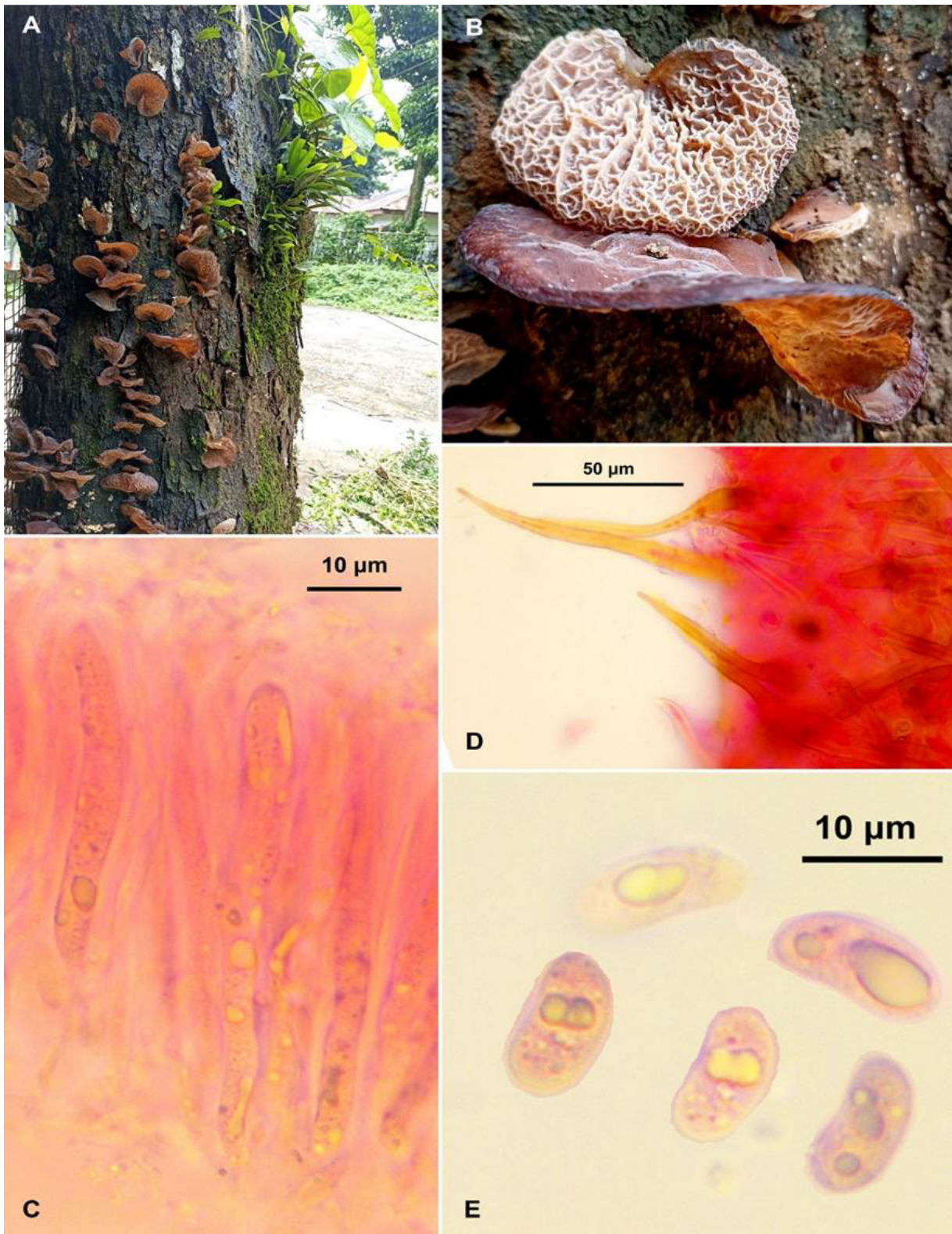


Fig. 1. *Auricularia australiana* Y.C. Dai & F. Wu. A. Habitat of the basidiomata; B. Basidiomata showing abhymenial surface and strongly reticulate hymenial surface; C. Basidioles and basidia; D. Abhymenial hairs; E. Basidiospores. Scale Bars: C & E = 10 µm; D = 50 µm

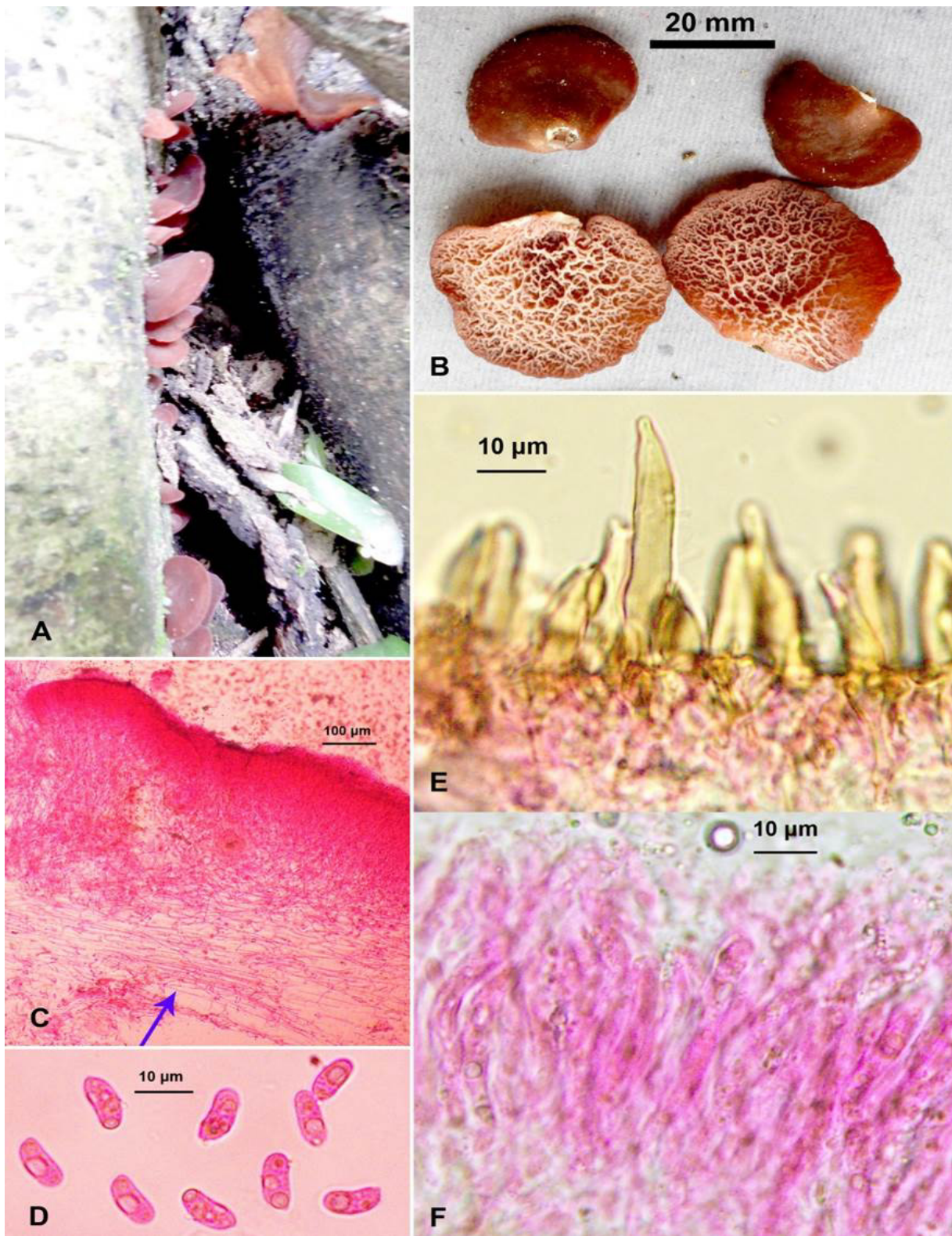


Fig. 2. *Auricularia delicata* (Mont. ex Fr.) Henn.: A. Habit of the basidiomata; B. Basidiomata showing abhymenial surface and strongly reticulate hymenial surface; C. Cross section of basidiomata showing Medula; D. Basidiospores; E. Abhymenial hairs; F. Basidia and basidioles. Scale Bars: B = 20 mm; C = 100 µm; D–F = 10 µm

Notes: Absence of medulla and cystidioles, and size and shape of abhymenial hairs and basidiospores are closely align with the morphological description provided by Wu *et al.* (2021): abhymenial hairs ($60\text{--}100 \times 7\text{--}11 \mu\text{m}$) and basidiospores ($11\text{--}12.8 \times 4.4\text{--}5 \mu\text{m}$), thus confirming its systematic position within the *Auricularia* genus. However, it should be noted that the present specimens exhibit slightly larger basidiospores. This observation further supports the identification of our specimens as members of the *Auricularia* genus based on morphological characteristics. In future phylogenetic analysis may be conducted to reconfirm its identity.

Auricularia delicata (Mont. ex Fr.) Henn. (Fig. 2)

Basidiomata 22–50×20–38 mm Gelatinous, fleshy, soft, caespitose, imbricate substipitate, greyish red (9C7) to reddish brown (9D7); pileus projecting up to 50 mm, 1–2 mm thick discoid or auriculate, margin entire, reddish brown (9E7–9E8) when dry; upper surface pilose, sometimes with a few folds; hymenophore surface conspicuously porose-reticulate reddish orange (7B4–7B5), yellowish red (8A4–8B5), when dry.

Medulla present; crystals absent; abhymenial hairs $35\text{--}60 \times 5\text{--}6 \mu\text{m}$, with slightly swollen base or centre, thick-walled, with a wide or narrow lumen, apical tips acute or obtuse, single, hyaline; hyphae 2–4 μm in diam., with clamp connections.; basidia $60\text{--}70 \times 4\text{--}5 \mu\text{m}$, clavate, transversely 3-septate, with oil guttules; cystidioles absent. Basidiospores $9.36\text{--}(10.3)\text{--}10.9 \times 4.69\text{--}(5.03)\text{--}5.8 \mu\text{m}$, $Q = 1.8\text{--}(2.05)\text{--}2.28$, allantoid, thin-walled, smooth, usually with one to two large guttules, hyaline.

Specimens Examined: India, Arunachal Pradesh, BSI, APRC, Residential complex alt. 317 m 27°05'55.35" N, 93°36'15.12"E, 05.08.2023, on a dead standing log, A. Parihar AP 23-89 (ARUN F 42).

Notes: Identification of present specimen as *Auricularia delicata* is supported by the presence of a medulla, a conspicuously porose-reticulate hymenophore, short hairs, and relatively small basidiospores. These characteristics align with the description provided by Wu *et al.* (2021). Although the basidiospores in our specimen are slightly wider than those reported by Wu *et al.* 2021: ($10.83 \times 4.93 \mu\text{m}$) and the abhymenial hairs are slightly shorter (Wu *et al.* 2021: $60\text{--}100 \times 5\text{--}8 \mu\text{m}$). Present specimen can be confused with *Auricularia sinodelicata*, a recently described species from china, but comparatively larger basidia of present specimen separate it from *Auricularia sinodelicata*. To further confirm its identity, molecular phylogenetic studies may be carried out in near future.

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