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RESEARCH ARTICLE

NEW STATE RECORDS OF TWO EDIBLE SPECIES OF *TERMITOMYCES* (*LYOPHYLLACEAE*) FROM ARUNACHAL PRADESH, INDIA

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Abstract: Two edible species of the Genus *Termitomyces* are recorded for the first time from the state of Arunachal Pradesh, India. Detailed Macro- and micro-morphological characterization coupled with colored illustrations are provided.

Keywords: Arunachal Pradesh, Edible, New Record, *Termitomyces*

INTRODUCTION

The Genus *Termitomyces* R. Heim. is a member of fungal family *Lyophyllaceae* Jülich of order *Agaricales* which is unique in forming a mutalistic association with *Macrotermitinae*, a group of fungal mycelium eating termites (Bels & Patarageti vit 1982, Shaw 1992, Kumar *et al*. 2022) and was first described in 1942 (Heim 1942). There is a confusion about the exact number of valid species in the Genus *Termitomyces*, however as per the 10th edition of the Dictionary of Fungi only 30 species exist (Kirk et al. 2008) in the Genus *Termitomyces*, but as per the Index fungorum 113 records of the Genus *Termitomyces* are available, which includes species, sub species, and synonyms, but the valid number of species in the Genus *Termitomyces* is only 62 (www.indexfungorum.org accessed on 10 July 2025). Many species of *Termitomyces* are economically important as most of the species are edible with high nutritional value, many species also possess medicinal properties and some are even having industrial uses (Batra & Batra 1979; Chakraborty *et al*. 2006, Tibuhwa 2012, Karun & Sridhar 2013). The basidiomata of this genus shows a great variation in their morphology as some species like *Termitomyces titanicus* produces the largest known agaric mushroom in the world, with a cap (pileus) that can exceed 1 meter in diameter (Piearce 1987). In contrast, *T. microcarpus* typically has a much smaller cap, rarely growing beyond 2.5 centimeters in diameter (Natrajan 1975, We *et al*. 2009).

During the routine fungal exploration tours of various districts of Arunachal Pradesh many specimens of the Genus *Termitomyces* were collected by the author and after thorough micro-morphological examinations two specimens were identified as *T. medius* and *T. microcarpus*. A review of existing literature (Chakravarty & Khatua 1979, Karun & Sridhar 2013, Kumari *et al*. 2022, Das *et al*. 2023, Pooja *et al*. 2024) indicates that these species have not been previously documented from Arunachal Pradesh. However, Kumari *et al*. (2022) reported the presence of *T. microcarpus* basidiomata being sold in local markets within the state. Despite this observation, their study did not include any detailed morphological characterization of the specimens collected from Arunachal Pradesh. Consequently, in the absence of prior formal documentation and diagnostic description, both species are herein treated as new records for the state.

MATERIALS AND METHODS

Routine Fungal survey and exploration tours of different districts of Arunachal Pradesh were conducted during the monsoon seasons of 2023–2025 and specimens were collected. Photographs of the specimens were taken with the help of a Camera (Nikon P950) and also with the mobile phones, showing important morphological features of basidiomata in the field and also in the base camp before drying. After macro-morphological characterization, specimens were dried with the help of a drier for future study. Colour codes and terminology follows Kornerup & Wanscher (1978). To study the microscopic features, free hand thin sections of basidiomata were prepared using 5% aqueous potassium hydroxide (KOH), 1 % phloxine, and 1 % cotton blue either separately or together. These thin sections were then observed under Olympus CX43, microscope. Detailed observations of micro-morphological structures, like basidiospores, basidia, cystidia, pileipellis and other

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important micro-morphological structures was done for the correct identification of the specimens. Photographs of important micro-morphological structures were obtained through an attached dedicated camera with the microscope. Measurements of basidiospores were 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 followed Thiers *et al*. 2016 (continuously updated). Identified specimens were deposited in Fungal section of Botanical Survey of India, Arunachal Pradesh, Regional Centre Herbarium (ARUN), Itanagar.

LEGENDS FOR THE FIGURES

Figure 1: *Termitomyces medius* R. Heim & Grassé A. Habit of the basidiomata; B. Basidiomata with scale; C. Cheilocystidia; D. Pleurocystidia; E. Basidiospores. Scale bars: C–E =10 µm.

Figure 2: *Termitomyces microcarpus* (Berk. & Broome) R. Heim A. Habit of the basidiomata; B. Habit of the basidiomata; C. Basidiomata with scale; D. Basidia and Pleurocystidia; E. C.S. through pileipellis; F. Basidia and basidiospores; G. Hymenophoral tramma; H. C.S. through stipe cuticle; I. Basidiospores. Scale bars: D, F & I = 10 µm; E, G & H = 50 µm.

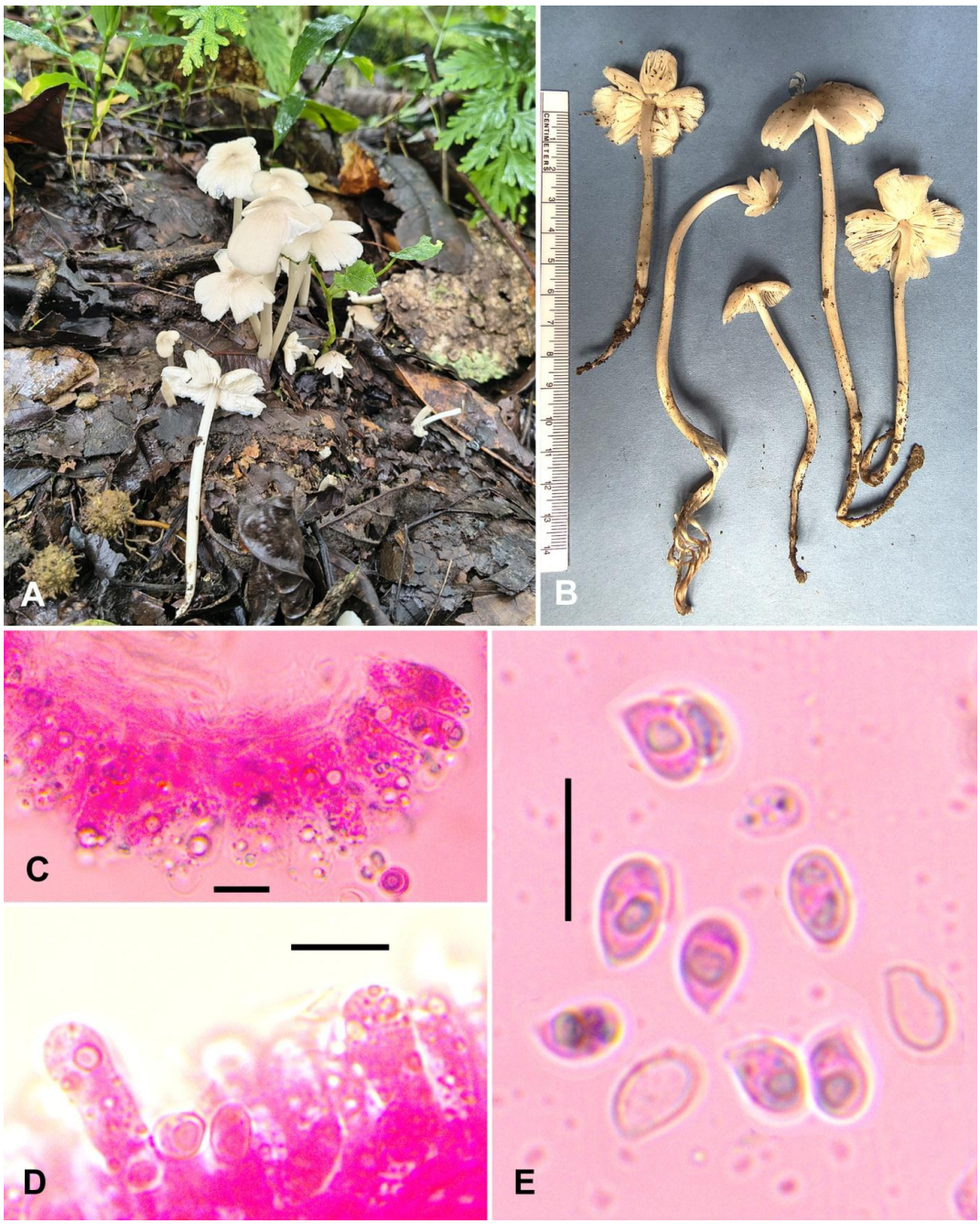

Figure 1: *Termitomyces medius* R. Heim & Grassé A. Habit of the basidiomata; B. Basidiomata with scale; C. Cheilocystidia; D. Pleurocystidia; E. Basidiospores. Scale bars: C–E =10 µm.

Figure 2: *Termitomyces microcarpus* (Berk. & Broome) R. Heim A. Habit of the basidiomata; B. Habit of the basidiomata; C. Basidiomata with scale; D. Basidia and Pleurocystidia; E. Hyphal arrangements from pileipellis; F. Basidia and basidiospores; G. Hymenophoral tramma; H. C.S. through stipe cuticle; I. Basidiospores. Scale bars: D, F, & I = 10 µm; E, G & H = 50 µm.

RESULTS

Taxonomy

***Termitomyces medius* R. Heim & Grassé,** Pathol. Koffee **88**: 8 (1951)

Basidiomata 100–160 mm long in height including pseudorrhiza, epigeous, soft. **Pileus** 15–40 mm in diam., initially convex, later plano-convex with conical umbo in center, moist, margins split and forming star like shape at maturity, fibrillose, smooth, white (4A1) to grey (5B1–6B1) when fresh brownish orange (5C3–5C4) when dry, with yellowish grey (4B2) to orange grey (5B2) center. **Lamellae** adnexed to free, regular, wavy edges, closed, chalky white when fresh orange white (5A2) when dry. **Stipe** 55–100 × 0.8–2 mm, cylindrical, fibrillose, central, solid, smooth, soft, whitish when fresh, orange white (5A2) to pale orange (5A3) when dry. **Annular ring** absent. **Pseudorrhiza** 40–60 mm long, concolorous with stipe. **Odour** mild, pleasant. **Volva** absents. **Taste** not recorded.

Basidiospores 6.0–(6.95)–8.0 × 4.0–(4.35)–5.5 µm, Q = 1.4–(1.59)–1.75, broadly ellipsoid, hyaline. **Basidia** 20.0–26.5 × 6.0–7.58 µm, 2 to 4 sterigmate, clavate, abundant, hyaline, sterigmata up to 4 µm long. **Cheilocystidia** 18.0–30.5 × 5.5–8.0 µm, clavate to slightly clavate, thin-walled. **Pleurocystidia** 22.5–25.0 × 5.5–6.0 µm, clavate, hyaline. **Hymenophoral tramma** regular consisting of parallel thin-walled hyphae; hyphae up to 5.5µm wide. **Clamp Connections** absent throughout.

Specimens Examined: India, Arunachal Pradesh, Upper Subansiri District, Taliha, Duchuk Basti, alt. 1295 m 28º12' 02.75" N, 94º07' 39.48" E, 06.07.2025, on the ground, near a termite nest, A. Parihar AP 25-42 (ARUN F 42).

Notes: The present species closely resembles *T. microcarpus* in morphology, but can be distinguished by a larger, fleshy basidioma with a prominent central umbo on the pileus, stipe with a well-developed pseudorrhiza. Micro-morphologically *T. medius* produces slightly larger basidiospores (6–8 × 4–5.5 µm). These differences, supported by recent morphological and molecular studies (Kumari *et al*. 2022; Das *et al*. 2023) which affirm its taxonomic separation and ecological specificity within moist deciduous forest areas. This species is recorded first time from the Arunachal Pradesh.

***Termitomyces microcarpus* (Berk. & Broome) R. Heim,** Arch. Mus. Hist. Nat. Paris, ser. 6 **18**: 128 (1942); *Agaricus microcarpus* Berk. & Broome, J. Linn. Soc., Bot. **11**(no. 56): 537 (1871).

Basidiomata 35–80 mm long in height, epigeous, soft. **Pileus** 10–35 mm in diam., convex to plano-convex, sometimes with a slightly uplifted margin with a prominent umbo in the center, moist, margins slightly split, fibrillose, smooth, white (4A1) to orange grey (5B2) when fresh brownish grey (5C2) to brownish orange (5C3) when dry, with brownish grey (5D2) to grayish brown (5D3) center. **Lamellae**, regular, wavy edges, closed, chalky white when fresh orange grey (5B2) when dry. **Stipe** 30–75 × 1–5 mm, cylindrical, fibrillose, central, hollow, smooth, soft, whitish when fresh, yellowish grey (4B2) to orange grey (5B2) when dry. **Annular ring** absent. **Pseudorrhiza** absent, **Odour** mild, pleasant. **Volva** absents. **Taste** not recorded.

Basidiospores 5.5–(6.07)–6.5 × 4.0–(4.30)–5.0 µm, Q = 1.4–(1.59)–1.75, ellipsoid, hyaline. **Basidia** 19.0–22.5 × 6.5–8.0 µm, 2 to 4 sterigmate clavate, thick-walled, abundant, hyaline, sterigmata up to 4 µm long. **Cheilocystidi** absent. **Pleurocystidia** 15.0–25.5 × 5.5–7.5 µm, clavate to slightly clavate, thin-walled. **Hymenophoral tramma** regular consisting of parallel thin-walled hyphae up to 10.5 µm wide. **Clamp Connections** present.

Specimens Examined: India, Arunachal Pradesh, Papum Pare District, Itanagar Capital Complex, Senki View, BSI, APRC Campus, , alt. 695 m, 27º05' 02.55" N, 93º36' 18.16" E, 11.07.2025, on the ground, near a termite nest, A. Parihar AP 25-81 (ARUN F 43).

Notes: This species was recorded first time from India by Natrajan 1975 after that it is reported by many workers from the different states of India (Chakravarty & Khatua 1979, Karun & Sridhar 2013, Das *et al*. 2023, Pooja *et al*. 2024) and also from Pakistan (Iqbal *et al*. 2024) and China (We *et al*. 2009). However, it is not reported from the state of Arunachal Pradesh till now. The description of present collection is closely aligned with the earlier description provided by of Natrajan 1975 and Karun & Sridhar 2013. Although well reported from other parts of India.

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