

**NEW AND NOTEWORTHY SPECIES OF PLUTEUS  
(PLUTEACEAE, AGARICALES) FROM KERALA STATE, INDIA**

C.K. PRADEEP & K.B. VRINDA

Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram-695 562,  
Kerala, India; e-mail: ckp123@rediffmail.com

*Pluteus delicatulus* spec. nov. and *Pluteus chrysaegis*, previously known only from the type, are described, illustrated and discussed based on collections made from Kerala State, India.

During our study on the agaric family Pluteaceae of Kerala State, India, several interesting collections belonging to the genus *Pluteus* were made. Subsequently, a preliminary account of the genus *Pluteus* sect. *Pluteus* was published (Pradeep et al., 2002). Further study on the genus revealed two more interesting species belonging to the section *Celluloderma* subsect. *Mixtini*, which are described, illustrated and discussed.

The descriptions are based on fresh collections made by the authors. Microscopic characters were studied from freehand sections mounted in 3% KOH stained with 1% Congo Red. Drawings of microscopic structures were made with a mirror type camera lucida attached to a Leitz Laborlux compound microscope. Colour codes given in quotation marks and colour codes given in the description refer to Kornerup & Wanscher (1967). All collections cited are deposited in the herbarium of the Royal Botanic Gardens, Kew (K).

***Pluteus delicatulus* C.K. Pradeep & Vrinda, spec. nov. — Fig. 1**

Basidiocarpus parvus, subtilis, delicatulus. Pileus 7–10 mm latus, convexus vel applanatus, atrobrunneus vel griseobrunneus, pruinosus. Lamellae liberae, confertae, lamellulis intermixtae. Stipes 8–20 × < 1 mm, centralis, cylindricus, soilidus.

Sporae 5.3–6 × 5.5–6 μm, hyalinae, crassitunicatae, globosae. Basidia 22.5–30 × 6.8–7.5 μm, clavata, 4-sporigera. Acies lamellarum steriles. Cheilocystidia 18–54 × 8.8–19.5 μm, vesiculosa vel clavata, tenuitunicata, hyalina. Pleurocystidia 22.5–40.5 × 15.5–21 μm, vesiculosa vel clavata, hyalina, tenuitunicata. Trama hymenophoralis bilateralis, inversa. Cuticula pilei et cellulis globosis vel subglobosis et dermatocystidis composita.

Holotypus: India, Kerala State, TBGRI campus, 19.VI.1996, C.K. Pradeep, K(M) 116243.

Etymology: delicatulus (L.), delicate.

Basidiocarps solitary to scattered; small, thin, delicate, fragile. Pileus 7–10 mm diameter, convex becoming applanate; surface dark brown (K. & W. 6F7) to greyish brown (7F3) with blackish brown disc when young; mustard brown (5E6) with 'madeira' (8E5) disc on expanding, punctate squamulose, denser at the disc, dry; margin straight, entire, pellucid-striate. Lamellae free, white, turning flesh (6B3), up to 1.5 mm wide, close with lamellulae of 1–2 lengths; edge concolorous with the sides, entire. Stipe 8–20 × < 1 mm, central, cylindric, narrowly tapering upwards from a subbulbous base, solid; surface white, transparent, glabrous. Context thin, white. Odour none.

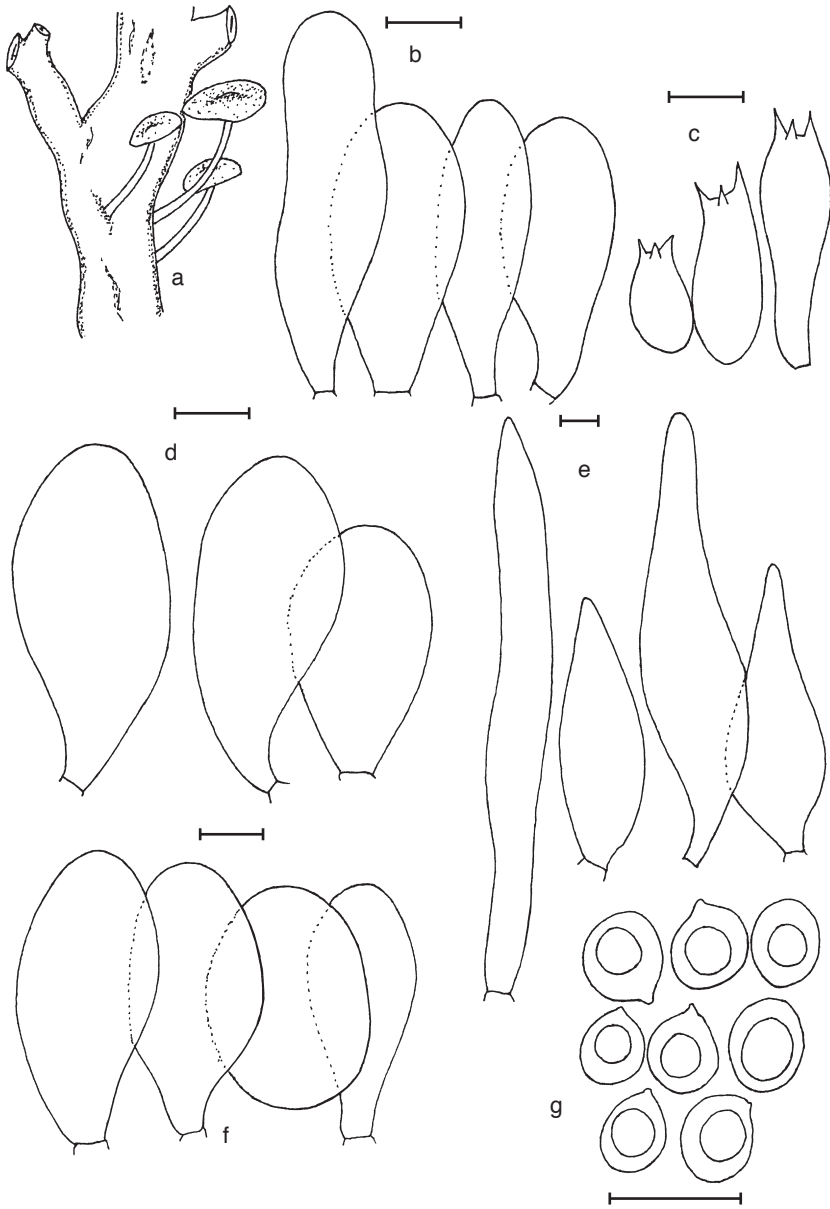


Fig. 1. *Pluteus delicatulus*. a. Habit  $\times 1$ ; b. cheilocystidia; c. basidia; d. pleurocystidia; e. pileocystidia; f. epithelial cells; g. spores. Scale bars: 10  $\mu\text{m}$ .

Spores (4.5–)5.3–6 × (4.5–)5.5–6  $\mu\text{m}$ , globose, thick-walled, with or without a guttule. Basidia 22.5–30 × 6.8–7.5  $\mu\text{m}$ , clavate, utriform, 4-spored. Lamella edge sterile with crowded cheilocystidia. Cheilocystidia 18–54 × 8.8–19.5  $\mu\text{m}$ , clavate, vesiculose, cylindroclavate, thin-walled, hyaline. Pleurocystidia collapsing, rare, vesiculose, clavate, 22.5–40.5 × 15.5–21  $\mu\text{m}$ , thin-walled, hyaline. Hymenophoral trama inversely bilateral with convergent hyphae, 2–12  $\mu\text{m}$  in diameter, thin-walled, hyaline. Subhymenial layer narrow, interwoven. Pileal trama composed of interwoven hyphae, 2–12  $\mu\text{m}$  in diameter, thin-walled, hyaline. Pileipellis an epithelium intermixed with numerous dermatocystidia. Epithelial cells 25–43.5 × 13–25.5  $\mu\text{m}$ , vesiculose, clavate, pyriform, thin-walled with thick brown intracellular contents. Pileocystidia 46.5–147 × 15–27  $\mu\text{m}$ , fusiform to lageniform often inflated with a long neck with obtuse or sub-acute apices, thin-walled with brown contents. Stipe trama composed of parallel hyphae, 2.3–12(–15)  $\mu\text{m}$  in diameter, thin-walled, hyaline. Caulocystidia and clamp-connections absent. Oleiferous hyphae present.

Habitat — On dead trees or on decayed parts of living angiosperm trees and logs.

*Specimens examined.* INDIA: Kerala State, TBGRI campus, 19.VI.1996, C.K. Pradeep, K(M) 116243 (Holotype); 24.X.1997, C.K. Pradeep, K(M) 116244; 28.X.1997, C.K. Pradeep, K(M) 116245; 4.XI.1997, C.K. Pradeep, K(M) 116246.

*Pluteus delicatulus* is characterized by the small, thin, fragile, delicate basidiomes, white transparent stipe, clavate to vesiculose cheilocystidia, the rare and collapsing, vesiculose to clavate pleurocystidia and lignicolous habitat. It shows close affinity with *P. subminutus* Singer (Singer, 1958) in most of the macroscopic and microscopic features. The subsmooth to rugulose pileus, numerous ventricose to vesiculose-ampullaceous pleurocystidia, versiform cheilocystidia and short pileocystidia differentiate *P. subminutus* from the new taxon. Other related taxa are *P. minutissimus* Maire (Orton, 1986) and *P. podospileus* Sacc. (Orton, 1986). Larger basidiomes, velvety pilose scaly pileus, brown scaly stipe, and subglobose spores (4–6 × 3.5–5  $\mu\text{m}$ ) demarcate *P. podospileus* from the present taxon. *Pluteus minutissimus* is distinguished by the pilose-tomentose to velvety pileus, snuff-brown scaly stipe and terrestrial habitat from the present species. The epithelial pileipellis intermixed with distinct pileocystidia indicates that this species is a good representative of sect. *Celluloderma* subsect. *Mixtini*.

### ***Pluteus chrysaegis* (Berk. & Broome) Petch — Fig. 2**

*Pluteus chrysaegis* (Berk. & Broome) Petch, Ann. Roy. Bot. Gard. Peradeniya 5 (1912) 271.

*Agaricus chrysaegis* Berk. & Broome, J. Linn. Soc. Bot. 11 (1871) 536.

*Entoloma chrysaegis* (Berk. & Broome) Sacc., Syll. Fung. 5 (1887) 61.

Basidiocarps solitary, in pairs or in groups. Pileus 2–4.5 cm in diameter, convex, becoming plano-convex, broadly umbonate; surface chrome yellow to butter yellow (3A8–4A5) with olive brown to ‘coffee’ (4E3–5F7) disc, pellucid-striate up to half way, dry; margin straight, entire, striate. Lamellae free, pale orange (6A3) to pink, up to 6 mm wide, crowded with lamellulae of different lengths; edge concolorous to sides, entire. Stipe 3.5–11 cm × 3–5 mm, central, cylindric, equal with a slightly broad base, solid; surface yellowish white (3A2) to white in upper half, mustard brown (5E6) to

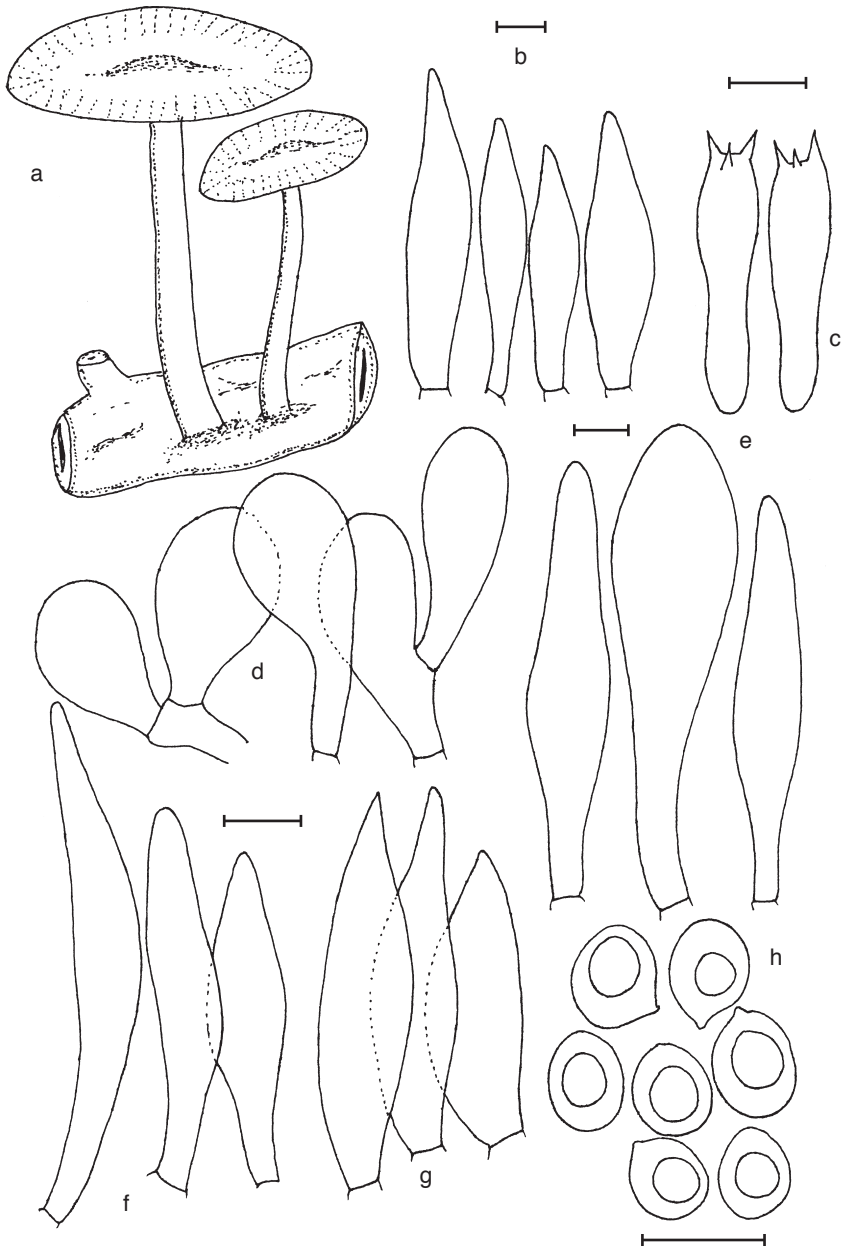


Fig. 2. *Pluteus chrysaegis*. a. Habit  $\times 1$ ; b. cheilocystidia; c. basidia; d. epithelial cells; e. pleurocystidia; f. pileocystidia; g. caulocystidia; h. spores. Scale bars: 10  $\mu\text{m}$ .

pale brown in lower half, fibrillose striate. Context white, transparent, up to 2 mm thick. Odour none.

Spores  $4.5\text{--}6 \times 4.5\text{--}5.25 \mu\text{m}$ , subglobose, thick-walled with a guttule. Basidia  $22.5\text{--}28.5 \times 5.3\text{--}6.8 \mu\text{m}$ , clavate, 4-spored. Lamella edge sterile, crowded with cheilocystidia. Cheilocystidia  $22.5\text{--}57 \times 6\text{--}15 \mu\text{m}$ , ventricose to ventricose rostrate, often lageniform with an acute or obtuse neck, thin-walled, hyaline. Pleurocystidia abundant, scattered,  $51\text{--}84 \times 12\text{--}22.5 \mu\text{m}$ , lageniform, rarely vesiculose with a long narrow neck and stalk, thin-walled, hyaline. Hymenophoral trama inversely bilateral with convergent hyphae,  $1.5\text{--}15 \mu\text{m}$  in diameter, thin-walled, hyaline. Subhymenium pseudoparenchymatous. Pileal trama composed of interwoven, inflated hyphae,  $1.5\text{--}33 \mu\text{m}$  in diameter, thin-walled, hyaline. Pileipellis composed of epithelial cells intermingled with distinct pileocystidia. Epithelial cells  $19.5\text{--}31.5 \times 10.5\text{--}18 \mu\text{m}$ , clavate, vesiculose, thin-walled, hyaline. Pileocystidia scattered,  $31\text{--}60 \times 7.5\text{--}10.5 \mu\text{m}$ , similar to cheilocystidia, thin-walled, hyaline. Stipe trama composed of parallel hyphae,  $2.3\text{--}25.5 \mu\text{m}$  in diameter, thin-walled, hyaline. Caulocystidia present in groups on the upper part,  $19.5\text{--}33 \times 7.5\text{--}10.5 \mu\text{m}$ , ventricose, mucronate, thin-walled, hyaline. Clamp-connections absent. Oleiferous hyphae present.

Habitat — On dead Rubber wood in Rubber plantation.

*Specimens examined.* INDIA: Kerala State, Kannur, Alakode, 29.XI.1996, C.K. Pradeep, K(M) 116241; 19.VI.2000, C.K. Pradeep, K(M) 116240; 11.III.2002, C.K. Pradeep, K(M) 116242.

The chrome yellow cap and mucronate dermatocystidia of *P. chrysaegis* is a unique set of characters, which separates this taxon from all others in sect. *Celluloderma*. This rare, remarkable species was originally and hitherto only known from Sri Lanka (Pegler, 1986). An additional feature not mentioned in earlier descriptions but observed in the present collection is the presence of groups of caulocystidia. Except for this, our collection matches in all respects with the Sri Lankan material.

#### ACKNOWLEDGEMENTS

We sincerely thank Dr. Orson K. Miller Jr., Department of Biology, Virginia Polytechnic Institute, Blacksburg, USA for useful suggestions, critical comments and presubmission review of the manuscript. One of us (CKP) acknowledges financial assistance from CSIR (New Delhi).

#### REFERENCES

- Kornerup, A. & J.H. Wanscher. 1967. *Methuen Handbook of Colour*. Ed. 2. Methuen, London.
- Orton, P.D. 1986. *Pluteaceae: Pluteus & Volvariella*. In *British Fungus Flora 4*. Royal Botanic Garden, Edinburgh.
- Pegler, D.N. 1986. *Agaric Flora of Sri Lanka*. HMSO, London.
- Pradeep, C.K., K.B. Vrinda & T.K. Abraham. 2002. *Pluteus* section *Pluteus* (Pluteaceae, Agaricales) from Kerala State, India. *Mycotaxon* 83: 59–66.
- Singer, R. 1958. *Monographs of South American basidiomycetes, especially those of the east slope of the Andes and Brazil*. *Lloydia* 21: 195–299.