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### CONTRIBUTION TO THE MACROMYCETES OF WEST BENGAL, INDIA: 28–33

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## CONTRIBUTION TO THE MACROMYCETES OF WEST BENGAL, INDIA: 28–33

Rituparna Saha<sup>1</sup> , Arun Kumar Dutta<sup>2</sup> , Soumitra Paloi<sup>3</sup> , Anirban Roy<sup>4</sup>   
& Krishnendu Acharya<sup>5</sup>

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<sup>1,2,3,5</sup> Molecular and Applied Mycology and Plant Pathology Laboratory, Department of Botany, University of Calcutta, Kolkata, West Bengal 700019, India

<sup>1,2,3,4</sup> West Bengal Biodiversity Board, Prani Sampad Bhawan, 5<sup>th</sup> floor, LB 2, Sector III, Salt Lake City, Kolkata, West Bengal 700106, India

<sup>1</sup> rituparnasaha2014@gmail.com, <sup>2</sup> arun.botany@gmail.com, <sup>3</sup> soumitrabotany@gmail.com,  
<sup>4</sup> dr.anirbanroy@yahoo.co.in, <sup>5</sup> krish\_paper@yahoo.com (corresponding author)

**Abstract:** The present paper deals with the report of six poroid woody macro fungi belonging to the family Ganodermataceae from West Bengal in India. The taxonomic account of these collected fungi is represented herein with detailed macro- and micro-morphological features.

**Keywords:** Basidiomycota, *Ganoderma* species, Polyporales, taxonomy.

distinguishing features of this genus include the presence of truncate basidiospores and the colour reaction of pileus and pore surface, which never turn permanently dark in 10% KOH solution (Sharma 2012).

The present study reports six poroid fungi with their detailed morpho-taxonomic enumeration from the state.

## MATERIAL AND METHODS

Macrofungal specimens were collected during the rainy seasons (June–October) of 2010–2017. Colour photographs were taken and macro-morphological features of each specimen were studied in the field. A small part of each fresh specimen was cut and its reaction with chemicals was observed. Each collection was then wrapped in tissue papers and kept separately in a box to avoid contamination. Finally, the collected specimens were withered in a hot air drier until the moisture was totally removed. Microscopic features were observed with a Carl Zeiss AX10 Imager A1 phase contrast microscope from thin handmade sections

West Bengal has a diverse range of biogeographical and ecological conditions due to the presence of the coastal region of the Bay of Bengal on one side and the subalpine mountains of the eastern Himalayan region on the other. This wide array of phyto-topographical features facilitates the luxuriant growth of macrofungi belonging to several types and stature like poroid, dentate, and gilled. The habitat of these fungi varies from saprophytic to humicolous and mycorrhizal (Pradhan et al. 2016).

The genus *Ganoderma* (Basidiomycota: Polyporales) is a woody, poroid group of saprotrophic fungi. The

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of the dried basidiocarps stained with congo red and Melzer's reagent. Identification and colour terminology followed Kornerup & Wanscher (1978), Bhosle et al. (2010), and Sharma (2012). Thirty measurements of basidiospores were taken from each sample for calculating the dimensions of the basidiospore. Length/breadth ratio denotes the Q value. Mean Q value ( $Q_m$ ) was measured by dividing the total sum of Q value by the total number of spores observed. Hand drawings of different identifying characters were obtained with a camera lucida and a 0.1mm rotring pen, which was used to trace the lines. The voucher specimens were preserved following Pradhan et al. (2015) and were deposited in the Calcutta University Herbarium (CUH), Kolkata, India.

### TAXONOMY

#### *Ganoderma lucidum* (Curtis) P. Karst.

Revue mycol., Toulouse 3(no. 9): 17 (1881)

(Fig. 1; Image 1)

Basidiocarp annual, laterally stipitate. Pileus applanate when young and funnel-shaped at maturity, 45–111 mm in length and 36–70 mm in breadth, 17mm thick near the base. Pileus upper surface reddish-brown (8D6, 8E6), shiny, glabrous, laccate. Margin lobed, whitish (1A1), thin. Pore surface whitish (1A1), greyish-orange (5B3) on bruising. Pores 4–6 per mm, circular. Tubes not stratified, brown (7E5), 3–6 mm deep. Context soft, double layered, upper reddish golden brownish-orange (6C3) and lower light brown (7D4) near the tubes, 4–10 mm thick near the base. Stipe cylindrical, central when young and lateral at maturity, 70–95 mm in length and 10–25 mm in breadth, reddish-brown (8E7), laccate, glabrous, shiny.

Hyphal system trimitic. Generative hyphae of context greyish-yellow (4C3), thin walled, clamped at septa, 2.5–3.5  $\mu$ m in breadth; binding hyphae branched, interwoven, 0.7–2  $\mu$ m wide, hyaline; skeletal hyphae unbranched at base and branched towards apex, 3.5–4.5  $\mu$ m wide, greyish-yellow (4C3), interwoven. Generative hyphae of the tube layer greyish-yellow (4C3), thin-walled, clamped at septa, difficult to observe, 2.5–3.5  $\mu$ m in breadth; binding hyphae branched, 0.5–2  $\mu$ m wide, hyaline; skeletal hyphae unbranched at base and branched towards apex, 3.5–5  $\mu$ m wide, greyish-yellow (4C3). Cuticular hyphae regular, closely packed with clavate end cells, sometimes cells are cylindrical or tubular, golden (4C6) to brownish-orange (6C8), thick, 6–12  $\mu$ m wide. Basidiospores truncate, (7–)7.5–8(–8.5)  $\times$  (3.5–)4–4.5(–5)  $\mu$ m,  $Q = 1.6$ –2.0,  $Q_m = 1.84$ , double



Image 1. *Ganoderma lucidum*. Scale = 10mm

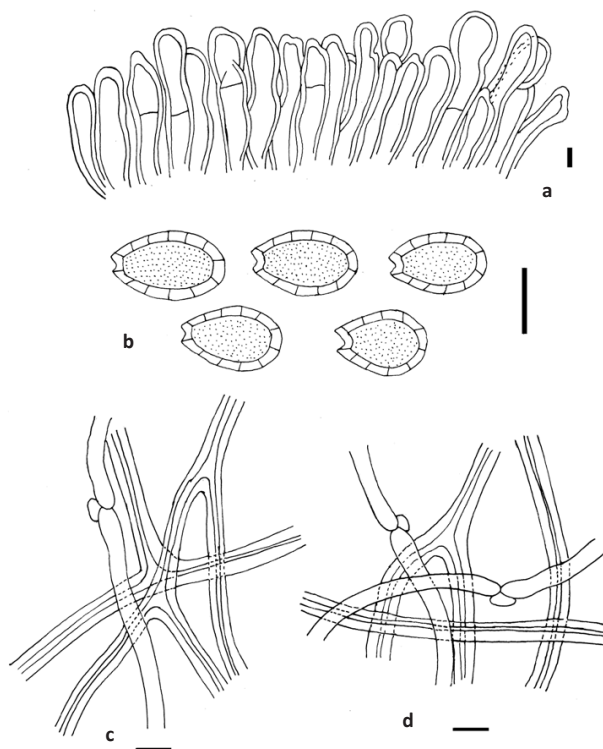


Figure 1. *Ganoderma lucidum*. a - hyphae of the cutis, b - basidiospores, c - context hyphae, d - tube layer hyphae. Bars = 5 $\mu$ m. Drawing by R. Saha.

walled, exospores hyaline, thin and endospore thick, brownish-orange (7C5).

Habit and habitat: Solitary to gregarious, grown on dead wooden log of angiosperm.

Specimen examined: CUH AM532, 26.vii.2017, 22.349°N & 88.069°E, elevation 12m, Uluberia, Kolkata, West Bengal, India, coll. A.K. Dutta & S. Paloi.

Remarks: *Ganoderma lucidum* is well characterized

by its laccate-shaped, laterally stipitate, reddish-brown coloured basidiocarp with whitish margin, distinctly double layered context differentiated by reddish golden brownish-orange upper and light brown (7D4) lower near the tubes, presence of regular, closely packed clavate end cells at the cutis, and basidiospores measuring  $7\text{--}8.5 \times 3.5\text{--}5 \mu\text{m}$  in diameter with  $Q_m$  of 1.84.

The taxon has a worldwide distribution and was previously reported from India (Sharma 2012). The description of the morphological features of the collected specimen matches that of the earlier report. The present collection does not reveal the presence of gasterospores and differs from the material reported from Portugal (Steyaert 1975). The collection reported from East Anglia by Corner (2009), however, varies a bit from the present collection with regard to the size of the basidiospores ( $9.5\text{--}12 \times 6\text{--}6.5 \mu\text{m}$  vs  $7\text{--}8.5 \times 3.5\text{--}5 \mu\text{m}$ ), which may be attributed to climatic and geographic variations.

Among macro-microscopically related taxa, *Ganoderma flexipes* differs by having a reddish-brown margin, chlamydospore in the context and trama, and larger basidiospores ( $7.5\text{--}10.5 \times 6\text{--}7.5 \mu\text{m}$ ); *G. curtisii* differs by having purplish-brown to black coloured pileus and larger spores ( $8.5\text{--}11 \times 5\text{--}7 \mu\text{m}$ ; Sharma 2012).

***Ganoderma applanatum* (Pers.) Pat.**

Hyménomyc. Eur. (Paris): 143 (1887) (Fig. 2; Image 2)

Basidiocarp sessile, dull, non-laccate, glabrous, perennial, woody, applanate,  $50\text{--}86 \times 30\text{--}35 \text{ mm}$  in diameter,  $35\text{--}44 \text{ mm}$  thick. Upper surface of pileus greyish to reddish-brown (8D3, 9E4) with concentric zonation, sulcate. Margin  $6\text{--}15 \text{ mm}$  thick, round, reddish-brown (9E4) in colour. Pore surface whitish (1A1), pore  $4\text{--}5$  per mm, round. Tube multilayered ( $3\text{--}4$  layered), dark brown (7F7). Context thick, single layered, dark brown (7F7).

Hyphal system trimitic. Generative hyphae of context thin walled,  $4.5\text{--}5.5 \mu\text{m}$  wide, yellowish-brown (6D4, 5D7), clamp connection present at septa, difficult to observe; skeletal hyphae dominant,  $4.5\text{--}6 \mu\text{m}$  wide, dark brown (9F4), branched; binding hyphae branched, hyaline,  $1.7\text{--}2.5 \mu\text{m}$  wide. Generative hyphae of tube layer thin walled,  $4\text{--}5.5 \mu\text{m}$  wide, yellowish-brown (6D4, 5D7), clamp connection present at septa, difficult to observe; skeletal hyphae dominant,  $4.5\text{--}6.5 \mu\text{m}$  wide, dark brown (9F4), branched; binding hyphae branched, hyaline,  $1.7\text{--}2.5 \mu\text{m}$  wide. Cutis irregular, trichodermis type with spores embedded within the gelatinous layer, cutis hyphae  $1.5\text{--}5.5 \mu\text{m}$  wide, brown (7E5).



Image 2. *Ganoderma applanatum*. Scale = 10mm

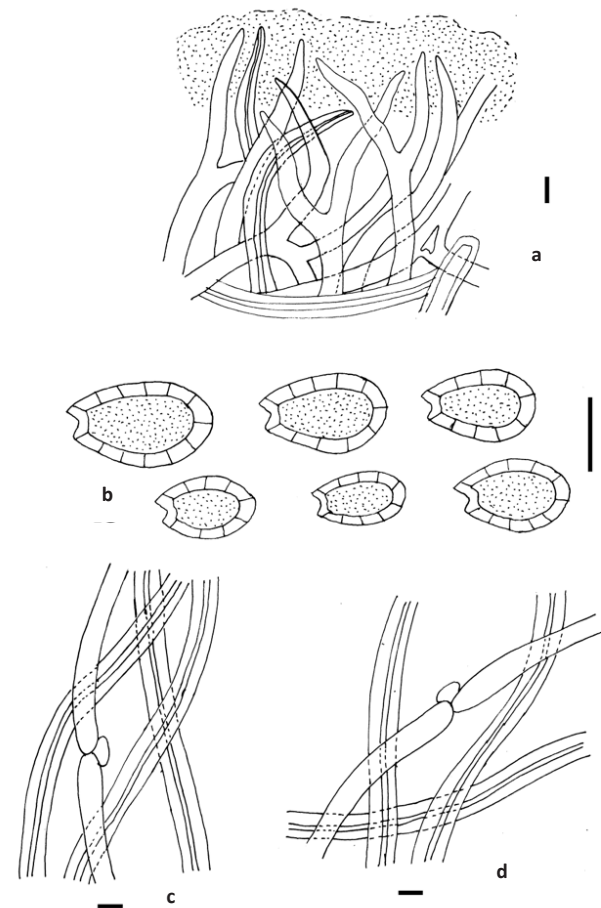


Figure 2. *Ganoderma applanatum*. a - hyphae of the cutis, b - basidiospores, c - context hyphae, d - tube layer hyphae. Bars =  $5 \mu\text{m}$ . Drawing by R. Saha.

Basidiospore truncate,  $(6.5\text{--})7.5\text{--}9\text{--}(10) \times 3.5\text{--}4.5\text{--}(6) \mu\text{m}$  in diameter,  $Q = 1.6\text{--}2.1$ ,  $Q_m = 1.8$ , double walled, exospores hyaline, thin, endospore pale yellow to dark

brown (6D7, 8E5) with elongated ridges.

Habit and habitat: Solitary, grown on hard wood of angiosperm.

Specimen examined: CUH AM 531, 16.vii.2017, 26.695°N & 89.551°E, elevation 47m, near Boxa Tiger Reserve, Dooars, Alipurduar District, West Bengal, India, coll. K. Acharya & A. Roy.

Remarks: *Ganoderma applanatum* is characterized by its perennial habit, the presence of a sessile basidiocarp coloured greyish to reddish-brown, a trichodermis type cutis, multilayered tubes, trimitic hyphal system, and basidiospores measuring  $6.5\text{--}10 \times 3.5\text{--}6.0 \mu\text{m}$ .

The taxon was previously reported from Maharashtra (Bhosle et al. 2010), Dehradun (Sharma 2012), and Punjab (Kaur et al. 2017) in India. Our collection matches the specimens reported from Punjab and Dehradun except for slight variations in the numbers of tube layers present. While the present specimen had 3–4 tube layers, that from Dehradun had 4–7 (Sharma 2012).

Among macro-microscopically similar taxa, *Ganoderma australe* (Fr.) Pat. differs by the presence of one or several crustaceous layers in the pileus context and larger basidiospores ( $7\text{--}13 \times 5\text{--}8.5 \mu\text{m}$ ); *G. philippi* (Bres. & Henn. ex Sacc.) Bres. Differs by having a blackish-brown upper surface and a very short tube (up to 3mm deep; Sharma 2012).

***Ganoderma flexipes* Pat.**

Bull. Soc. mycol. Fr. 23(2): 75 (1907) (Fig. 3; Image 3)

Basidiocarp annual, distinctly stipitate. Pileus glabrous, laccate,  $75 \times 53 \text{ mm}$  in diameter, 4–10 mm thick near the base. Upper surface reddish-brown (8E7, 9E8) in colour, uneven. Margin slightly wavy, reddish-brown (8E7) in colour. Pore surface brownish-grey (7C2) in colour, greyish-brown (7D3) on bruising, pores 4–5 per mm. Tubes brown (7E5) in colour, 4–5 mm deep, not stratified. Context thin, 1.5–2 mm double layered, upper light brown (7D5) and lower brown (7E5) near the tubes. Stipe dorsi-lateral, 100mm long, 8–12 mm in diameter, laccate, glabrous, reddish-brown to dark brown (8F7, 9F6) in colour.

Hyphal system trimitic. Generative hyphae of context reddish blond brownish-orange to yellowish-brown (5C3, 5D6), clamped at septa, thin walled, branched,  $2.5\text{--}3.5 \mu\text{m}$  wide; skeletal hyphae brownish-orange (5C4), thick walled, unbranched at base and branched towards apex, arboriform,  $3.5\text{--}5 \mu\text{m}$ , interwoven; binding hyphae branched, hyaline,  $0.7\text{--}1.5 \mu\text{m}$  wide, interwoven. Generative hyphae of tube layer pale reddish blond brownish-orange to yellowish-brown



Image 3. *Ganoderma flexipes*. Scale = 10mm

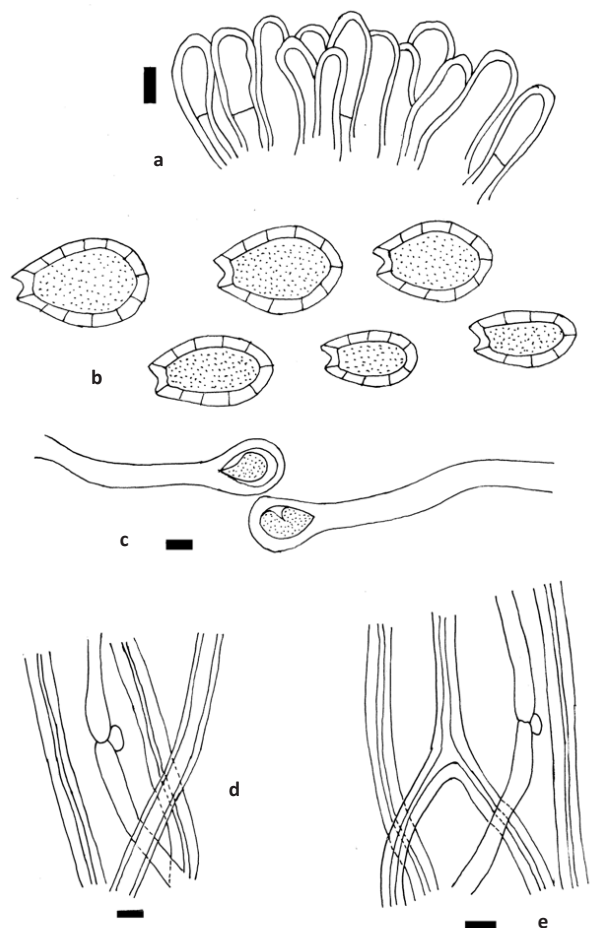


Figure 3. *Ganoderma flexipes*. a - hyphae of the cutis, b - basidiospores, c - chlamydospore, d - context hyphae, e - tube layer hyphae. Bars =  $5 \mu\text{m}$ . Drawing by R. Saha.

(5C3, 5D6), clamped at septa, thin walled, branched,  $2.5\text{--}3.5 \mu\text{m}$  wide; skeletal hyphae brownish-orange

(5C4), thick walled, unbranched at base and branched towards apex, arboriform, 3.5–5.5  $\mu\text{m}$ , interwoven; binding hyphae branched, hyaline, 0.7–1.5  $\mu\text{m}$  wide, interwoven. Cuticular hyphae regular, closely packed with clavate end cells, light brown (6D5) in colour, 4–7  $\mu\text{m}$  wide. Basidiospores truncate, 7–9(–10)  $\times$  4–5.5(–6.5)  $\mu\text{m}$  in diameter,  $Q = 1.4$ –2.2,  $Q_m = 1.7$ , bitunicate, exospores hyaline, thin walled, endospore light brown (7D6). Chlamydospore present in the context and trama, 9.5–10.5  $\mu\text{m}$  in diameter, ovoid, reddish-blond brownish-orange (5C3) in colour.

Habit and habitat: solitary, grown on dead dicotyledonous wood.

Specimen examined: CUH AM534, 09.viii.2015, 22.595°N & 88.263°E, elevation 4m, Howrah, West Bengal, India, coll. K. Acharya.

Remarks: The present specimen is characterized by a laccate pileus coloured reddish-brown, distinctly double layered context (upper light brown and lower brown) near the tubes, a dorsi-lateral stipe, presence of closely packed clavate end cells at the cutis, basidiospores measuring 7–10  $\times$  4–6.5  $\mu\text{m}$  in diameter ( $Q_m = 1.7$ ), and presence of chlamydospore in the pileus context and trama.

Based on the artificial key proposed by Sharma (2012), the presence of chlamydospores characterises the specimen to be *Ganoderma flexipes*. This taxon has a worldwide distribution and was reported from China (Zhou et al. 2015), India (Uttarakhand) (Sharma 2012), and Vietnam (Steyaert 1972). Our present specimen mostly matches the description of that from India except for having a slightly larger chlamydospore (9.5–10.5  $\mu\text{m}$  vs 6–9.5  $\mu\text{m}$ ). The specimen from China differs from the present collection with regard to slightly longer basidiospores (8.5–11  $\times$  5–7  $\mu\text{m}$  vs 7–10  $\times$  4–6.5  $\mu\text{m}$ ).



Image 4. *Ganoderma ahmadii*. Scale = 10mm

The collection from Vietnam had slightly larger sized basidiocarps and comparatively larger basidiospores (8–13  $\times$  5.5–8  $\mu\text{m}$ ).

Among morphologically related species, *Ganoderma lucidum* differs by the presence of white coloured pileus margin and the absence of chlamydospore; *G. curtisii* (Berk.) Murrill differs by the presence of purplish-brown to black pileus and the absence of chlamydospores; *G. ahmadii* differs by the presence of uniform coloured context and the absence of chlamydospores (Sharma 2012).

#### *Ganoderma ahmadii* Steyaert

Persoonia 7(1): 91 (1972) (Fig. 4; Image 4)

Basidiocarp annual, laterally stipitate. Pileus glabrous, laccate, flabelliform, 45–55  $\times$  60–75 mm in diameter, 4–8 mm thick near the base. Upper surface of pileus glabrous, laccate, shiny, dark brown (9F6). Margin lobed, whitish (1A1) to straw (4B1) coloured, thick. Pore surface whitish (1A1) to straw (4B1) in colour, greyish-brown (8D3) on bruising, pores 4–7 per mm. Tubes reddish-brown (9E4) in colour, 2–7 mm deep, not

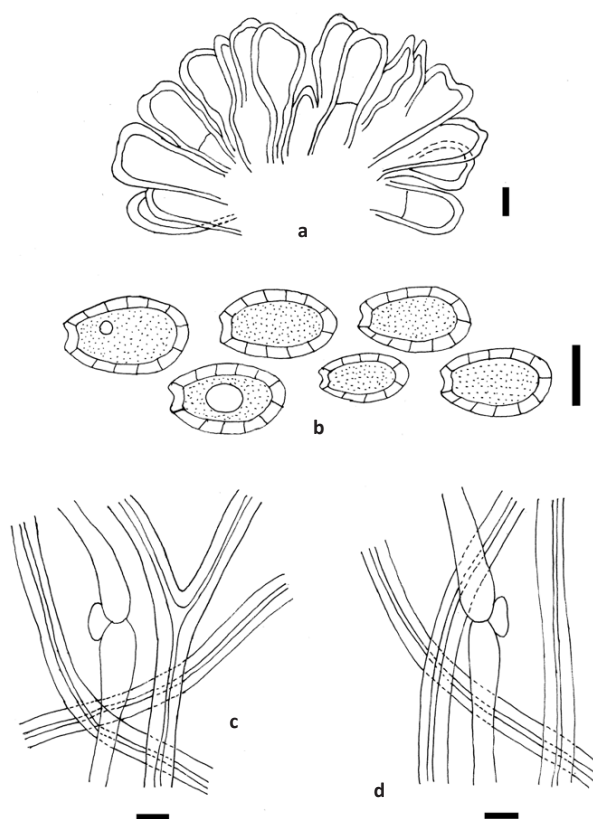


Figure 4. *Ganoderma ahmadii*.

a - hyphae of the cutis, b - basidiospores, c - context hyphae, d - tube layer hyphae. Bars = 5  $\mu\text{m}$ . Drawing by R. Saha.

stratified. Context 1–5 mm thick, single layered, reddish-brown (8E4) in colour. Stipe dorsi-lateral, 100–125 mm long and 8–10 mm broad, laccate, shiny, glabrous, dark brown (8F5, 9F5) in colour.

Hyphal system trimitic. Generative hyphae of context greyish-brown (6D3), thin walled, branched, clamped at septa, difficult to observe, 3–4.5  $\mu$ m wide; skeletal hyphae dominant, light brown (6D4), thick walled, unbranched at base and branched towards apex, arboriform, 4.5–6  $\mu$ m, interwoven; binding hyphae branched, greyish-brown (6D3), septate, 1–2  $\mu$ m wide, interwoven. Generative hyphae of tube layer greyish-brown (6D3), thin walled, branched, clamped at septa, difficult to observe, 3–4.5  $\mu$ m wide; skeletal hyphae light brown (6D4), thick walled, unbranched at base and branched towards apex, arboriform, 4.5–5.5  $\mu$ m, interwoven; binding hyphae branched, greyish-brown (6D3), septate, 0.7–1.5  $\mu$ m wide, interwoven. Cuticular hyphae regular, closely packed with clavate end cells, light brown (6D4, 6D5) in colour, 7–11  $\mu$ m wide. Basidiospores truncate, brown, bitunicate, (7.5–)8–9(–10.5)  $\times$  4–5(–6.5)  $\mu$ m in diameter,  $Q = 1.4$ –2.2,  $Q_m = 1.7$ , exospores hyaline, thin walled, endospore thick, brown (6E6) with elongated ridges.

Habit and habitat: solitary, growing on dead and rotten *Bambusa bambos* wood.

Specimen examined: CUH AM530, 18.vii.2017, 26.388°N & 89.526°E, elevation 43m, Kaljani, Coochbehar District, West Bengal, India, coll. K. Acharya & A. Roy.

Remarks: *Ganoderma ahmadii* possesses characteristic features of an annual habit; laterally stipitate, laccate basidiocarp coloured reddish-brown to dark brown with white to straw coloured pileus margin; single layered context coloured reddish-brown; presence of a dorsi-lateral stipe measuring 100–125 mm long; pileus surface consisting of regular, closely packed clavate end cells; and truncate, double walled basidiospores measuring 7.5–10.5  $\times$  4–6.5  $\mu$ m in diameter.

*Ganoderma ahmadii* was previously reported from Uttarakhand, India (Sharma 2012). Our collection matches the previous report. The specimen reported from Pakistan differs by having double layered context coloured cinnamon buff towards the cutis and Verona brown near the tubes and larger spores (8–11  $\times$  5.5–7  $\mu$ m; Steyaert 1972).

Among the macro- and micro-morphologically related species, *Ganoderma flexipes* differs from *G. ahmadii* on the basis of the presence of chlamydospore in the context and trama. *Ganoderma ahmadii* is also morphologically different from *G. applanatum* on the

basis of size, shape, and colour of the basidiocarp. The basidiocarp of *G. applanatum* has sessile, non-laccate pileus with stratified tube, and trichodermis type cutis (Sharma 2012).

***Ganoderma lucidum* var. *lucidum* (Curtis) P. Karst.**

Revue mycol., Toulouse 3(no. 9): 17 (1881)

(Fig. 5; Image 5)

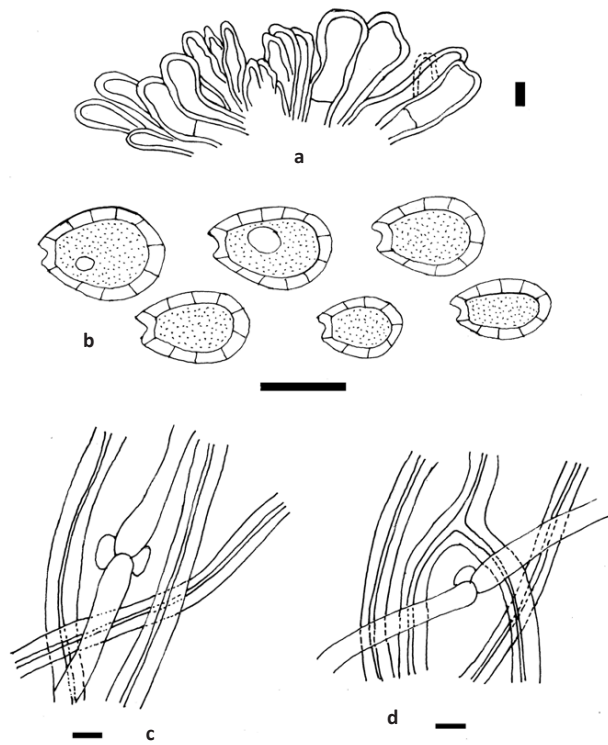
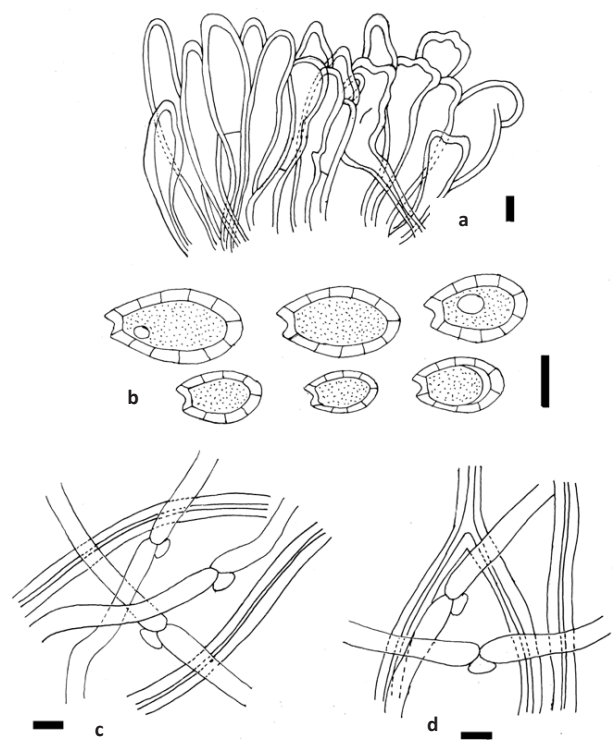
Basidiocarp annual, laterally stipitate. Pileus reniform, up to 90mm in diameter, 10–12 mm thick near the base. Upper surface reddish-brown (8D6, 8D7), shiny, glabrous, laccate. Margin thin, obtuse, white to orange grey (5A1, 5B2) in colour. Pore surface white (1A1), light brown (7D4) on bruising, pore sub orbicular, 4–5 per mm. Tubes not stratified, reddish-brown (8E5) in colour, 3–6 mm deep. Context soft, spongy, double layered, yellowish-brown (6E5) at upper side and brown (7E5) lower near to the tubes, 10–11 mm thick near the base. Stipe lateral, shiny, glabrous, laccate, reddish-brown (8E6), 50–70 mm in length and 10–20 mm broad.

Hyphal system trimitic. Generative hyphae of context light brown (6D5), thin walled, branched, 3.5–5  $\mu$ m wide, clamped at septa, difficult to observe; skeletal hyphae dominant, brown (7E5), thick walled, unbranched at base and branched towards apex, 4.5–7  $\mu$ m in breadth, interwoven; binding hyphae colourless, branched, 0.7–1.8  $\mu$ m wide, interwoven. Cuticular hyphae regular, closely packed with clavate end cells, yellowish-brown (5D6) to light brown (7E5) in colour, thick walled, 4–11.5  $\mu$ m wide. Basidiospores truncate, 5–6.5(–7.5)  $\times$  3.5–4.5(–5.5)  $\mu$ m in diameter,  $Q = 1.0$ –1.8,  $Q_m = 1.5$ , bitunicate, exospores hyaline, thin-walled and endospore with elongated ridges, light brown (6D5) to brown (7E5) in colour.

Habit and habitat: Cespitose, grown on dead wooden log of angiosperm.

Specimen examined: CUH AM529, 25.vii.2016, 22.992°N & 88.531°E, elevation 10m, near Chandirampur, Birohi, Nadia, West Bengal, India, coll. K. Acharya.

Remarks: The present variety is easily recognized by the smaller size of the basidiospores (5.3–7.5  $\times$  3.5–5.3  $\mu$ m in diameter with  $Q_m = 1.5$ ). *Ganoderma lucidum* var. *lucidum* was previously reported from India (Maharashtra, Bhosle et al. 2010). According to the key of Bhosle et al. (2010), under *G. lucidum* complex, if the spore index is 1.5, then the specimen is considered as *G. lucidum* var. *lucidum*. In the case of our collection, the spore index was 1.5. Hence, it could be identified as *G. lucidum* var. *lucidum*. Though the specimen from Maharashtra had a few larger spores (7–8.5  $\times$  5–6  $\mu$ m), the spore index was

Image 5. *Ganoderma lucidum* var. *lucidum*. Scale = 10mmImage 6. *Ganoderma resinaceum*. Scale = 10mmFigure 5. *Ganoderma lucidum* var. *lucidum*.  
a - hyphae of the cutis, b - basidiospores, c - context hyphae,  
d - tube layer hyphae. Bars = 5µm. Drawing by R. Saha.Figure 6. *Ganoderma resinaceum*.  
a - hyphae of the cutis, b - basidiospores, c - context hyphae,  
d - tube layer hyphae. Bars = 5µm. Drawing by R. Saha.

the same (Bhosle et al. 2010). Among other varieties of *G. lucidum*, *G. lucidum* var. *capense* has a Q value of 1.6 (Bhosle et al. 2010).

***Ganoderma resinaceum* Boud., in Patouillard**  
Bull. Soc. mycol. Fr. 5(2,3): 72 (1889) (Fig. 6; Image 6)

Basidiocarp annual, sessile. Pileus flabelliform,

50 × 40 mm in diameter and 10–13 mm thick. Upper surface reddish-brown (8E8) with shiny concentric zones, irregular, laccate, darker (8F8) towards base. Margin thin, whitish (1A1) in colour, dark brown (7F7) on bruising. Pore surface white (1A1), dark brown (7F7) on bruising, pore circular, 3–4 per mm. Tubes not stratified, 5–7 mm deep, reddish-brown (8E4). Context double layered, upper brown (7E7) and lower reddish-brown

Key to the species *Ganoderma* reported in the study

1. Pileus upper surface laccate; hyphae of the cutis regular, closely packed with clavate end cells ..... 2
- 1a. Pileus upper surface non-laccate; hyphae of the cutis irregular, clavate end cells absent ..... *G. applanatum*
2. Pileal context double layered, upper yellowish-brown and lower brown to dark brown near the tubes ..... 3
- 2a. Pileal context uniformly coloured brown to dark brown ..... *G. ahmadii*
3. Basidiocarp containing a well-developed stipe ..... 4
- 3a. Basidiocarp sessile ..... *G. resinaceum*
4. Chlamydospore present in the context and trama; fruitbody reddish-brown with concolorous margin ..... *G. flexipes*
- 4a. Chlamydospore absent; fruit body reddish brown with discoloured, white margin ..... 5
5. Basidiospores measuring  $7-8.5 \times 3.5-5 \mu\text{m}$  with  $Q_m > 1.5$  ..... *G. lucidum*
- 5a. Basidiospores smaller, measuring  $5-7.5 \times 3.5-5.5 \mu\text{m}$  with  $Q_m$  of 1.5 ..... *G. lucidum* var. *lucidum*

(8E5) near the tubes, up to 10mm thick near the base. Stipe absent.

Hyphal system trimitic. Generative hyphae of context brown (7E6) to dark brown (7F7), thin walled, clamped at septa, difficult to observe,  $3-4.5 \mu\text{m}$  in breadth; binding hyphae interwoven,  $2.5-3.5 \mu\text{m}$  wide, hyaline; skeletal hyphae unbranched at base and branched towards apex,  $3.5-5 \mu\text{m}$  wide, dark brown (7F7), interwoven. Generative hyphae of tube layer brown (7E6) to dark brown (7F7), thin walled, clamped at septa, difficult to observe,  $3.5-4.5 \mu\text{m}$  in breadth; binding hyphae branched,  $2.5-3.5 \mu\text{m}$  wide, hyaline; skeletal hyphae unbranched at base and branched towards apex,  $3.5-5 \mu\text{m}$  wide, dark brown (7F7). Cuticular hyphae regular, closely packed with clavate end cells, brown (7E8) in colour, thick,  $7-10 \mu\text{m}$  wide. Basidiospores truncate,  $(7-9-12.5(-13.5) \times 4-5.5(-7) \mu\text{m}$  in diameter,  $Q = 1.3-2.3$ ,  $Q_m = 1.7$ , bitunicate, exospores hyaline, thin and endospore thick, brown (7E8).

Habit and habitat: Solitary, grown on root of *Areca catechu*.

Specimen examined: CUH AM562, 13.xi.2017,  $22.527^\circ\text{N}$  &  $88.362^\circ\text{E}$ , elevation 13m, Ballygunge Science College campus, Kolkata, West Bengal, India, coll. K. Acharya.

Remarks: *Ganoderma resinaceum* is characterized by features like a sessile, laccate basidiocarp coloured reddish-brown with white margin, double layered context separated by brownish upper and reddish-brown lower side near the tubes, the presence of closely packed clavate end cells at the cutis, and truncate basidiospores measuring  $7-13.5 \times 4-7 \mu\text{m}$ .

*Ganoderma resinaceum* was earlier reported from Italy (Corner 1983) and India (Bhosle et al. 2010; Sharma 2012). Our collection matches those in earlier reports.

Among morphologically related species, *Ganoderma lucidum* has a distinct stipe, *G. flexipes* has chlamydospores, and *G. applanatum* differs by the presence of trichodermis type cutis (Sharma 2012).

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