The genus *Gloiodon*

Dennis E. Desjardin[1] & Leif Ryvarden[2]

[1] Department of Biology, San Francisco State University, 1600 Holloway Ave., San Francisco, California 94132, USA.[†]
[2] Botany Department, Biological Institute, University of Oslo, P.O. Box 1045, N-0316 Oslo, NORWAY[‡]

Desjardin, D. E. & L. Ryvarden (2003). The genus *Gloiodon*. – Sydowia 55 (2): 153–161.

Gloiodon nigrescens (Petch) Maas Geest. is redescribed from material collected in Bali, Indonesia, and a synopsis of the genus is provided.

Keywords: *Auriscalpium*, Bali, Basidiomycetes, hydnoid fungi, *Hydnum*, Indonesia, taxonomy.

The genus *Gloiodon* was established by Karsten (1879) to accommodate three wood-inhabiting species with a hydnoid hymenophore, viz., *Hydnum strigosum* Sw. : Fr., *H. hirtum* Fr. and *H. pudorinum* Fr. Later, Karsten (1882) restricted the genus to include only one species, *G. strigosus* (Sw. : Fr.) P. Karst. *Hydnum strigosus* was regarded as the type species by Banker (1902, 1910), and Miller (1933), and specifically selected as the type species by Donk (1956). For many decades the genus was accepted as monotypic until Maas Geesteranus (1964) transferred the tropical Southern Hemisphere species *Hydnum nigrescens* Petch to the genus. Later, Ginns (1988) described *G. occidentale* Ginns from Canada, a species phenetically similar to the type species, but distinguished by larger spores and a habit seemingly restricted to coniferous hosts.

During a recent collecting trip to Indonesia, one of us (D. E. D.) encountered a pileate, fimbriate, dark brown to black hydnoid species that turned out to be *G. nigrescens*. Because this is apparently only the fifth collection known of the species, supplying the previous descriptions with more details, a redescription of *G. nigrescens* is warranted. In addition, a complete survey of the genus is provided. Color terms in parentheses are those of Kornerup and Wanscher (1978). Author abbreviations are those of Kirk & Ansell (1992).

[†] Corresponding author: e-mail: ded@sfsu.edu
[‡] e-mail: leif.ryvarden@bio.uio.no

Gloiodon P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 5: 42. 1879.

Basidiocarp annual, pileate to effused-reflexed; upper surface strigose to smooth, dark brown to almost black when mature; lower side covered by dark, conical spines; context an entangled mass of hyphal strands, dark brown; hyphal system monomitic with clamped generative hyphae some of which are sclerified, sparingly branched, pigmented and with occasional clamps, simulating true skeletal hyphae. – Gloeocystidia present. – Basidiospores subglobose, hyaline, finely ornamented and strongly amyloid; on dead wood, causing a white rot.

Type species: *Hydnum strigosus* Sw. : Fr.

Gloiodon is undoubtedly closely related to *Auriscalpium* S. F. Gray. Both genera include species with a hydnoid hymenophore, gloeoplerous hyphae, and amyloid, ornamented basidiospores. However, while species of *Gloiodon* have pileate-sessile or effused-reflexed basidiomes, those of *Auriscalpium* are characterized by stipitate basidiomes. Maas Geesteranus (1963, 1971) included both genera in the Auriscalpiaceae Maas Geest. Later, Donk (1964) transferred *Lentinellus* P. Karst. to the family because of the micromorphological similarities of *Lentinellus*, *Gloiodon* and *Auriscalpium*, even though *Lentinellus* is comprised of lamellate species. Stalpers (1996) included Auriscalpiaceae and five other families in the Hericiales and provided short descriptions of the families to which the reader is referred for further details. Based on recent DNA investigations, Hibbett & Thorn (2001) have accepted *Auriscalpium, Gloiodon* and *Lentinellus* and included *Gloeodontia* Boidin in the Auriscalpiaceae, and their data indicate that the Auriscalpiaceae belongs to the Russuloid clade.

Key to Species of *Gloiodon*

1. Basidiospores 6–7 × 4–5.5 µm, on coniferous wood . . . . . 2. *G. occidentale*
1*. Basidiospores 3.8–5.5 × 3.5–4.5 µm, on hardwoods 2
2. Basidiomes deeply incised, margin digitiform, context up to 3 mm thick, spines up to 1 mm long, tropical species . . . . . 1. *G. nigrescens*
2*. Basidiomes entire, margin occasionally with a few lobes, context up to 10 mm thick, spines up to 6 mm long, boreal species . . . . . 3. *G. strigosus*

1. *Gloiodon nigrescens* (Petch) Maas Geest., Persoonia 3 (2): 166. 1964. – Figs. 1–5.

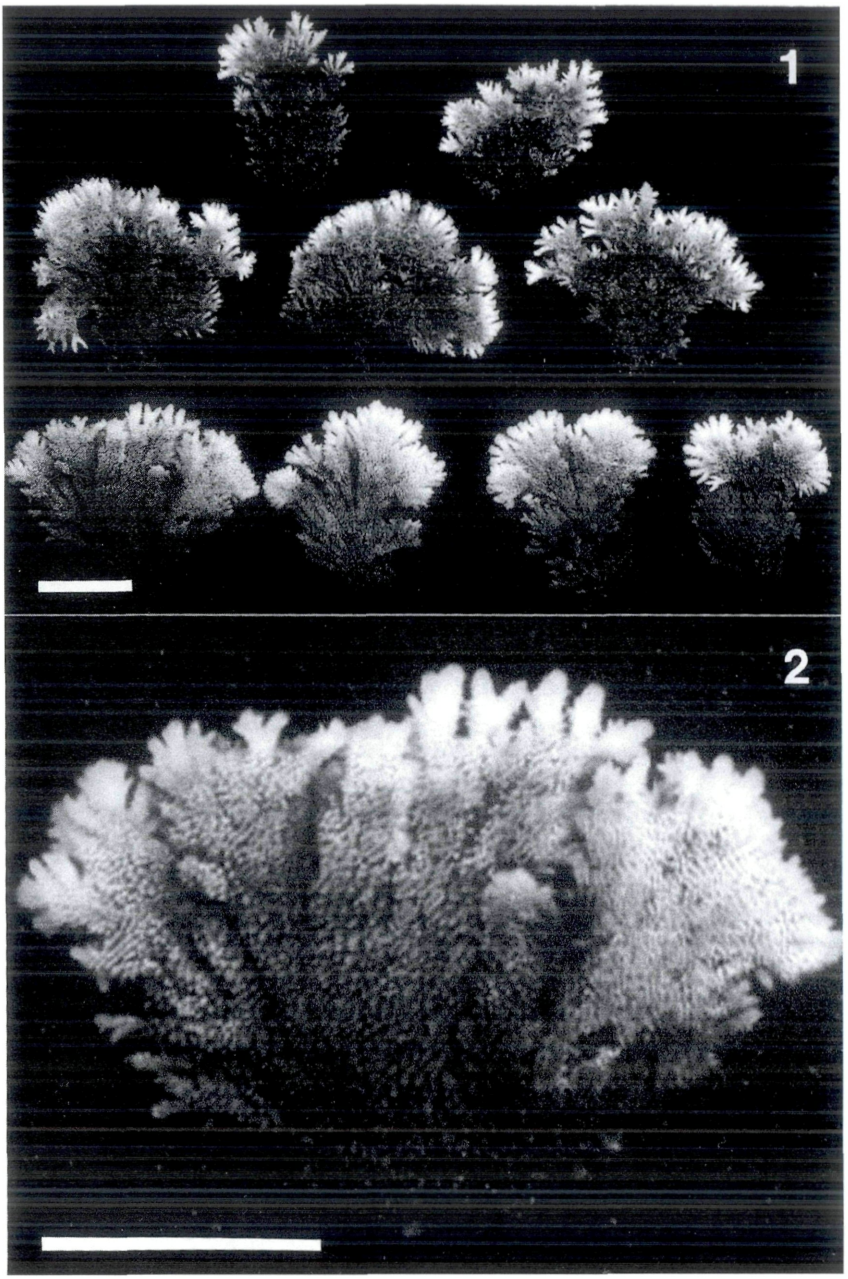
≡ *Hydnum nigrescens* Petch, Ann. Roy. Bot. Gard. (Peradeniya) 7: 288. 1922.

Basidiomes (Fig. 1, 2) annual, pileate, sessile, attached laterally to the substrate without obvious subiculum or effused portion, distinct (not confluent), irregularly flabelliform to spathulate in outline, 10–28 mm long × 15–20 mm wide × 2–3 mm thick, formed from ramified strands of tissue that give rise to a deeply lobed and dissected, digitiform margin; upper surface densely wooly-tomentose to wooly-scaly, matted-tomentose and dark brown (6-7F4-8) near attachment to substrate, with a dingy orange-buff (<5A2) to nearly white margin; lower side strongly hydnoid, individual spines 0.5–1 × <0.1 mm, narrowly conical, brown (6E4-6) near region of basidiocarp attachment to the substrate, grading into dingy orange-buff (<5A2) at the margin. – Hyphal system monomitic; upper surface and ramified strands composed of subparallel to slightly interwoven generative and skeletal-like hyphae; generative hyphae 2–3.2 µm diam, cylindrical, septate, hyaline to yellow, clamped, thin-walled, becoming thick-walled in age, terminating in skeletal-like hyphae, these 2–4 µm diam, arising from a basal clamp, aseptate or rarely secondarily septate, cylindrical for most their length then narrowing to an acute apex, ranging from hyaline to yellow, yellowish brown or pale brown with walls up to 1.2 µm thick; hymenophoral trama composed of subparallel to intertwined skeletal-like hyphae 2–3.8 µm diam, cylindrical to sinuous, aseptate or septate, unclamped, hyaline, non-amyloid, with walls up to 1.2 µm thick; generative hyphae rare; tips of hymenophoral spines gelatinized; young spines with conspicuous gloeoplerous hyphae, 2.5–5 µm diam, with oily, refractive, hyaline contents, terminating in gloeocystidia; subhymenium composed of generative hyphae 2–2.8 µm diam, cylindrical, thin-walled, clamped, subgelatinous. – Gloeocystidia (Fig. 3) scattered, common, 20–28 × 5–7.5 µm, clavate to fusoid, projecting up to 8 µm beyond other hymenial elements, hyaline, weakly refractive, thin-walled, readily collapsing. – Basidia (Fig. 4) clavate, 1-, 2-, and 4-sterigmate, 12.8–16 × 5.2–6 µm, with a basal clamp. – Basidiospores (Fig. 5) globose to subglobose, seldom ellipsoid, hyaline, minutely asperulate to roughened, amyloid to strongly amyloid in Melzer's reagent, 3.8–5.1 × 3.5–4.5 µm.

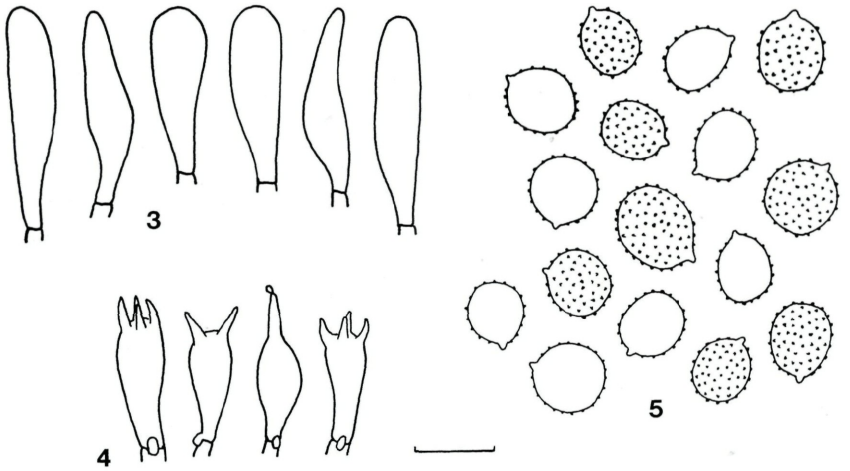
Substrate. – On dead hardwoods.

Distribution. – Known at present from Sri Lanka, Sumatra and Bali.

Specimens examined. – INDONESIA: Bali, Lake Tamblingan area, 20 Jan. 2001, D. E. Desjardin 7287 (SFSU, BO). SRI LANKA: Hakgala, April 1917, Petch 5110 (Holotype, K). Maas Geesteranus (1964:166) cited two additional specimens from Sri Lanka (nos. 5582 and 3961) and one specimen from Enggano Island (Sumatra, Indonesia; deposited in L).



Figs. 1–2. Basidiomes of *Gloiodon nigrescens* (DED 7287). – 1. Upper two rows showing upper surface of basidiomes; lower row showing lower surface. – 2. Close-up of hydnoid hymenophore. – Scale bars = 10 mm.



Figs. 3–5. *Gloiodon nigrescens* (DED 7287). – 3. Gloeocystidia. – 4. Basidia. – 5. Basidiospores. – Scale bar: Figs. 3-4 = 10 µm; 5 = 5 µm.

Distinctive features of *G. nigrescens* include a dark brown to nearly black basidiocarp with deeply incised, digitiform margin, a thin context (only up to 3 mm thick), and short spines. This is an apparently rare southern Asian species, the only known species in the genus from the Southern Hemisphere. Maas Geesteranus (1964) noted that the growth form of *G. nigrescens* is quite variable. The Sri Lankan specimens were reported as forming resupinate to partly reflexed basidiomes with entire or dimidiate margin, whereas the Sumatran basidiomes were described as nearly spathulate with venose-reticulate margins often dissected into numerous small pileoli. The growth form of our Balinese specimen matchs nicely with the Sumatran material.

2. *Gloiodon occidentale* Ginns, Mycologia 80: 66. 1988.

Basidiomes annual, pileate, dimidiate to laterally substipitate, 45–80 × 40–70 × 10–15 mm, fleshy when fresh, hard and woody when dry; upper surface brownish purple to brown, becoming paler when dry, densely strigose, undulating, margin paler and in parts glabrous, in parts split into tongue-like extensions 1–2 mm wide; lower side strongly hydnoid, individual spines white when fresh, greyish black when dry, up to 12 mm long and 0.3 mm in diameter; context pale brown, in older parts with black lines and alternating zones of loose and denser consistency, up to 10 mm thick at the base. – Hyphal system monomitic; generative hyphae with clamps, hyaline, and thin-walled, highly branched and dominating in the subhymenium, 3–4 µm wide, sclerified dark coloured generative

hyphae abundant simulating skeletal hyphae, but with scattered clamps and spaced branching, the strands or hairs on the pileus consist of such hyphae, dark coloured and up to 5 µm wide, all hyphae negative in Melzer's reagent. – Gloeocystidia abundant, smooth, tubular and often irregular with slight constrictions, in parts parallel with the hymenium and then bending into this, the hymenial part up to 45 µm long 8–12 µm in diameter. – Basidia clavate, 4–sterigmata, 24–28 × 5–6.5 µm, with a basal clamp. – Basidiospores broadly ellipsoid, hyaline, finely ornamented, strongly amyloid in Melzer's reagent, 6–7 (–7.5) × 4–5.5 µm.

Substrate. – Hitherto known only from dead wood of *Tsuga heterophylla*.

Distribution. –Known only from British Colombia, Canada.

This species is distinguished from the far more common *G. strigosus* by larger, more compact basidiomes, larger basidiospores and growth on gymnosperms.

3. *Gloiodon strigosus* (Sw. : Fr.) P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 5: 28. 1879.

≡ *Hydnum strigosus* Sw. : Fr., Syst. Mycol. 1: 414. 1821.

Basidiomes annual, pileate, effused-reflexed, up to 20 mm wide and 50 mm long and to 10 mm thick; upper surface dark brown to almost black, strigose to hispid; lower side strongly hydnoid, concolorous with upper surface or light brown when sporulating; individual spines conical, up to 6 mm long; context a strongly intertwined mass of strands or cordons, dark brown to black. – Hyphal system monomitic; generative hyphae with clamps, hyaline, and thin-walled, highly branched and dominating in the subhymenium, 2.5–3.5 µm wide, sclerified dark coloured generative hyphae abundant simulating skeletal hyphae, but with scattered clamps and spaced branching, the strands or hairs on the pileus consist of such hyphae, dark coloured and up to 6 µm wide, inner part of the hairs similar but with hyaline hyphae, spines covered by a hymenium arising from a subhymenium of hyaline generative hyphae while the core consist of thick-walled, pigmented sclerified hyphae, those of the spine apex with numerous adventitious septa, all hyphae negative in Melzer's reagent. – Gloeocystidia abundant, smooth, tubular and often irregular with slight constrictions, up to 120 µm long. – Basidia clavate, 4-sterigmata, 30–40 × 4–6 µm, with a basal clamp. – Basidiospores subglobose, hyaline, finely ornamented, strongly amyloid in Melzer's reagent, 4–5.5 × 3.5–4 µm.

Substrate. – On dead hardwoods, rarely on conifers.

Distribution. – Widespread but rare in Europe. Not known from Great Britain.

Specimens examined. – NORWAY: Akershus, Bærum, Sandvika, on dead *Populus tremula*, 3. May 1912, J. Egeland (O-F81059). Akershus, Nannestad, Tømte, on dead *Populus tremula*, 24 May 1981, E. Johannesen (O-F81058). Buskerud, Modum, Pilterudkløfta by Holsfjorden, on dead *Alnus incana*, 2. Oct 1969, L. Ryvarden (O-F81067). Nordland, Hemnes, Kangsen, on dead *Alnus incana*, 27. Aug 1969, L. Ryvarden (O-F81066). Rogaland, Forsand, Rtssdalen, on dead *Populus tremula*, 14. Oct 1998, L. Ryvarden 41256 (O-F91046).

The dark, strigose to hispid, pileate basidiocarp covered on the lower side with long (up to 6 mm), acute, dark spines, and growth on angiospermous wood is usually sufficient to recognize this species. In addition to the distinguishing features presented in the key, *G. strigosus* differs from *G. nigrescens* in forming longer gloeocystidia and basidia. For further information on *G. strigosus*, refer to the recent redescription by Jahn & Sturm (1983) based on European material.

Nomenclator

Bold font indicates currently accepted taxonomic status.

Gloiodon P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 5: 42. 1879.
= *Sclerodon* P. Karst., Finl. Basidsv. 360. 1889.
= *Leaia* Banker, Mem. Torrey Bot. Club 12: 175. 1906.

fimbriatus, Gloiodon (Pers. : Fr.) Donk, Meded. Ned. Mycol. Ver. 18–20: 190. 1931.
≡ *Odontia fimbriata* Pers., Obs. Mycol. 1: 88. 1796.
≡ *Hydnum fimbriatum* Pers. : Fr., Syst. Mycol. 1: 421. 1821.
≡ ***Steccherinum fimbriatum*** (Pers. : Fr.) J. Erikss., Symb. Bot. Upsal. 16: 134. 1958.

hirtus, Gloiodon (Fr.) P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 5: 42. 1879.
≡ *Hydnum hirtum* Fr., Epicr. Syst. Mycol.: 514. 1838.
= ***Steccherinum ochraceum*** (Pers. : Fr.) S. F. Gray, Nat. Arrang. British Plants 1: 651. 1821; teste Maas Geesteranus (1974: 518).

nigrescens, Gloiodon (Petch) Maas Geest., Persoonia 3: 166. 1964.
≡ *Hydnum nigrescens* Petch, Ann. Roy. Bot. Gard. (Peradeniya) 7: 288. 1922.

occidentale, Gloiodon Ginns, Mycologia 80: 66. 1988.

pudorinus, Gloiodon (Fr.) P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 5: 42. 1879.
≡ *Hydnum pudorinum,* Fr., Elench. Fung. 1: 133. 1828.
= ***Steccherinum ochraceum*** (Pers. : Fr.) S. F. Gray, Nat. Arrang. British Plants 1: 651. 1821; teste Maas Geesteranus (1974: 518).

stratosus, Gloiodon (Berk.) Banker, Mycologia 2: 11. 1910.

≡ *Hydnum stratosum* Berk., London J. Bot. 4: 307. 1845.

≡ *Leaia stratosum* (Berk.) Banker, Mem. Torrey Bot. Club 12: 177. 1906.

= belongs in the Clavariaceae sensu lato (K. Hjortstam, pers. comm.). Current generic status unresolved. Type specimen: USA, Ohio, June, T. G. Lea no 279 (K).

strigosus, Gloiodon (Sw. : Fr.) P. Karst., 1879, Meddeland. Soc. Fauna Fl. Fenn. 5: 28. 1879.

≡ *Hydnum strigosum* Sw., Kngl. Vet. Akad. Nya Handl. p. 250. 1810.

≡ *Hydnum strigosum* Sw. : Fr., Syst. Mycol. 1: 414. 1821.

≡ *Sclerodon strigosus* (Sw. : Fr.) P. Karst., Finl. Basidsv. 361. 1889.

≡ *Steccherinum strigosum* (Sw. : Fr.) Banker, Mem. Torrey Bot. Club 12: 128. 1906.

= *Hydnum parasiticum* Pers., Icon. et Descript. Fung. 2: 55. 1800, non *Hydnum parasiticum* L., Spec. Pl. ed. 2, 2: 1648. 1763; teste Banker (1910: 11).

= *Leaia piperata* Banker, Mem. Torrey Bot. Club 12: 175. 1906.

Acknowledgments

D. E. Desjardin is most grateful to his Indonesian sponsor, Dr. Mien Rifai, and to Lembaga Ilmu Pengetahuan Indonesia (LIPI – Indonesian Institute of Sciences) and Pusat Penelitian Dan Pengembangan Biologi (PPPB) for facilitating acquisition of research and collecting permits for Indonesia. This research was funded in part by NSF grant #DEB-9705083 to D. E. Desjardin and E. Horak. We are thankful to K. Hjortstam who has kindly supplied information on the type of *Hydnum stratosum*.

References

Banker, H. J. (1902). A historical review of the proposed genera of the Hydnaceae. – Bull. Torrey Bot. Club 29: 443–447.

—— (1910). A correction in nomenclature. – Mycologia 2: 7–11.

Donk, M. A. (1956). The generic names proposed for Hymenomycetes–V. – Taxon 5: 69–80.

—— (1964). A conspectus of the families of Aphyllophorales. – Persoonia 3: 199–324.

Ginns, J. (1988). New genera and species of lignicolous Aphyllophorales. – Mycologia 80: 63–71.

Hibbett, D. S. & R. G. Thorn (2001). Basidiomycota: Homobasidiomycetes. pg. 121–168. – In: The Mycota VII Part B. McLaughlin, McLaughlin & Lemke, Eds. Springer-Verlag, Berlin, Heidelberg.

Jahn, H. & C. Sturm (1983). Der seltene Stachelpilz *Gloiodon strigosus* (Sw. ex Fr.) P. Karst. in den Alpen gefunden. – Westfälische Pilzb. X–XI: 209–220.

Karsten, P. (1879). Symbolae ad Mycologicam Fennicam V. – Meddeland. Soc. Fauna Fl. Fenn. 5: 15–46.

—— (1882). Rysslands, Finlands och den Skandinaviska Halföns Hattsvampar, part 2: Pip-, Tagg-, Hud -, Klubb- och Gelèsvampar. – Bidrag Kännedom Finlands Natur Folk 37: 1–257.

Kirk, P. M. & A. E. Ansell (1992). Authors of fungal names. – International Mycological Institute, CABI. 95 p.

Kornerup, A. & J. H. Wanscher (1978). Methuen handbook of colour. 3rd Ed. – Eyre Methuen, London. 252 p.

Maas Geesteranus, R. A. (1963). Hyphal structures in Hydnums II. – Proc. K. Ned. Akad. Wet. (Ser. C) 66: 426–430.
—— (1964). Notes on Hydnums – II. Persoonia 3: 155–192.
—— (1971). Hydnaceous fungi of the Eastern World. – Verh. Kon. Ned. Akad. Wetensch. (2nd Series) 3(3): 1–175.
—— (1974). Studies in the genera *Irpex* and *Steccherinum*. – Persoonia 7: 443–581.
Miller, L. W. (1933). The genera of Hydnaceae. – Mycologia 25: 286–302.
Stalpers, J. A. (1996). The Aphyllophorales fungi. II. Keys to the species of the Hericiales. – Stud. Mycol. 40: 1–185.