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Boletellus piakaii sp. nov. and a new distribution record for *Boletellus ananas* var. *ananas* from Guyana

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Abstract — *Boletellus piakaii* (*Boletaceae*, *Boletales*, *Basidiomycota*) is described as new to science. *Boletellus ananas* var. *ananas* is recorded for the first time from the Guiana Shield region. These boletes were collected from tropical forests dominated by ectomycorrhizal *Dicymbe* spp. (*Caesalpiniaceae*) in the Pakaraima Mountains of western Guyana. A key is provided for *Boletellus* species known to occur in Guyana.

Key words — bolete, monodominant forest, tropical fungi, taxonomy

Introduction

The genus *Boletellus* Murrill (*Boletaceae, Boletales, Basidiomycota*) encompasses ~ 46 described species worldwide, the majority with tropical distributions (Heinemann & Goossens-Fontana 1954, Snell & Dick 1970, Smith & Thiers 1971, Corner 1972, Horak 1977, Singer 1986 Singer et al. 1992, Watling 2001, Halling & Mueller 2005, Ortiz-Santana et al. 2007, Fulgenzi et al. 2008). For a discussion on various authors' concepts of *Boletellus* see Fulgenzi et al. (2008).

Here we describe *Boletellus piakaii* sp. nov. and provide a new distribution record, host association, and redescription for *Boletellus ananas* var. *ananas* occurring in ectomycorrhizal (EM) *Dicymbe* (*Caesalpiniaceae*) forests of Guyana. The new species is easily accommodated in *Boletellus* based on its olivaceous brown, longitudinally ridged basidiospores, dry pileus, tubulose, blue-staining hymenophore, and lack of clamp connections. Previous work in Guyana within

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this genus has lead to the description of two new species, *Boletellus exiguus* T.W. Henkel & Fulgenzi and *Boletellus dicymbophilus* Fulgenzi & T.W. Henkel (Fulgenzi et al. 2008). A key is provided for *Boletellus* taxa known to occur in Guyana.

Materials and methods

Collecting expeditions were conducted during the May–July rainy seasons of 1997–99 in the Upper Ireng River Basin along Guyana's western border with Brazil in the west-central Pakaraima Mountains, and of 2000–07 in the Upper Potaro River Basin ~ 30 km north of the Ireng River site. At each site fungi were collected within a five km radius of a previously established base camp in forests dominated by *Dicymbe corymbosa* Spruce ex Benth. (Henkel et al. 2002, Henkel 2003).

Basidiomata were examined in the field for their fresh characteristics. Color was subjectively described and recorded according to Kornerup & Wanscher (1978) with color plates noted in parentheses (e.g., 3C4). Macro-chemical spot tests were performed following Singer (1986). Basidiomata were field-dried with silica gel beads.

Microscopic anatomical details were determined on fresh specimens at the base camp with an EPOI microscope and in the laboratory using an Olympus BX51 microscope with bright field and phase contrast optics. Fungal tissue of dried specimens was rehydrated and mounted in either H_2O, 3% KOH, or Melzer's solution. For each taxon a minimum of 20 basidio-spores, basidia, cystidia and other structures were measured. Line drawings were made with a phototube, inked and scanned. Scanning electron micrographs of spores were obtained with either a Jeol JSM-6400 or Topcon ABT32 scanning electron microscope. Specimens are deposited in the following herbaria as noted: BRG, HSU, and NY (Holmgren et al. 1990).

Taxonomic descriptions

Boletellus piakaii T.W. Henkel & Fulgenzi, **sp. nov.** FIGS **1–2**

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Pileus olivaceo-brunneus, rugosus et minute granulatus, 40–72 mm late; trama caerulescens ubi exposita. Stipes stramineus, apice cum collo porphyreo, longitudinaliter porcatus, 98–120 × 7–9 mm. Basidiosporae olivaceo-brunneae in massa, amygdaliformes, longitudinaliter porcatae, 9.8–12.4 × 5–7.4 µm.

HOLOTYPE: Henkel 8728 (BRG; ISOTYPE: HSU, NY)

ETYMOLOGY. The species epithet recognizes the collector of the holotype, Piakai Henkel.

KEY CHARACTERS — *Boletellus piakaii* is recognized in the field by its olive-brown rugose pileus, yellow-tan subequal stipe with maroon longitudinal striations,

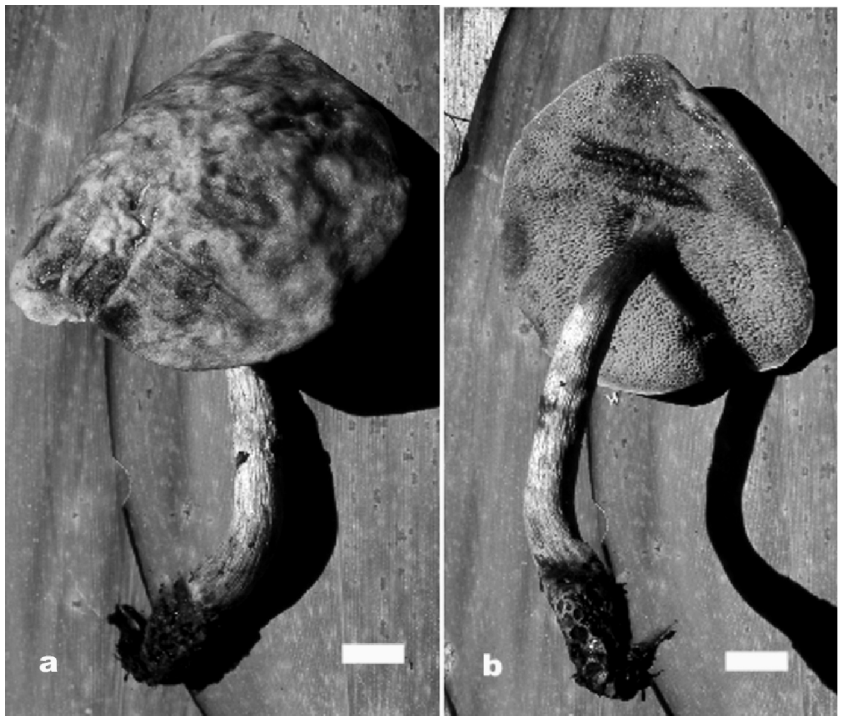

Fig. 1. Basidioma of *Boletellus piakaii* (BRG HOLOTYPE Henkel 8728).
a. Dorsal. b. Ventral. Bar = 10 mm.

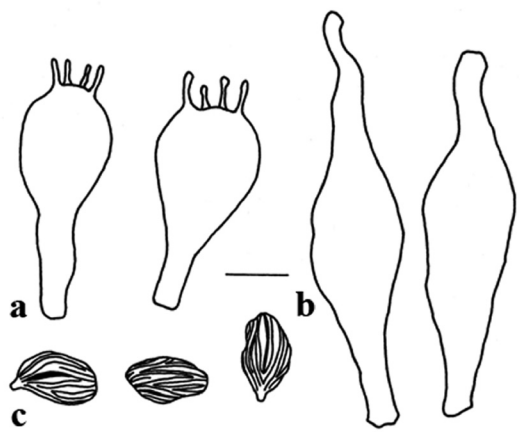

Fig. 2. Microscopic features of *Boletellus piakaii* (BRG HOLOTYPE Henkel 8728)
a. Basidia. b. Pleurocystidia. c. Basidiospores. Bar = 10 μm.

and a rapid bluing reaction of the bruised hymenophore and exposed trama. Microscopically *B. piakaii* is distinguished by having basidiospores that do not exceed 12.5 µm in length, basidia with long sterigmata and numerous golden refractive globules, a cystoderm pileipellis of irregularly globose to subangular cells, and numerous thick-walled hyphae in the pileus trama.

Macrocharacters — pileus (25) 40–72 mm broad, convex to planoconvex, dark brown (6F8) throughout when young to olive brown (5E6–5E8–5F8) to olive-yellow (4A8–4B8–4C8–4D8) with age, rugulose to rugose, minutely granular (under 10× lens), moist, margin slightly inrolled and entire; trama 1–2 mm thick at margin, 3–5 mm over tubes, 6–12 mm above stipe, off-white, immediately green-blue (26D5) upon exposure, fading to dingy-green (28D6) and yellowing after several minutes, solid; tubes 3–6 mm long at margin, 8–13 mm centrally, 6–7 mm at stipe, of irregular lengths, narrowly and deeply depressed around stipe, with short decurrent teeth 1–2 mm long, light olive-yellow (3A7–3B7), quickly blue-green (20F8–24F8) upon exposure, eventually fading to dull brown; pores yellow (2A8) when immature to olive-yellow (3A7–3B7–4B8–4C8), immediately blue-green (24F8) with pressure, then fading gradually to green (27F8), green-brown (4E6), and eventually brown (6E8–6F8), 1–1.5 per mm, subisodiametric to angular; stipe (60) 98–120 × 7–13 mm, subequal, enlarging gradually to 11–13 mm broad at base, ground tissue yellow-tan (4A5–4B5–4C8), overlaid with pinkish brown (6D5–6E5–6D4–6E4) to red-maroon (7E6–7E7–7D8–8E7) longitudinal striations throughout, these darkening with age and handling, apex with light red-brown (7A5) band, lower 20–25 mm with densely matted dark-brown (7F4–8F2) tomentum; subtending hyphae con-colorous and often associated with ectomycorrhizal rootlets; trama off-white to yellow (4A7–4B7) to brown (7D5–7E5–7D8–8E7) with age, transiently bluing upon exposure, solid; odor minimal, pleasant; taste mild.

Microcharacters — basidiospores dark olive-brown (4F8–5F8) in medium to heavy deposit, 9.8–12.4 × 5–7.4 µm (mean Q = 1.69), golden-olive in H_2O and KOH, inamyloid, amygdaliform, 1–2 guttulate, with 18–22 longitudinal ridges; ridges < 1 µm tall, repeatedly dichotomously forked, converging at both poles, transverse striae absent; hilar appendage 0.5–0.9 µm long; basidia 32.4–46 × 13.1–15.6 µm, clavate, wall hyaline in H_2O and KOH, with numerous refractive globules, these light golden in H_2O, lighter in KOH, 4-sterigmate; sterigmata 3.2–5 µm long; pleurocystidia 37–69 × 8.4–12.4 µm, ventricose-rostrate, frequent, arising from the subhymenium, projecting 21–30.8 µm beyond the hymenial palisade, hyaline, thin-walled; cheilocystidia absent; hymenophoral trama boletoid, strongly divergent; mediostratum 19.7–49.4 µm wide, of many thin-walled, nearly parallel hyphae, golden in H_2O, lighter and gelatinized in KOH; lateral stratum

hyphae 7.4–12.4 µm wide, hyaline, nongelatinized; PILEIPELLIS a cystoderm of irregularly globose to subangular cells; these thin-walled, faint-golden in H_2O, hyaline in KOH; PILEUS TRAMA of interwoven hyphae, many with thickened walls; individual hyphae 4.4–11.1 µm wide, wall up to 0.5 µm thick, regularly septate, devoid of contents, in mass light golden in H_2O, lighter in KOH; STIPITIPELLIS an interwoven trichodermial palisade of cylindrical elements with inflated terminal cells, in mass golden orange in H_2O, lighter in KOH; TERMINAL CELLS projecting 22.5–40 µm, cylindrical to clavate, occasionally ventricose to mucronate, these concentrated on longitudinal striations; SUBPELLIS hyphae interspersed with external burgundy acerose crystals; STIPE TRAMA of densely packed parallel hyphae, in mass faint golden in H_2O, lighter in KOH; individual hyphae 4–9.6 µm wide, hyaline in H_2O and KOH, regularly septate; CLAMP CONNECTIONS absent.

MACROCHEMICAL REACTIONS — NH_4OH rapidly light red-brown (8D6) on pileus, soon darkening, burgundy (9E8) on stipe ground, black on longitudinal striations, light burgundy (9D6) on stipe trama; KOH light orange-brown (7C6) to burgundy (8F7) on pileus, burgundy (8F7) on stipe, red-brown (8D8) on pileus and stipe trama; $FeSO_4$ dark grey-green (28F4) on pileus, dark green (29F5) on tube mouths, dark green (28F8) on stipe, yellow-green (29D6) on stipe trama.

ECOLOGY, RANGE, DISTRIBUTION — Solitary to scattered on root mat in *D. corymbosa* forest, rarely on lower base of *D. corymbosa* trunks; more frequent late in the rainy season; known only from the type locality in the Upper Potaro River Basin of Guyana.

REPRESENTATIVE SPECIMENS EXAMINED. **GUYANA.** REGION 8: POTARO-SIPARUNI. Pakaraima Mountains, Upper Potaro River, within a 5 km radius of 'Potaro Base Camp' (5° 18′ 04.8″ N, 59° 54′ 40.4″ W, elevation 710–750 m); vicinity of Potaro base camp, 2 May 2001, *Henkel 8013* (BRG; HSU); in *Dicymbe* plot 1, 9 May 2001, *Henkel 8077* (BRG; HSU), 2 July 2004, *Henkel 8728* (HOLOTYPE, BRG; ISOTYPE: HSU, NY); 1 km west of Potaro base camp, 30 May 2005, *Henkel 8810* (BRG; HSU); 1.5 km southeast of Potaro base camp on 'Benny's ridge', 14 August 2007, *Henkel* 8869 (BRG; HSU); in *Dicymbe* plot 2, 24 August 2007, *Henkel* 8878 (BRG; HSU); 0.75 km northeast of Potaro base camp between north end of 'Benny's ridge' and 'Leon camp', 25 August 2007, *Henkel* 8882 (BRG; HSU).

COMMENTS — Within the genus *B. piakaii* is best disposed in Section *Chrysenteroidei* Singer due to the longitudinally ridged basidiospores, dry pileus lacking in red tints, and the absence of a veil (Snell & Dick 1970, Singer 1986). *Boletellus piakaii* is similar in stature and shares the brown, rugose pileus reported for *Boletellus longicollis* (Ces.) Pegler & T.W.K. Young from Malaysia and Japan; *B. longicollis* can be distinguished by its white, gelatinous, appendiculate veil and non-cyanescent trama (Corner 1972, Imazeki et al. 1988). Among other Malaysian boletelli only *Boletellus fallax* (Corner) Watling non Singer has

cyanescent trama and lacks an appendiculate veil; *B. fallax* otherwise differs from *B. piakaii* in having longer basidiospores (18–24 µm vs. 9.8–12.4 µm), longer pleurocystidia (60–140 µm vs. 37–69 µm), a smaller stature (pileus diam 25–45 mm vs. (25) 40–72 mm, stipe length 22–70 mm vs. (60) 98–120 mm), and red tints in the pileus (Corner 1972). Among Congolian *Boletellus* species none are similar to *B. piakaii*; only *Boletellus longipes* Heinem. has a similar stature, but larger basidiospores (12.7–16.2 × 7.2–8.5 µm vs. 9.8–12.4 × 5–7.4 µm), an orange stipe, and areolate pileus (Heinemann & Goossens-Fontana 1954). The Central American *Boletellus belizensis* B. Ortiz & T.J. Baroni and *Boletellus domingensis* B. Ortiz & Lodge lack marginal appendiculae and have a cyanescent reaction in the exposed pileus trama and bruised hymenophore, yet these species are dissimilar to *B. piakaii* in having smaller statures (pileus diam 24–40 and 18–60 mm vs. (25) 40–72 mm, stipe length 60–70 and 27–55 mm vs. (60) 98–120 mm), larger basidiospores (12–14.4 × 5.6–7.2 and 12.8–16 × 5.6–8 µm vs. 9.8–12.4 × 5–7.4 µm) pruinose stipe ornamentations, and in lacking a rugulose to rugose pileus surface (Ortiz-Santana et al. 2007).

Boletellus ananas (M.A. Curtis) Murrill, Mycologia 1:10. 1909 **var. *ananas***

Figs **3–5**

≡ *Boletus ananas* M.A. Curtis Amer. J. Sci. Arts 6 : 351. 1848.
= *Boletus coccineus* Fr. Epic. Myc. 423. 1838, nom. illegit., non Bull. 1791.
≡ *Strobilomyces coccineus* Sacc., Syll. Fungorum 6: 50 1888 ut "Fr".
≡ *Boletellus coccineus* (Sacc.) Singer in Singer et al. Beih. Nova Hedwigia 105: 6: 1992 ut "(Fr.)".
= *Boletus isabellinus* Peck, Bull. Torrey Bot. Club 24: 146. 1897, nom. illegit., non Schwein. 1822.
= *Strobilomyces pallescens* Cooke & Massee in Cooke, Grevillea 18: 5 1889.
≡ *Boletellus pallescens* (Cooke & Massee) E.-J. Gilbert, Bolets. 107. 1931.

Key characters — *Boletellus ananas* var. *ananas* is recorded for the first time from northeastern South America. This striking bolete is recognized in the field by its red-pink squamose pileus, membranous marginal appen-diculae, bright yellow, rapidly blue-staining hymenophore, cyanescent trama, and tree trunk fruiting habit. These features are consistent with those of *B. ananas* var. *ananas* as described from other regions (McNabb 1967, Smith & Thiers 1971, Corner 1972, Singer 1986, Halling & Mueller 2005). Micro-scopically *B. ananas* var. *ananas* is distinguished by large basidiospores with cross striae on the ridges and spirally encrusted hyphae in the marginal appendiculae and stipe trama.

Macrocharacters — pileus 33–74 mm wide, convex to planoconvex, with appressed to recurved squamules, red-brown (10B7–10D7) to red-tan (7D5–8D4–8E5) to pink (9A4–10B4) to pink-grey (10C4), vestiture concentrated and more squarrose on disk, extending out of cream (1A2–3A2–3A3–4A3) to light orange-pink (7A3) to light pink-red (9A6) floccose ground; margin

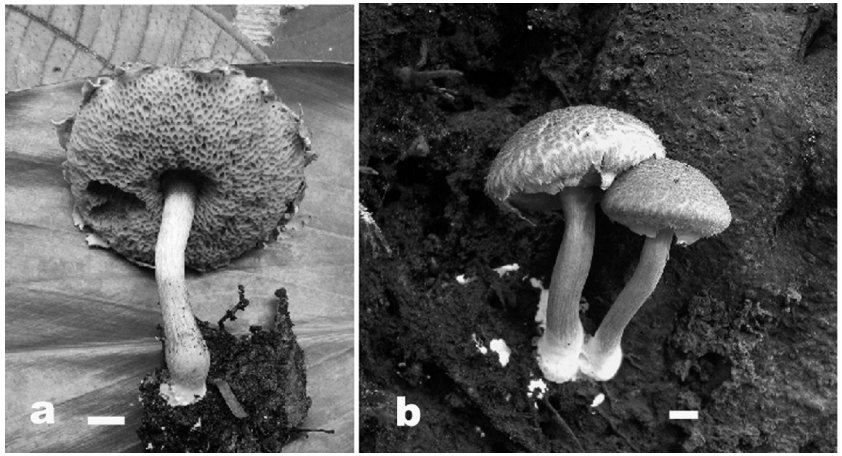

Fig. 3. Basidiomata of *Boletellus ananas* var. *ananas*.
a.HSU Henkel 8819. b. Fruiting habit on humic deposit of *Dicymbe* trunk, Upper Potaro Basin, Guyana. Bar = 10 mm.

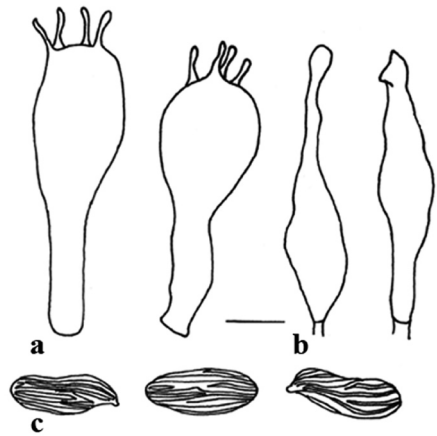

Fig. 4. Microscopic features of *Boletellus ananas* var. *ananas* (HSU Henkel 8168)
a. Basidia. b. Pleurocystidia. c. Basidiospores. Bar = 10 μm.

entire and clasping stipe when young, at maturity separating into triangular appendiculae, these 6–12 × 3–10 mm, buff white (5A3–5B4), occasionally faint pink; moist; trama 2–3 mm thick at margin, 7–10 mm over tubes, 11–18 mm centrally, buff white to light yellow (3A3), rapidly bluing (23C7) upon exposure, solid; TUBES 1–5 mm long at margin, 10–20 mm centrally, 4–6 mm at stipe, broadly and deeply depressed around stipe, of irregular lengths, bright yellow

(3A8) to olive yellow (2B7–3B7–3C7) to mustard yellow (4A8–4B8), rapidly bluing (23C7) upon exposure; PORES concolorous with tubes, rapidly blue-green (23C8) with pressure, 0.5–1.5 per mm, angular; STIPE 53–115 × 6–14 mm broad, subequal, gradually enlarging toward base to 10–19 mm, apical portion cream (3A4) to pink (9A4), middle portion finely longitudinally striate, striations darkening with handling, red-lavender (11A6–11B4–11B7–11B8) to brown-red (9E8–10E8), lighter with age, immediately above basal tomentum cream (3A2–3A4) with few striations; BASAL TOMENTUM of white strigose hairs over lower 6–50 mm, occasionally subtended by ectomycorrhizal rootlets; TRAMA white to buff-tan (5B4) to light yellow (3A4), slightly bluing with exposure; solid; ODOR non-descript; TASTE mild.

MICROCHARACTERS — BASIDIOSPORES olivaceous-brown (4D7-4E7-5E6–5F6) in medium to heavy deposit, 17.5–22.2 × 6.4–8 µm (mean Q = 2.73), golden in H_2O and KOH, inamyloid, amygdaliform, one to multiguttulate; wall 0.5–1 µm thick, with 12–14 longitudinal ridges; ridges < 1 µm tall, occasionally bifurcating, converging at poles, with minute cross-striae; hilar appendage 0.3–1 µm long; BASIDIA 39–57 × 11–15 µm, clavate, wall hyaline in H_2O and KOH, with numerous refractive globules, these faint golden in H_2O and KOH, 4-sterigmate; PLEUROCYSTIDIA 42–47 × 8–12 µm, ventricose-rostrate, slightly capitate, frequent, arising from the sub-hymenium, projecting 19.3–29.6 µm above the hymenial palisade, thin-walled, hyaline, devoid of refractive contents; CHEILOCYSTIDIA 19–42 (51) × 5–11 µm, ventricose, cylindrical, to narrowly clavate, thin-walled, infrequent; HYMENOPHORAL TRAMA boletoid, strongly divergent; medio-stratum 24.7–45.7 µm wide, of many parallel, slightly interwoven hyphae, faintly grey-yellow in H_2O, lighter and gelatinized in KOH; lateral stratum hyphae 4.4–8.4 µm wide, hyaline and gelatinized in KOH, regularly septate; PILEIPELLIS a densely interwoven trichodermial palisade of cylindrical elements with inflated terminal cells, in mass faint golden in H_2O, lighter in KOH; terminal cells 23.5–51.9 × 9.4–16.8 µm, hyaline in H_2O and KOH, inamyloid, cylindrical to clavate, interwoven, concentrated on squamules; *marginal appendiculae* composed of wefts of interwoven inflated hyphae, some with faint golden spirally arranged encrusting pigments evident in H_2O, KOH, and Melzer's; PILEUS TRAMA highly interwoven; individual hyphae 7.4–11.1 µm wide, hyaline in H_2O, gelatinized and hyaline in KOH, regularly septate; STIPITIPELLIS a trichodermial palisade of cylindrical elements with inflated terminal cells, in mass golden in H_2O, lighter in KOH; terminal cells projecting 30.4–63 µm, cylindrical to clavate, occasionally mucronate; STIPE TRAMA densely interwoven, in mass golden in H_2O, lighter in KOH; individual hyphae 4.9–7.2 µm wide, hyaline in H_2O and KOH, with spirally arranged faint golden encrusting pigments, these evident in KOH, Meltzer's, and H_2O; CLAMP CONNECTIONS absent.

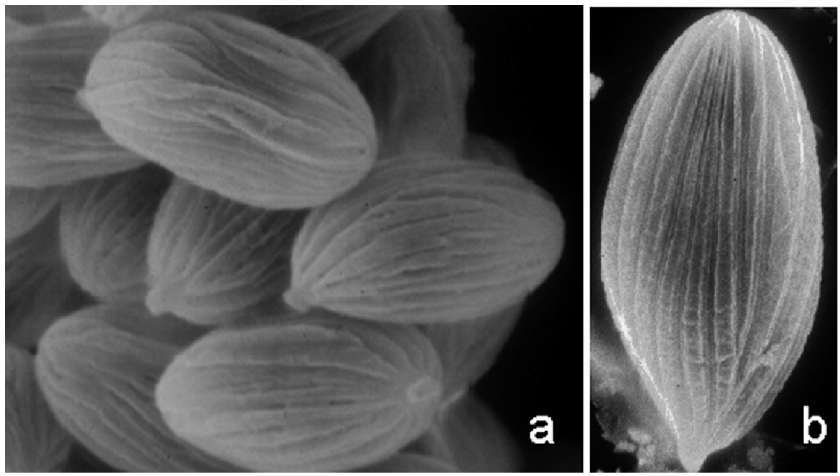

Fig. 5. Scanning electron micrographs of basidiospores of *Boletellus* species from Guyana.
a. *Boletellus piakaii* (HSU Henkel 8013) ×4000.
b. *Boletellus ananas* var. *ananas* (HSU Henkel 8168) ×6300.

Macrochemical reactions — NH_4OH olivaceous yellow (4D6) on pileus, dirty yellow (4C7) on tube mouths, bright red (10B8) on stipe, tan (6C4) on basal tomentum, yellow on trama of pileus and stipe; KOH bleaching pileus ground, rusty-brown (7D8) on squamules, orange-brown (5C6) on stipe, orange-yellow on pileus trama, burgundy to orange on stipe trama; $FeSO_4$ pink to faint grey on pileus, steel-grey on stipe; olive-green (26F6) on tube edges.

Ecology, range, distribution — In Guyana typically fruiting singly or in pairs within 1–2 m above ground level on *D. corymbosa* trunks, associated with ectomycorrhizas within humic accumulations; rarely found fruiting on ground on heavily decayed, root-penetrated wood; recorded from the Upper Potaro and Upper Ireng River Basins in Guyana; also known from south-eastern North America, Central America, New Zealand, Malaysia, and possibly Australia (Corner 1972, Singer et al. 1983).

Representative specimens examined — **BRAZIL, Amazonas**: *Boletellus ananas* var. *minor*, Estrada Manaus-Caracarai, 4 April 1980, *Singer B10913* (HOLOTYPE, INPA). **GUYANA, Region 8, Potaro-Siparuni,** Pakaraima Mountains, Upper Ireng River Basin, west bank of Suruwabaru Creek, 1 km upstream from confluence with Yuarka creek, 2 March 1997, *Henkel 6263- 6264;* 23 May 1999, *Henkel 7038*; Upper Potaro River, within a 5 km radius of 'Potaro Base Camp' (5° 18′ 04.8″ N, 59° 54′ 40.4″ W, elevation 710–750 m); Ayanganna airstrip, 19 May 2000, *Henkel 7400*; vicinity of Potaro base camp, 30 June 2000, *Henkel 7925*; 4 km southwest of Potaro base camp near *Dicymbe* plot 3, 18 May 2001, *Henkel 8168*; vicinity of Potaro base camp, 25 July 2003, *Henkel 8614*, 5 July 2004, *Henkel 8734*, 31 May 2005, *Henkel 8819;* 2 km south of Potaro base camp, 2 June 2005, *Henkel 8826*; 0.75 km west of Potaro base camp, 3 June 2005, *Henkel 8833.* Guyana collections housed in BRG and HSU.

Commentary — We have not adopted the nomenclature erected by Singer et al. (1992: i.e. *Boletellus coccineus* var. *coccineus* for *Boletellus ananas* var. *ananas*). Singer created this name in the mistaken belief that the earliest available name for the taxon was *Boletus coccineus* Fr. 1838. However, Fries's name is an illegitimate later homonym (cf. *Boletus coccineus* Bull. 1791), and Singer's combination is actually based on *Strobilomyces coccineus* Sacc. 1888. The earliest available name for the taxon is therefore *Boletus ananas* M.A. Curtis 1848, the basionym of *Boletellus ananas*.

Boletellus ananas var. *ananas*, as the type of the genus, is in Section *Boletellus* Singer based on the squamose, dry pileus with red-pink tones, a marginal veil that clasps the stipe when immature, and longitudinally ridged spores that are > 16 µm long (Singer 1986). Most characters of the Guyana material other than host association are consistent with those previously reported for *B. ananas* var. *ananas*; one minor deviation is that the pleuro-cystidia of Guyana specimens are consistently shorter (< 50 µm) than those reported for collections from Malaysia (50–95 µm), and the Dominican Republic and Belize (44–91.2 µm) (Corner 1972, Ortiz-Santana et al. 2007), but consistent with those of material from southeastern North America, New Zealand, and Costa Rica (McNabb 1967, Smith & Thiers 1971, Singer et al. 1983). *Boletellus ananas* var. *ananas* has consistently larger basidiomata than *B. ananas* var. *minor* Singer from Brazil and Nicaragua, and lacks the thick-walled cheilocystidia of *B. ananas* var. *crassotunicatus* Singer from Nicaragua and Panama and laciniate-reticulate stipe ornamentation of *B. coccineus* var. *amarus* Singer from Honduras and Belize (Singer et al. 1983, Singer et al. 1992, Ortiz-Santana et al. 2007).

The habit of fruiting on tree trunks has been reported for varieties of *B. ananas* from southeastern North America, Costa Rica, Brazil, Panama, Nicaragua, and Guyana (Murrill 1909, Singer et al. 1983, this paper), although terrestrial fruiting has been reported in Malaysia (Corner 1972) and Central America (T. Baroni pers. comm.). Due to the typically elevated fruiting habit and occurrence on dead wood the ectomycorrhizal status of *B. ananas* has been debated, although all collections have been made in association with ectotrophic host trees including *Pinus* and *Quercus* spp. in southeastern North America (Murrill 1909) and Central America (Singer et al. 1983, Halling & Mueller 2005, Ortiz-Santana et al. 2007), *Quercus humboldtii* Bonpl. in Colombia (Franco-Molano & Uribe-Calle 2000), various *Fagaceae* and *Dipterocarpaceae* spp. in Malaysia (Corner 1972), and *Leptospermum* and *Pinus* spp. in New Zealand (McNabb 1967). In Guyana the humic deposits on *Dicymbe* trunks bearing *B. ananas* are consistently permeated with abundant ectomycorrhizas (Woolley et al. 2008).

Boletellus in Guyana

Key to *Boletellus* species

1a. Marginal veil present, becoming appendiculate; pileus squamose to squamulose, with pinkish tones ..... ***B. ananas* var. *ananas***

1b. Marginal veil absent; pileus squamulose or otherwise, lacking pinkish tones **2**

2a. Fruiting terrestrial, rarely on tree trunks; pileus ≥ 46 mm broad; stipe ≥ 98 mm long; basidiospores not exceeding 12.5 × 7 µm ..... ***B. piakaii***

2b. Fruiting on tree trunks; pileus ≤ 45 mm broad; stipe ≤ 80 mm long; basidiospores up to 15 × 11 µm **3**

3a. Basidiomata small; pileus 9–33 mm broad; stipe 7–34 × 1–4 mm; pleurocystidia infrequent, ventricose, 65–85 (100) × 14–20 µm ..... ***B. exiguus***

3b. Basidiomata larger; pileus 19–34 mm broad; stipe 41–60 (80) × 4–7 mm; pleurocystidia frequent, cylindrical to narrowly clavate, 33–56 × 7–12 µm ..... ***B. dicymbophilus***

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