Bolbitius aurantiorugosus
**Bolbitius aurantiorugosus** E.F. Malyshева, O.V. Morozova & Kovalenko, *sp. nov.*

**Etymology.** The epithet refers to the colour and character of pileus surface – from Latin 'aurantius' (orange) and 'rugosus' (wrinkled).

**Classification — Bolbitiaceae, Agaricales, Agaricomycetes.**

*Pileus* 10–25 mm, oviform when young, then broadly campanulate becoming applanate with low obteuse umbo, with uneven, slightly undulating margin; slightly hygrophanous, translucently striate up to centre; when young deep yellow or orange yellow (4A7–A8), mature vivid yellow (3A8), deep yellow or orange yellow (4A7–A8), with darker reddish orange (7B–C8), orange red (8B8) or tomato red (8C8) centre (colour terms according to Kornérup & Wanscher 1978); radially sulcate-striate, pitted or pitted-wrinkled at centre, less venous towards margin, shiny, slightly glutinous. *Lamellae* rather distant, narrowly adnate to almost free, greyish yellow when young, then brownish yellow (5B7–5B8) or clay-brown (5D5), with concolorous fimбриate edges; not deliquescuent. *Stipe* 20–45 × 1.5–3.5 mm, cylindrical, white-pruinose at apex, elsewhere longitudinally fibrillose, pastel yellow (2A4) to light yellow (2A5), with white basal mycelium, when fresh entirely covered by transparent drops. Context yellow (4A7‒A8), with darker reddish orange (7B8‒C8), or orange or slightly oblique germ pore, rusty brown in KOH. *Clamp connections* = 2.23 (n = 30), elongate-fusoid, slightly boletoid to amygdaliform in side-view, thick-walled, 1–1.5 μm diam, central or slightly oblique germ pore, rusty brown in KOH. *Basidia* 12.5–14(–14.5) × 5.5–6.5 μm, Q = (1.92–)2.05–2.41(–2.44), Qm = 2.23 (n = 30), elongate-fusoid, slightly boletoid to amygdaliform in side-view, thick-walled, 1–1.5 μm diam, central or slightly oblique germ pore, rusty brown in KOH. *Basidiospores* numerous, 25–55 × 6–17(–25) μm, irregularly shaped, mostly inflated lageniform to utriform, often with bifurcated apex or with apical projections, hyaline, thin-walled; intermixed with some vesicolose or broadly clavate cells. *Pleipellis* hymeniform, made up of sphaeropedunculate (with long pedicels), clavate or pyriform elements, 27–50 × 6–15 μm, thin- or slightly thick-walled, colourless, with vacuolated context. *Caulocystidia* abundant, 25–70 × 5.5–12 μm, in fascicles, irregularly shaped, cylindrical, narrowly clavate, often curved and subcapitate, thin-walled, hyaline. *Lamellae* 6–17(–25) μm, irregularly shaped, mostly narrowly clavate, often curved and subcapitate, thin-walled, hyaline. *Cheilocystidia* abundant, 25–70 × 5.5–12 μm, in fascicles, irregularly shaped, cylindrical, narrowly clavate, often curved and subcapitate, thin-walled, hyaline. *Stipe* 1.5‒3.5 mm, cylindrical, white-pruinose at apex, elsewhere longitudinally fibrillose, broad yellowish. Taste and smell not distinctive.

**Habit, Habitat & Distribution — In small groups on soil and litter under *Tetrameles nudiflora*, in lowland tropical rainforest, dominated by *Dipterocarpus* spp., *Shorea* spp., *Hopea odorata*, *Sindora siamensis*, *Lagerstroemia* spp. Known only from the type locality in Vietnam.

**Notes** — *Bolbitius aurantiorugosus* is a remarkable and beautiful fungus due to unusual bright colour of its basidiocarps. In addition to noticeable yellowish red colouration of the pileus, it is also characterised by conspicuous microscopic features: large boletoid basidiospores and irregularly shaped caulocystidia. Among other species of *Bolbitius* with reddish or yellow basidiocarps it is most close to *B. titubans*, *B. callistus* and *B. male­sianus*.

*Bolbitius titubans*, having a widespread distribution, differs from *B. aurantiorugosus* not only in the bright yellow pileus totally lacking reddish tints, but also in spore form, caulocystidia shape and size, as well as the ecological preferences. According to the molecular data (ITS sequences) *B. aurantiorugosus* is related to *B. titubans* more than to the other species, but with the percentage of sequence divergence (6–8 %) significant to consider both of these taxa as separate species. *Bolbitius callistus*, originally described from North America, has more robust basidiocarps, larger pileus with distinct blush and olivaceous tinges, differently shaped and significantly smaller basidiospores (8–9(–10) × 5–6 μm, according to Watling 1987). *Bolbitius malesianus*, described from Malaysia (Watling 1994), can be separated from *B. aurantiorugosus* primarily by a purplish or lilac-purplish pileus, white-coloured stipe and identically shaped but smaller basidiospores (8.7–9.6(–11) × 3.9–4.8(–5.2) μm).

The phylogeny inferred from the Bayesian analysis of nrITS dataset sequences of *Bolbitius aurantiorugosus* and closely related species. Analysis was performed under a GTR model, for 3 million generations, using MrBayes v. 3.1 software. Maximum likelihood analyses were run in the PhyML v. 3.0. Branch support values were obtained by 1 000 bootstrap replicates. Numbers at branches indicate Bayesian posterior probabilities > 0.95 and Maximum likelihood bootstrap values > 50 %. The bar indicates the number of expected substitutions per position.