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Notes on the variability of Gymnopus luxurians (Tricholomataceae)

VLADIMÍR ANTONÍN[1] and JOSEF HERINK[2]

[1]Moravian Museum, Dept. of Botany,
Zelný trh 6, CZ-659 37 Brno, Czech Republic
[2]Turnovská 717/3,
CZ-295 01 Mnichovo Hradiště, Czech Republic

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The variability of *Gymnopus luxurians* is described in detail. An aberration with distinctly double edged lamellae which are connected to each other, especially when young, is described. This feature, as well as the number of lamellae do not have any taxonomic value. The world distribution of this species is also given.

Key words: Basidiomycetes, Tricholomataceae, *Gymnopus luxurians*, taxonomy, distribution.

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Je podrobně rozebrána variabilita druhu *Gymnopus luxurians*. Je popsána odchylka s lupeny se dvěma, v mládí navzájem spojovanými ostřími. Tento znak, stejně jako hustota lupenů, však nemá žádnou taxonomickou hodnotu. Je rovněž shrnuto celosvětové rozšíření druhu.

Gymnopus luxurians (Peck 1897) Murril 1911 was originally described (as *Collybia luxurians*) in North America. It was characterized by rather robust carpophores, a radially (innately) fibrillose pileus and a distinctly striate, mostly twisted stipe. Some years ago it was found in Europe and published as *Collybia crassipes* ss. Ricken (Noordeloos 1995). Later it was identified with *Gymnopus luxurians* (Antonín and Noordeloos 1997). In the genus *Gymnopus* it belongs to the sect. Vestipedes (Fr.) Antonín, Halling et Noordel., subsect. Vestipedes Antonín, Halling et Noordel. (Antonín, Halling and Noordeloos 1997). All European localities known at that time are summarized by Antonín and Noordeloos (1997).

In 1998 the first author received some collections of this fungus from Austria, Germany and the Czech Republic with rather distant lamellae. Moreover, a similar fungus has been found in Benin (West Africa) and in two greenhouses in the Czech Republic. However, the latter ones distinctly differ by the lamellae being connected to each other and totally closing off the interlamellar space in young specimens. Later they crack and form double lamellar edges. In the end, only a single pubescent to slightly denticulate edge can be found in old carpohores (see macrodescription). These characters, which have never been described in literature (e. g. Antonín and Noordeloos 1997; Bon and Massart 1996; Contu and La Rocca

1999; Desjardin, Hemmes and Wong 1996; Halling 1983, 1997; Hausknecht and Zuccherelli 1998), attracted us to study this species again.

We studied 20 specimens available to us in detail. These studies showed that all fungi (independent of locality – in a field or in a greenhouse, in Europe, U. S. A. or in Benin) were totally identical in all studied macro- and microfeatures, except for the double or single edge and connected or non-connected lamellae. However, we found a continual transition between carpophores with well-developed lamellar connections and carpophores without them. Therefore, this feature does not have any taxonomical value.

Studies of fresh carpophores and exsiccata showed that the number of lamellae varies very strongly from about 30 to 100, and neither this feature has any taxonomic value. In one collection from the Netherlands (Gatzen, L 99341) the carpophores are very small (pileus up to ca. 30 mm broad in dry specimens). However, this feature also fits into the variability of *G. luxurians*.

The macrodescription is based on the authors' own descriptions from the Czech Republic (greenhouses) and Benin, and descriptions by M. Beran (České Budějovice, Czech Republic) and A. Hausknecht (Maissau, Austria). Microscopical features are described from material mounted in Melzer's reagent, Congo-red, and KOH. For the basidiospores the following factors are used: E (quotient of length and width in any one spore); Q (mean of E-values).

Detailed description of *Gymnopus luxurians* (Peck) Murrill

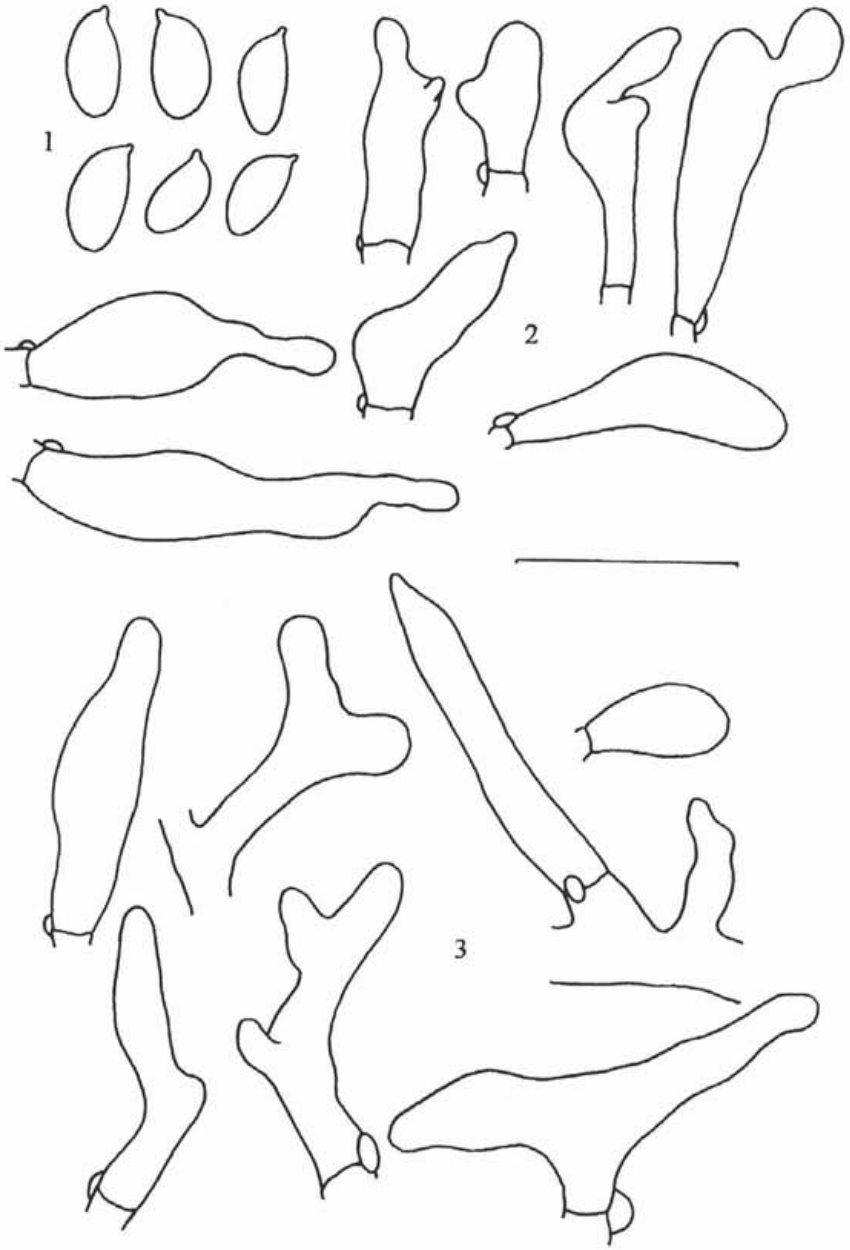
Pileus (15-)20–110(-150) mm broad, central to slightly eccentric, hemispherical to (sub)campanulate when young, then convex with a low umbo and involute margin, finally applanate to concave, with straight, often abrupt, slightly to distinctly undulate margin, non-viscid, rarely slightly sticky, very slightly hygrophanous, not translucently striate or slightly translucently striate at margin only when old, pileipellis removable (sometimes up to the centre), thin, entire when young, then pale radially innately fibrillose to striate, to slightly striate-sulcate at margin in old carpophores, not lustrous when moist, lustrous like silk when dry; dark brown to dark reddish brown (Kornerup and Wanscher 7E5–6) when young, then paler, reddish golden to brownish orange (6C7–8), paler towards margin. Lamellae close to rather distant, L = (30-)55–80(-100), with lamellulae (l = 3–4), slightly emarginate with a short tooth to narrowly adnate, cuneate-curved, then more or less horizontal, slightly intervenose when old, (2-)4–6(-8) mm broad, thin, then transversally splitting; dirty pale orangish (5A3 + greyish tinge), with reddish brown stains when old; edge concolorous, lamellae either divided in two up to 1 mm broad edges and connected to each other (a distinct "line" is present between both edges in contact) when young (interlamellar spaces are closed off), later the connection line cracks and both lamella edges start to diverge (lamellae with double

edge), finally both edges of the lamellae are attached to each other and may be coalesced (lamellae with one edge), each edge slightly to distinctly denticulate, with a simple edge. Stipe (10-)30–85 × (3-)6–10(-15) mm, cylindrical, slightly attenuate towards base but slightly clavate to fusoid at base [(6-)8–12(-18) mm], longitudinally striate, soon appressed fibrillose and strongly longitudinally striate, sometimes twisted and laterally compressed, hollow, entirely finely white floccose-pruinose when young, then glabrescent towards base; under the whitish pruina pale dirty ochraceous, brownish with tobacco tinge at base; with slight whitish to yellowish basal mycelium. Context rather elastic when young, lustrous like silk, (2-)3–6(8) mm thick, white-yellowish in pileus, solid, slightly fibrillose, almost hollow when old, elastic, white-yellowish to brownish in stipe base, pale brownish in stipe cortex, without a distinct smell or with an indistinct smell like *Marasmius oreades*, with indistinct to slightly stale or bitterish taste. Spore print yellowish-white, pale yellow to light yellow (4A2–4).

Basidiospores (8.0-)8.5–11.5(-13) × 4.0–6.0 μm, E = 1.8–2.4(-2.6), Q = 1.9–2.2, ellipsoid, subfusoid or sublacrymoid, thin-walled, non-amyloid, smooth. Basidia 24–36 × 7.0–9.0(-10.0) μm, 4-spored, clavate. Basidioles 15–36 × 2.5–9.0(-11) μm, cylindrical to clavate, sometimes subfusoid. Cheilocystidia 15–60 × 5.5–15 μm, variable in shape, cylindrical, clavate to subutriform, mostly irregular to subcoralloid, sometimes with a few apical projections or subrostrate, thin-walled. Pleurocystidia absent. Tramal hyphae cylindrical to subinflated, more or less thin-walled, smooth or finely incrusted, up to 15 μm wide. Pileipellis a cutis, made up of radially arranged, cylindrical, slightly thick-walled, mostly coarsely incrusted, up to 10(-13) μm wide hyphae, pigment greyish brownish or often dark brown to black-brown, sometimes with olivaceous tinge; with 16–55 × (3.0-)5.0–15 μm large, digitate, cylindrical to clavate, often irregular lateral projections and (sub)erect terminal cells; pale grey-brownish in KOH; contents of some hyphae yellowish ochraceous in Melzer's reagent. Stipitipellis a cutis, consisting of parallel, cylindrical, slightly thick-walled, mostly incrusted, up to 10 μm wide hyphae. Caulocystidia (8.0)20–42(-70) × 5.5–10.5(-13) μm, numerous, appressed to erect, cylindrical, clavate, sublageniform or subutriform, sometimes irregular, rarely branched, slightly thick-walled, obtuse; lateral projections of stipitipellis hyphae present. Clamp-connections abundant in all tissues. Hyphae of the connecting layer made up of cylindrical, slightly thick-walled, ± parallel or slightly interwoven, clamped, up to 6 μm wide cells with cylindrical, narrowly clavate, rarely irregular terminal cells (see Figs. 1–5).

Microchemical reactions: No part of carpophore dextrinoid or amyloid.

Macrochemical reactions: Guyajac – context becoming slightly greenish; Benzidine (1 % solution in 10 % acetic acid) – context and lamellae becoming slowly sky-blue, then darkening to blue-grey; Phenol (2 %) – context becoming slowly wine red; Pyramidon (concentrated solution) – context and lamellae



Figs. 1–3 *Gymnopus luxurians*: **1.** spores, **2.** cheilocystidia, **3.** caulocystidia. Scale bar = 20 μm.

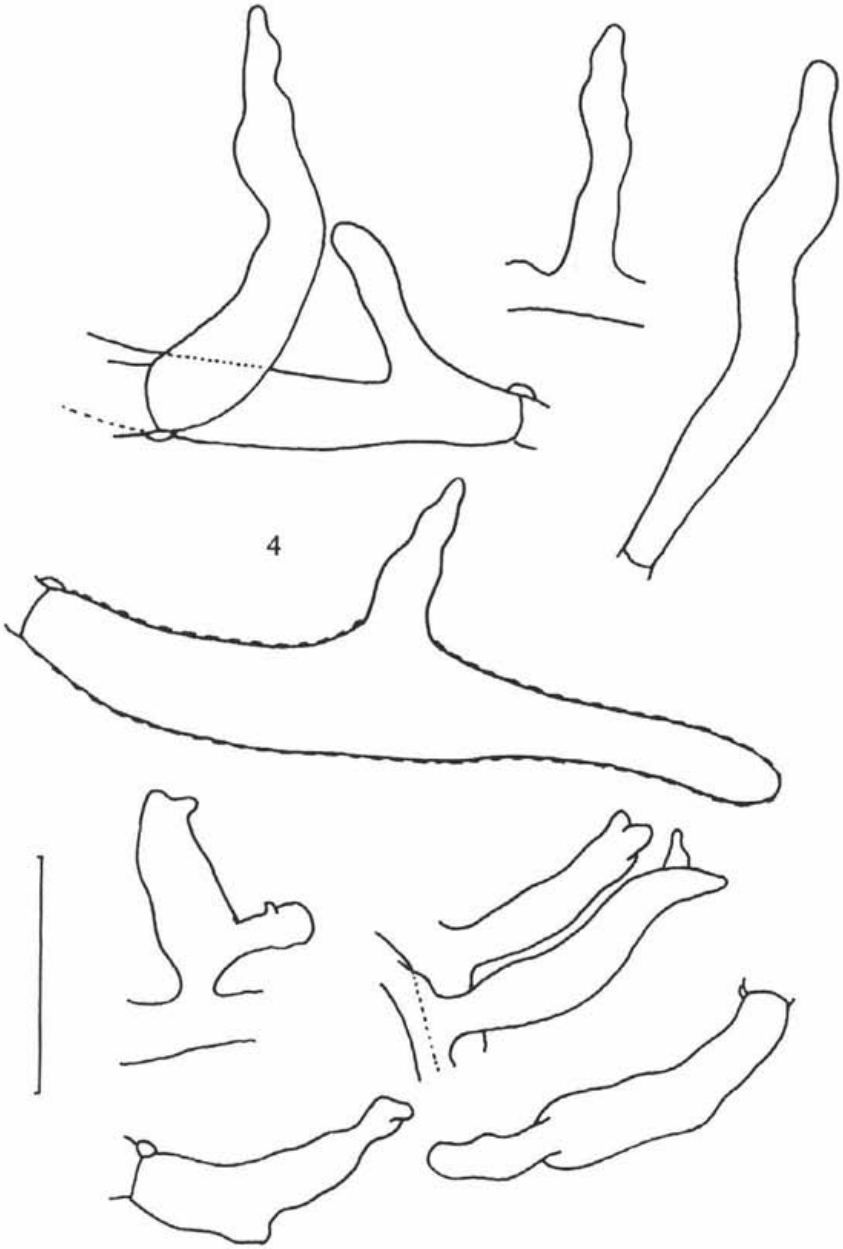


Fig. 4 *Gymnopus luxurians*: pileipellis cells. Scale bar = 20 μm.

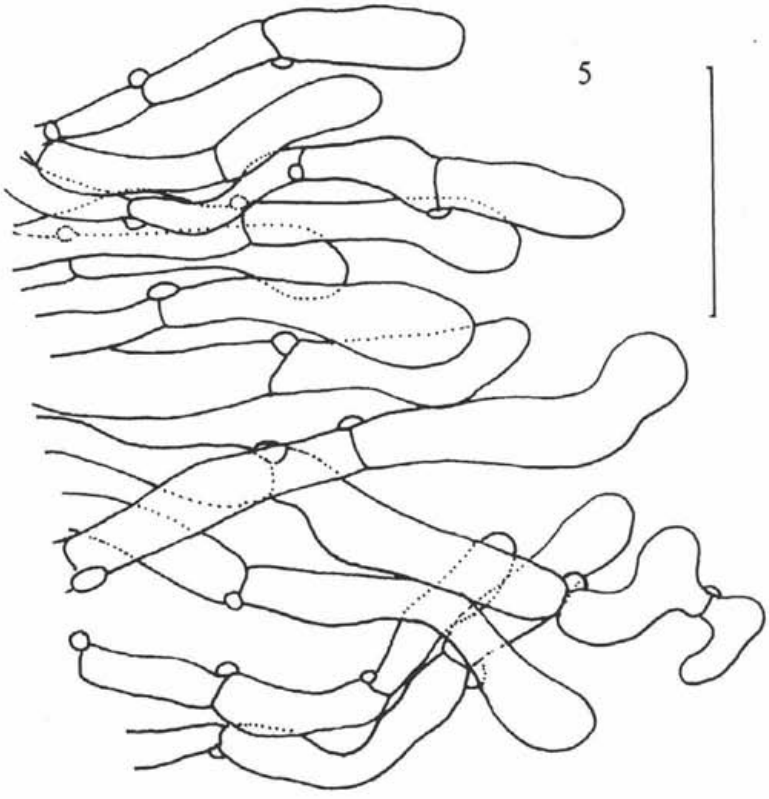


Fig. 5 *Gymnopus luxurians*: hyphae of lamellae connecting layer. Scale bar = 20 μm.

becoming slowly purple-violett, after 60 minutes changing into dirty orange; NaOH (10 %) – context and lamellae becoming quickly straw-yellow; $AgNO_3$ (10 %) – context becoming slowly grey-pink to grey-violet, later dark chestnut brown.

Ecology: Growing in fascicles on bark and woodchips (of both deciduous or coniferous trees), leaves mixed with soil, or on dead twigs and wood lying on soil, less frequently on soil among grass; probably a lignicolous fungus; it has been found both in greenhouses and in the open air.

Collections examined

AUSTRIA: Graz, Botanical garden, in a greenhouse; 30. IV. 1998 leg. H. Pidlich-Aigner (BRNM; WU).

BENIN: Ouari Maro, Borgou prov., 20. VIII. 1997 leg. V. Antonín 97.69 (BR, BRNM). – ditto, 22. VIII. 1997 leg. V. Antonín 97.90 (BR, BRNM). – Boukombe,

Atacora prov., 25. VIII. 1997 leg. A. De Kesel (BR). – Koussoukouangou, Atacora prov., 5. IX. 1997 leg. V. Antonín 97.166 (BR).

CZECH REPUBLIC: České Budějovice, city park "Stromovka", 3. VIII. 1998 leg. V. Bícha (BRNM; CB). – Praha, Botanical garden, in a greenhouse; II. 1976 leg. M. Svrček 623/76 (PRM 820173, as *Collybia dryophila* forma pileo pallide carneo). – ditto, 13. IV. 1983 leg. A. Vágner (herb. Herink 13/83). – Liberec, Stráž n. Nisou, in greenhouse of a commercial nursery, 13. IV. 1983 leg. Z. Pelda (herb. Herink 18/83). – ditto, 13. and 20. IV., and 3. V. 1983 leg. Z. Pelda (herb. Herink 17/83). – ditto, 19. VIII. 1983 leg. J. Herink and J. Sedláček (herb. Herink 138/83).

GERMANY: Speyer, nördlich Hanhofen, 21. VII. 1997 leg. W. Winterhoff 9765 (herb. W. Winterhoff).

ITALY: Ravenna, private garden, 6. IX. 1994 leg. A. Zuccherelli 624 (L 99337).

NETHERLANDS: Noord-Brabant, Eindhoven, "Philip de Jong wandelpark", 20.–28. IX. 1989 leg. H. Huyser. (L 99338). – Nijverdal, 1. VIII. 1994 leg. W. Ligterink (L 99335). – Overyssel, Ryssen, 1. VIII. 1994 leg. W. Ligterink (L 99336). – Limburg, Venlo, Water Supply Area, 21. V. 1986 leg. G. M. Gatzen (L 99341).

U. S. A.: Massachusetts, Hampshire Co., Amherst, Village Park, 27. VII. 1979 leg. R. E. Halling 2076 (L 99339). – New York, Bronx, New York Botanical Garden, 26. IX. 1989 leg. R. E. Halling 6317 (L 99340).

Gymnopus luxurians is characterized by often rather robust carpophores, an innately radially fibrillose pileus, a distinctly fibrillose-striate and often twisted stipe, the presence of variable cheilocystidia and its ecology. Some carpophores differ in having lamellae divided in two up to 1 mm broad edges connected to each other when young, later with a double edge, finally with one edge (for lamellae development sketch see Fig. 6). Other macroscopical and all microscopical features are identical with the type form. However, we also found transient forms between both extremes. This feature is often distinct (under a stronger lens) as a small ribbon along both sides of the lamellar edges while the space between them is almost smooth. This is the main reason why we consider it a character without taxonomic value. This character may be a reaction to climatic conditions (humidity? – the higher humidity, the better developed connections?) as the best developed ones were found in carpophores from greenhouses in Austria and the Czech Republic, and open air localities in New York Botanical Garden, Bronx, U. S. A. and Benin (West Africa).

Gymnopus luxurians is known in Europe from the Czech Republic, France (Bon and Massart 1996), Germany, Italy (Contu and La Rocca 1999, Hausknecht and Zuccherelli 1998), and the Netherlands, in North America from the U. S. A. (Halling 1983), and the Hawaiian Islands (Desjardin, Hemmes and Wong 1996). Photographs of this species were published by Antonín and Noordeloos (1997), Bon and

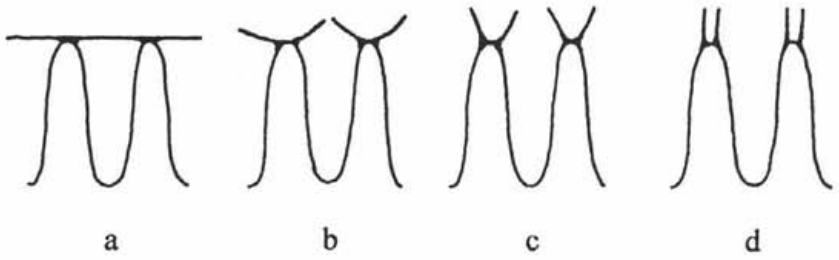


Fig. 6. Lamellae development sketch: a) young specimen, b) becoming mature, c) mature specimen, d) old specimen.

Massart (1996), Contu and La Rocca (1999), Desjardin, Hemmes and Wong (1996), Halling (1983, in black and white; 1997, in colour), Hausknecht and Zuccherelli (1998).

According to the description and a pencil drawing, a macroscopically similar fungus seems to be *Collybia tamatavae* Bouriquet described from Madagascar (Bouriquet 1942–1943). However, the original description is very short, and the double edged lamellae are not mentioned. The type specimen is not preserved in herbarium PC (Mascarell in litt.).

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