

## ***Russula zonaria*, a new species of *Russula* subsect. *Ochricompactae* from Thailand.**

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**Abstract** – *Russula zonaria*, a new species of *Russula* subsect. *Ochricompactae* is described from Thailand. Its macro- and microscopical features, being intermediate between those of *Russula* and *Lactarius*, are discussed and illustrated in detail. Its relation to the other species of *Ochricompactae* is discussed.

**Résumé** – *Russula zonaria*, une nouvelle espèce de *Russula* sous-sect. *Ochricompactae* est décrite de Thaïlande. Ses caractères macro- et microscopiques, étant intermédiaires entre ceux des lactaires et russules, sont discutées et illustrées en détail et sa relation avec les autres espèces des *Ochricompactae* est commentée.

### **INTRODUCTION**

In this contribution, we present a new species of *Russula*, that was collected recently under *Dipterocarpus costatus* C. F. Gaertn. in a montane primary forest of northern Thailand. *Russula* is an important fungal component in the forests of southeast Asia, as it is known to form ectomycorrhizal associations with Dipterocarpaceae (Watling & Lee, 1995, 1998; Lee *et al.*, 2002). Although commonly encountered in association with Dipterocarpaceae, Fagaceae and Pinaceae in montane primary and secondary forests throughout the region (Desjardin, unpubl.), very little has been published on the *Russula* of Thailand since the publication by Heim (1962).

The difficulty of assigning this new species to either *Lactarius* or *Russula*, not only in the field, but also when considering microscopical features, is discussed in detail. Its systematic placement and affinities with other subsections and sections in *Russula* is also discussed.

### **MATERIAL AND METHODS**

The color notations indicated in the descriptions are from Kornerup and Wanscher (1978). Microscopic features were examined and sketched by Buyck and compared with existing type specimens. All microscopic observations and

measurements – except for basidiospores – were made in ammoniacal Congo red, after a short aqueous KOH pretreatment to improve tissue dissociation and matrix dissolution. Original drawings for all elements of the hymenium or pellis were made at x 2400. In the figures, the long 10 µm scale line is for the basidiospores and the short one for the other elements. Contents of hymenial and dermatocystidia in the illustrations are indicated schematically, except for a single element where contents are indicated as observed in Congo Red preparations from dried material. All elements of the basidiomes were also examined for the presence of ortho- or metachromatic contents or incrustations in cresyl blue as explained in Buyck (1989). Observations and measurements of basidiospores were made in Melzer's reagent. Measurements are given according to Heinemann and Rammeloo (1985) and are based on 20 spores (n). The mean length/width ratio (Q) gives minimum, mean, and maximum values. We refer the reader to Buyck (1991) for an explanation of cystidial terminology.

## DESCRIPTION

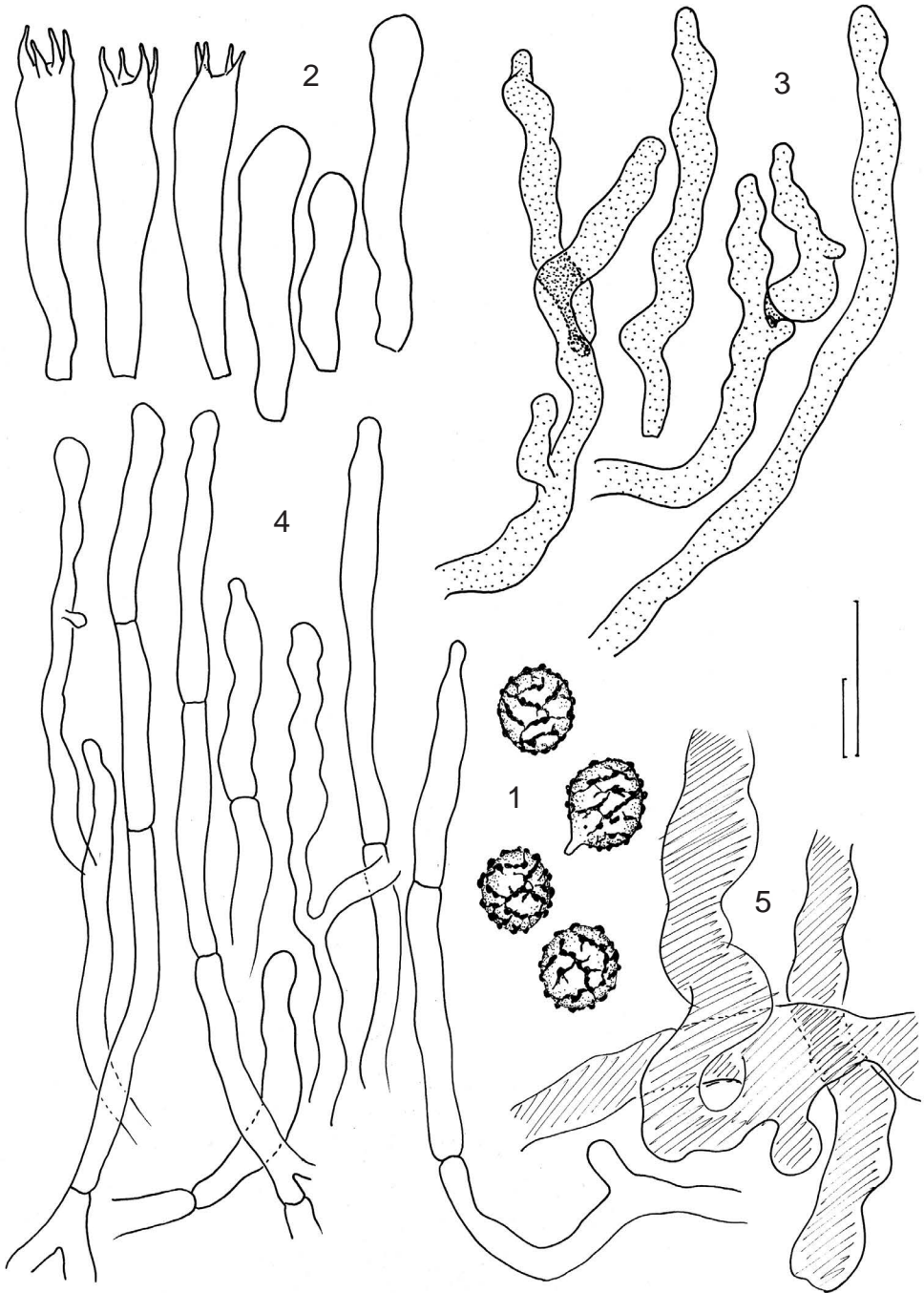
***Russula zonaria*** Buyck & Desjardin sp. nov. – Figs. 1-7

*A ceteris Ochricompactis differt odore acrylico-chemico, lamellis angustis minus aurantiacis, pileo obscuriore brunneo-aurantiaco tincto, hymenio pelleque pseudocystidiis haud cystidiis praeditis associatione Dipterocarpis.*

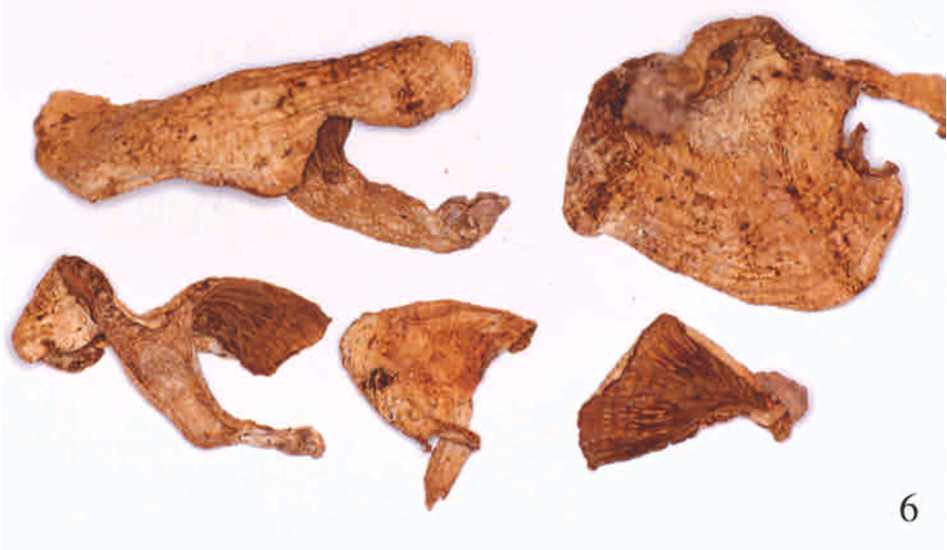
*Holotypus* : Thailand, Chiang Mai, Doi Suthep, Sangra Sabhasri Lane to Huai Kok Ma Village, 1200 m alt., 3 July 2002, D.E.Desjardin 7442 (SFSU ; isotypes BBH, PC)

**Pileus** 50-110 mm diam., plano-convex, depressed ; margin wavy to lobed and strongly incurved ; surface moist to subviscid, watery-zonate, glabrous, wrinkled to rugulose, canescent, dull, splotchy with areas of white intermixed with areas of light orange (5A3-4), orange (5A6) and brownish orange (6C6-8). **Lamellae** adnate, crowded, often forked and anastomosing, very narrow (2-3 mm high), orangish white (5A2) when young, becoming dark grayish orange (5B5-6) in age. **Stipe** 20-45 x 12-20 mm, eccentric, narrowed downward, hollow, irregularly terete, brittle ; surface felted to matted – tomentose at the base, nearly glabrous above, dingy buff overall. **Latex** absent. **Context** up to 10 mm thick, watery-zonate, dingy off-white, unchanging, brittle. **Odor** strong, pungent, somewhat like latex paint, acrylic-chemical. **Taste** mild. **Spores** orange in mass.

**Basidiospores** very small, 5.10-5.34-5.70 (6.25) × (4.33)4.32-4.59-4.85(5.29) µm, Q = (1.10)1.16 (1.25), ornamentation composed of a strongly amyloid, partial network of low, obtuse ridges and some occasional, obtuse warts ; suprahilar spot poorly developed, not amyloid, sometimes verrucose. **Basidia** 40-44 × 7-9 µm, slightly inflated in their upper part, 4-spored ; sterigmata slender, not particular in any way. **Cystidia** not observed and either extremely rare or absent. **Pseudocystidia** dispersed, subcylindrical, 4-8 µm diam., tortuous-sinuuous, corresponding to the endings of sometimes branching, thin-walled extremities of vascular hyphae ; these sparsely filled with oily-refringent contents, not or hardly reacting in sulfovanillin. **Marginal cells** not observed, the edge of the lamellae being a rather poorly developed zone with sparse basidia and pseudocystidia. **Lamellar trama** with vascular hyphae reminding of lactifers, although with atypical (i.e. not crystalline) contents in congo-red. **Pileipellis** poorly developed, enti-



*Russula zonaria* (holotype): 1 – Spores. 2 – Basidia and basidiola. 3 – Hymenial pseudocystidia. 4 – Pseudocystidia and hyphal extremities of pileipellis. 5 – Oleiferous hyphae of subpellis-trama transition.



*Russula zonaria* (holotype): 6 – Dried basidiomes. Note the strong concentric zonation of the cap surface near the margin of the cap.



*Russula zonaria* (holotype): 7 – Fresh basidiomes. Note the concentric zonation within the cap context in the sectioned areas.

rely orthochromatic in cresyl blue, one-layered, a loose cutis of entangled, narrow hyphae of nearly equal diam., 3-5 µm diam., sparsely septate, simply rounded at the apex, without any differentiation into special structures as in most other *Russula*; pileocystidia absent; pseudocystidia with very poorly differentiated, slightly refringent contents, sinuous near the extremities, sparsely ramified, similar to hymenial pseudocystidia, but even more difficult to differentiate. **Stipitipellis** similar to pileipellis.

**Clamp connections** absent in all tissues.

Scattered in soil under *Dipterocarpus costatus* in primary montane forest.

Thailand: Chiang Mai, Doi Suthep, Sangra Sabhasri Lane to Huai Kok Ma Village, elev. 1200 m, 3 July 2002, D.E.Desjardin 7442 (SFSU, BBH, PC).

## DISCUSSION

Although the type specimen consists of several good and well-dried basidiomes, microscopical tissues of the hymenium collapse rapidly and easily and the material is very hard to inflate, perhaps because it is composed of very thin-walled cells.

Because of the dichotomously branching, dark grayish orange lamellae and orange spore print, the lactarioid habit, and the small size of the spores, it was not difficult to find a subsection in *Russula* to accommodate this species. *Russula zonaria* completely agrees with the circumscription of subsect. *Ochricompectae* Bills & O.K.Miller. Species of this subsection are so different from other *Russula* in the field, that there is no mistake possible. However, as with the other two known species of *Ochricompectae*, the biggest problem in the field is usually the recognition of *Russula* as being the correct genus for this mushroom. Indeed, the bifurcate, vividly coloured lamellae and the presence of a strong, often very peculiar smell, unlike other *Russula*-species, may be very misleading.

*Russula zonaria* differs from the other two species in this subsection, viz., *R. ochricompecta* Bills & Miller and *R. grossa* Berk., by several macro- and micromorphological characters. In the field, it is easily separated by its different smell, the much more narrow and less orange lamellae, the more shining, smoother and browner pileus surface, and the watery-zonate pileus trama which shows distinct concentric rings in radial section. In the herbarium, these concentric areas become accentuated, the exsiccatum presenting several distinct concentric depressions near the margin, reminiscent in aspect of the *Lactarius zonarius* group; hence the name we propose for this new species. Also, the smell is not persistent in the exsiccatum, whereas it remains unchanged and strong in *R. ochricompecta*.

Micromorphologically, *R. zonaria* differs from both other *Ochricompectae* by the absence of typical lageniform to fusiform hymenial cystidia. *Russula zonaria* possesses pseudocystidia instead, a feature that was considered by Buyck (1989b, 1995) as being the sole remaining criterion to separate the genera *Lactarius* and *Russula*. Absence of latex production on injury was no longer considered to be a valid distinction between tropical members of *Lactarius* and *Russula*.

Why not place *R. zonaria* in *Lactarius* then? Although this can be considered a very serious alternative, it would make *Ochricompectae* in general – and

*R.zonaria* in particular – more marginal in *Lactarius* than it presently is in *Russula*. Although *Ochricompactae* stand out from the rest of the genus, at least in the field, a number of morphological characters – especially under the microscope – may suggest possible affinities with other groups in *Russula*. Indeed, the sparse hymenial cystidia (and/or pseudocystidia), that originate deep in the lamellar trama, the orthochromatic and hardly differentiated pilei- and stiptipellis tissues, the very similar, subreticulate, crested spores and the tendency towards producing dark spore prints are also typical features of *Russula* subsections *Pallidosporinae* Bon and *Ilicinae* (Romagnesi) Buyck. A detailed review of all species in *Russula* subsect. *Ochricompactae* and their characters of will be presented in another paper (Buyck, in prep.).

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