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REVISION OF LACTARIUS FROM MEXICO
Additional new records

LETICIA MONTOYA & VICTOR M. BANDALA

Departamento Biodiversidad y Sistemática, Instituto de Ecología, A.C., A.P. 63, Xalapa, Veracruz, 91000, México.
E-mail: montoya@ecologia.edu.mx, bandala@ecologia.edu.mx

Three species of *Lactarius* from Mexico were studied: *L. deceptivus*, *L. luteolus* and *L. rimosellus*. The latter two concern new records from western Mexico and from the Gulf of Mexico region, respectively, and the former was found on new localities. A study of their respective type collections and those of *L. tomentosomarginatus* and *L. echinatus* was made in order to support the identity of Mexican specimens. Based on a morphological study we propose reducing *L. tomentosomarginatus* to synonymy of *L. deceptivus* and agree with other authors that *L. echinatus* is conspecific with *L. luteolus*. Descriptions and illustrations are given of the three Mexican records.

Key words: Russulales, taxonomy, ectomycorrhizal fungi, type studies.

The study of the genus *Lactarius* in Mexico indicates that Mexican *Lactarius* mycota is more similar to that reported from the USA (Hesler & Smith, 1979), while the percentage of taxa described from other continents is lower (Montoya & Bandala, 2002). However, new undescribed *Lactarius* species, either from temperate or tropical sites, have also been found (Montoya & Bandala, 2003). Other new species are currently under study. To confirm the identity of Mexican collections of *Lactarius* it has become necessary to restudy types of several selected taxa, which include those of species poorly known since their respective descriptions from northern areas in America, and record their range of distribution as far as this latitude. Extended descriptions and illustrations based on Mexican material are given here, as well as data after comparison with the type specimens. *Lactarius luteolus* Peck, *L. rimosellus* Peck and *L. deceptivus* Peck are taxa documented from other areas, but up to now the first two are unknown in Mexico. *Lactarius deceptivus* deserved additional study on its ecological distribution and variation.

MATERIAL AND METHODS

Macroscopic descriptions are based on fresh material. Colour codes indicated in the descriptions follow Kornerup & Wanscher (1978). Microscopic structures are described from hand sections of revived tissues; their measurements and colours were observed in 3% KOH, except for basidiospores, which were studied in Melzer's reagent. The following notations are used: RM = range of means of length × width; QM = length/width ratio of spores, indicated as a range in n collections. The methods followed to make measurements and SEM analyses are those used by Montoya & Bandala (2003). Herbarium acronyms are according to Holmgren et al. (1990).

STUDIED SPECIES

Lactarius deceptivus Peck — Figs. 1–9

Lactarius deceptivus Peck, Ann. Rep. N.Y. Mus. St. Mus. 38 (1885) 125.
= *Lactarius tomentosomarginatus* Hesler & A.H. Sm., N. Amer. Sp. Lactarius (1979) 195.

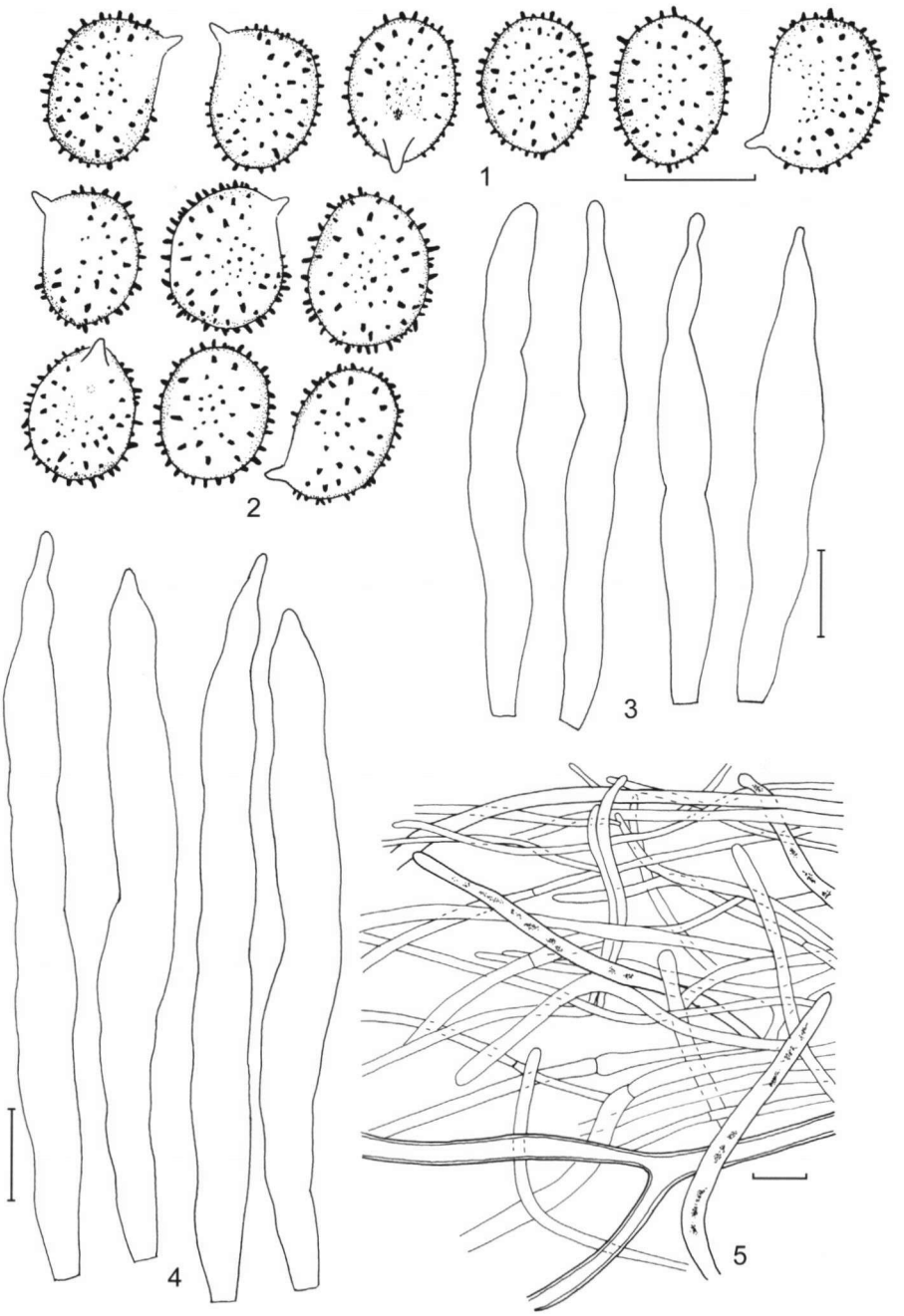
Pileus 61–160 mm in diameter, convex to plano-convex, infundibuliform with age, white to cream-coloured, smooth, with a soft texture in young stages, cracked with pileus expansion, then the surface appears somewhat squamulose and progressively fibrillose or fibrillose-squamulose, the centre of the disc with short cracks which become somewhat squamulose, staining yellowish then brown when handled; margin involute, soft, cottony, expanded, broken, and fibrillose with age. Lamellae decurrent, crowded in young stages, close to subdistant and even distant in older specimens, broad, bifurcate, white to cream-coloured, thick. Stipe 32–60 × 20–40 mm, cylindrical to attenuated towards base, velvety, at times with remains of cottony tissue near lamellae attachment, white, staining yellowish then brown, compact. Latex white, invariable, staining cut surfaces yellowish then brown, strongly acrid. Context white, compact, staining brownish. Odour somewhat like chlorine, taste acrid.

Basidiospores (8.8–)9–12(–12.8) × 7.2–9.6 µm; RM = 10.3–11.4 × 7.9–8.7 µm; QM = 1.2–1.4, broadly ellipsoid to ellipsoid, verrucose; verrucae 0.25–1.10(–1.5) µm high; under SEM the ornamentation appears as isolated, semiconic and obtuse, at times rounded or cylindrical warts. Basidia 57.6–79.6 × 10.4–12.8 µm, clavate to subfusiform, tetrasporic. Pleurocystidia 52–100 × (6.4–)7.2–10.4 µm, subcylindric, subfusiform, with an attenuated apex, thin-walled, abundant. Cheilocystidia 40–52(–60) × 4.8–8 µm, similar in shape to pleurocystidia, thin-walled, frequent. Pileipellis made of hyphae loosely arranged, intermixed irregularly, in a cutis or projected, 2.4–12 µm in diameter, curved, thin-walled, with some laticifers and occasionally with slightly thick-walled hyphae (0.8 µm thick). Hymenophoral trama hyphae 3–7 µm in diameter, laticifers 8–14 µm in diameter and sphaerocytes 12–16 µm in diameter. Context hyphae 3.2–7.2 µm in diameter, laticifers 4–10.4 µm in diameter, scarce, sphaerocytes 16–32 µm in diameter. Stipitipellis a trichodermis composed of numerous caulocystidia 80–500 × 5.2–9.6 µm, thick-walled, 1.6–2.4(–3.2) µm thick, attenuated at apex, born from hyphal elements, 2.4–8 µm in diameter, intermixed.

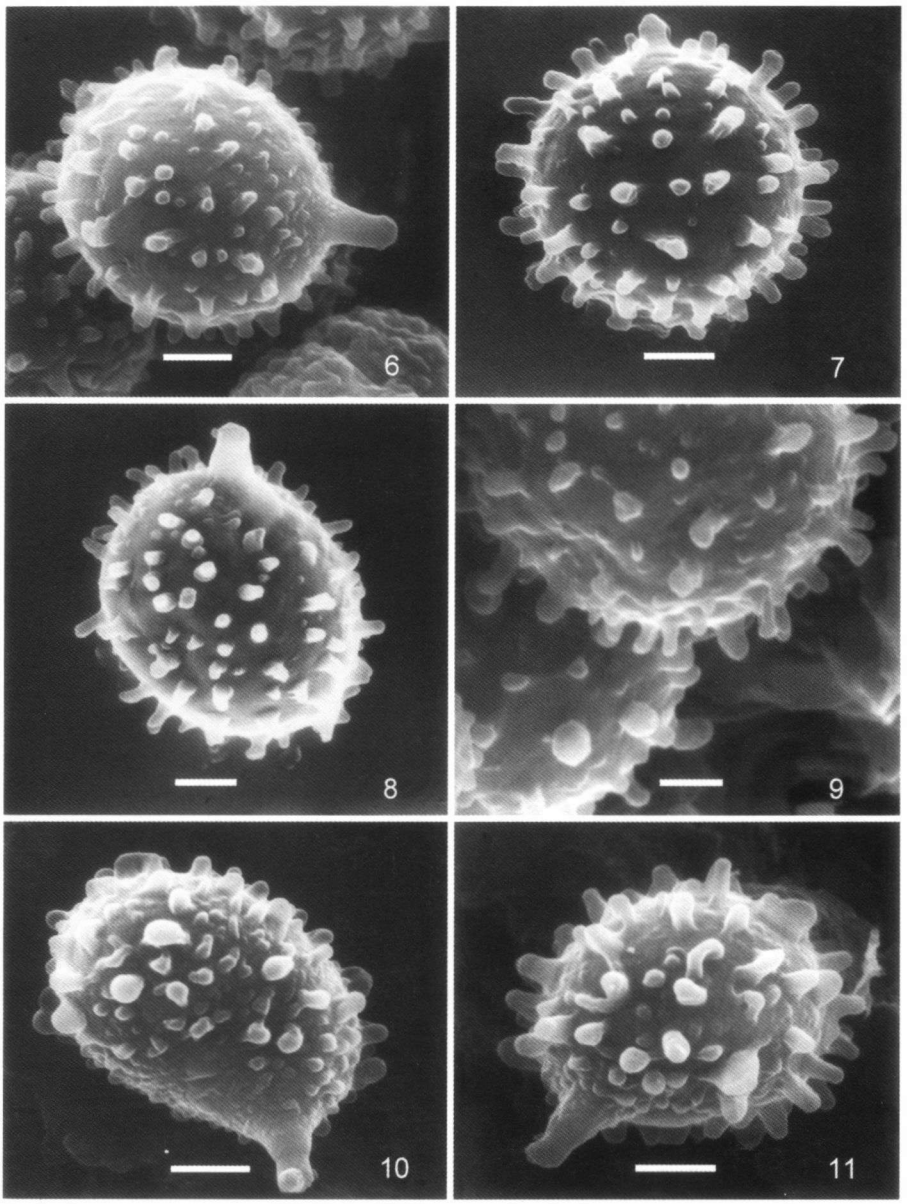
Habitat — In mesophytic forest, *Quercus* forest and in associations of *Pinus* and *Quercus*.

Material studied. MEXICO: Chihuahua, Mpio, Bocoyna, Babureachi, 6–7 km NE Bocoyna, 14.VIII.1992, *Moreno-Fuentes V-16* (FCME); Durango, Mpio, Pueblo Nuevo, El Mil Diez, 2.IX.1983, *Guevara 139* (ITCV, XAL); Guerrero, Mpio, Chilapa de Alvarez, 14 km from Atzacoaloya to Hueycaltenango, 19.VIII.1981, *Capello 159* (FCME); Oaxaca, Mpio, Ixtlán de Juárez, 3–5 km E Ixtlán de Juárez, 21.IX.1967, *Ruth Mc Vaugh 1265, 1290, 1292* (all in MICH under *L. tomentosomarginatus*); Puebla, Mpio, Huauchinango, 25.VIII.1987, *Gutierrez-Ruiz 2* (FCME), Mpio, Teziutlán, around Teziutlán, Cerro Techachapa, 9.VIII.1991, *Montoya 1968* (XAL); Veracruz, Mpio, Banderilla, SW Banderilla, Cerro La Martinica, 12.VII.1983, *López 160* (XAL).

Other material studied. USA: New York, Sandlake, *Peck s.n.* (lectotype of *L. deceptivus*, NYS); Maine, Penobscot Co., VIII.1967, *Homola 2380*; near Pushaw Lake, 22.IX.1976, *Homola 4012* (ENCB; XAL); Michigan, Oscoda Co., Perry Creek, 27.VIII.1973, *Nimke 506* (holotype of *L. tomentosomarginatus*, MICH).



Figs. 1–5. *Lactarius deceptivus*. 1, 2. Basidiospores (1. *Peck s.n.*, holotype of *L. deceptivus*; 2. *Nimke 506*, holotype of *L. tomentosomarginatus*); 3. pleurocystidia; 4. cheilocystidia; 5. pileipellis (*Peck s.n.*). Scale bars: 10 μm, except for 5 = 20 μm.



Figs. 6–11. *Lactarius* basidiospores under SEM. 6–9. *L. deceptivus* (6, 7. *Guevara 139*; 8. *Nimke 506*, holotype of *L. tomentosomarginatus*; 9. *Peck s.n.*, holotype of *L. deceptivus*). 10, 11. *L. luteolus* (*Thiers 1700*, holotype of *L. echinatus*). Scale bars: 2 μm, except for 9 = 1 μm.

Lactarius deceptivus is a well-known species from North America. It is widely spread in the eastern regions, from Canada across the east coast of USA to the Gulf of Mexico (Peck, 1885; Burlingham, 1908; Kauffman, 1918; Murrill, 1948; Hesler & Smith, 1979;

Homola & Czapowskyj, 1981; Montoya et al., 1990; Phillips, 1991; Montoya & Bandala, 1996; Bessette et al., 1997). It is a distinctive species characterized by white to cream-coloured basidiomes which stain brown, surface fibrillose-squamulose with age, distinctly involute margin of pileus which is cottony in young stages, velvety stipitipellis, white latex which is invariable in colour but stains the cut surfaces brown, acrid taste and ellipsoid basidiospores with a verrucose ornamentation pattern (Peck, 1885; Burlingham, 1908; Hesler & Smith, 1979; Montoya et al., 1990; Montoya & Bandala, 1996).

Among the examined specimens, those of Mc Vaugh from South Mexico were found at MICH labelled as *L. tomentosomarginatus* Hesler & A.H. Sm., a close relative of *L. deceptivus* (Hesler & Smith, 1979). Basidiomes of these collections, however, show the same morphologic variability (macro- and microscopic) as was observed in the examined collections of *L. deceptivus*, including the type specimen. Hesler & Smith (1979) used the following set of characters to distinguish *L. tomentosomarginatus* from *L. deceptivus*: (i) the low basidiospore ornamentation [0.2–0.7 μm in *L. tomentosomarginatus* vs 0.5–1(–1.5) μm in *L. deceptivus*]; (ii) basidiospores slightly shorter [9–11 × 7–8.5 μm vs 9–12(–13) × 7.5–9 μm]; (iii) the crowded, bifurcate and narrow lamellae; and (iv) the pileipellis without cracks.

Our analysis revealed that all specimens studied exhibit a wide variation regarding these features, which does not allow us to recognize discontinuity among the samples. Within a basidiome there may be variation in the height of the basidiospore ornamentation. Under SEM Peck's collection exhibited basidiospores with isolated verrucae, 0.3–1.1(–1.5) μm high. The verrucae are somewhat variable in shape (even within a single basidiospore), often appearing as rods, papillas or cylindrical, conical, broad or rounded verrucae, but these fit a consistent verrucose pattern. A similar variation was found in the Homola specimens from Maine and the other specimens considered (Figs. 1, 6, 7, 9). The height of the spore ornamentation in the three Mexican specimens labelled as *L. tomentosomarginatus* shows a range of 0.25–1.1 μm (measured under SEM), meanwhile the type collection (from USA, *Nimke 508*) even shows a wider range, up to 1.13(–1.5) μm (Figs. 2, 8). On the other hand, our data on the basidiospore size (Table 1) revealed only minor differences, which we consider of no taxonomic value.

Table 1. Basidiospore size of studied collections related with *L. deceptivus*.

Collections	RM	QM
Peck s.n. (Sandlake)	11 × 8 μm	1.4
Mc Vaugh's collections	10.1–11.3 × 8.3–8.9 μm	1.2–1.3
Nimke 508 (holotype of *L. tomentosomarginatus*)	10.8 × 7.8 μm	1.4
Other samples studied (*Capello 159, Moreno-Fuentes V-16, Guevara 139, Homola 2380, 4012*)	10.3–11.4 × 7.9–8.7 μm	1.2–1.4

Basidiomes in Peck's Sandlake material exhibit crowded to close lamellae, which agree with the variation of the arrangement observed in the type of *L. tomentosomarginatus*. Among the three collections of Mc Vaugh, some basidiomes even have broader and more distant lamellae than in Peck's specimen of *L. deceptivus*, similar to the wide variation observed in other Mexican collections. Furthermore, the pileus cuticle tends to crack with the expansion of the pileus and this cracking is probably also influenced by environmental conditions. At any rate, the microscopic structure of pileipellis is similar among all the samples examined (Fig. 5). The holotype of *L. tomentosomarginatus* (*Nimke 508*) is composed of young basidiomes which are of small to medium size, with the pileus margin still involute and a mostly uncracked pileipellis, except for some specimens of which the pileipellis is somewhat cracked towards the margin. The lectotype material of *L. deceptivus* exhibits a somewhat wider macroscopic variation due to the different stages of development of the basidiomes represented in this collection (but includes basidiomes similar in size to those of the type of *L. tomentosomarginatus*). The pileus cuticle in the individuals of this latter collection is scarcely cracked in younger basidiomes, and cracked into fibrillose patches in the older ones.

As a result of these morphological studies we conclude that the basidiomes of the studied material show the morphologic variation of a single taxon, and therefore we interprete the differences used by Hesler & Smith (1979) to distinguish *L. deceptivus* from *L. tomentosomarginatus* as representing part of such variation. *Lactarius tomentosomarginatus* is in our opinion a synonym of *L. deceptivus*.

Lactarius deceptivus is represented in Peck's herbarium (NYS) by the collection from Sandlake mentioned above which is recorded as the type material. This collection, labelled as 'type', was gathered by Peck in August (year not indicated), and is accompanied by drawings of fresh basidiomes, and also by a handwritten note by H.D. House (who succeeded Peck as State Botanist at NYS Museum): "... Peck did not designate a type collection or locality for *L. deceptivus*, hence the mounted material from Sandlake, accompanied by drawings and spore print may – perhaps not? (these two words not clearly legible) – serve the purpose of a type ...". Also, it is accompanied by a study of the microscopic features of the basidiomes made by G. Bills in1982 with the indication of being the type specimen.

Several authors (Saccardo, 1887; Burlingham, 1908; Kauffman, 1918; Hesler & Smith, 1979; Walleyn et al., 1996), including databases (Type Specimen Database of the New York State Museum Mycological Collections, NYS; Russulales News Website) recorded the publication of Peck (1885) as the original description of *L. deceptivus*. The epithet in Peck's report, written as "*L. deceptivus* Peck", does not have an indication of the status as new species (i.e., *sp. nov.* or *n. sp.*), as clearly stated for other species described by him in the same publication (e.g. *Russula basifurcata, n. sp.*, *Polyporus crispellus, n. sp.*, *L. varius, n. sp.*). The information provided by Peck in that work, as stated by House in his notes, did not include a specimen nor a locality but only a date (July–September) and habitat (woods and open places, especially under hemlock trees). We have not found any previous description of *L. deceptivus* by Peck, and the material from Sandlake matches the description of 1885. This original material supports validly the lectotypification by Hesler & Smith (1979).

A description of the type specimen based on our microscopic observations is as follows.

Basidiospores (8.8–)9.6–12 × 7.2–9.6 μm (RM = 11 × 8 μm, QM = 1.4), ellipsoid, occasionally giant, verrucose; pileipellis a loosely arranged cutis also with elements in a more or less anticlinal orientation, others irregularly curved and even projected, the elements being (1.6–)2.4–6.4 μm wide, some thick-walled hyphae (wall up to 1.8 μm thick) and laticifers also present; pleurocystidia sinuous, fusiform 56–100 × 6.4–9.6 μm, thin-walled, with constricted apex, others with rounded apex; cheilocystidia 44–78.4 × 5.6–8 μm, thin-walled, similar in shape to pleurocystidia. Hymenophoral trama heteromerous. Stipitipellis a trichodermis consisting of thick-walled (1.6–2.4 μm) filamentous caulocystidia, 100–450 × 4–7.2 μm, with attenuated apex, arising from a tighten hyphal tissue.

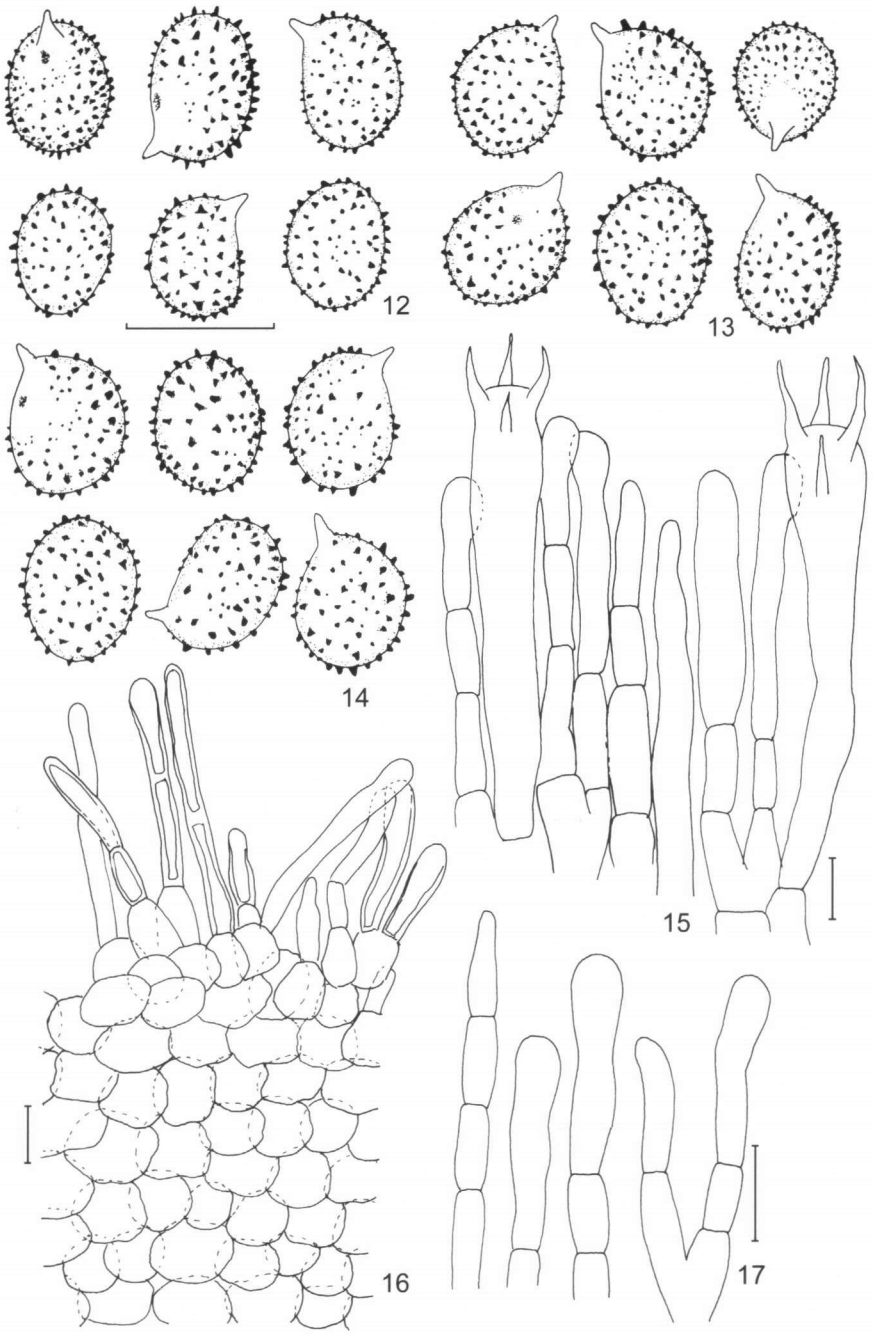
In the taxonomic arrangement followed by Hesler & Smith (1979), *L. deceptivus* was included in subgenus *Lactiflui* (Burl.) Hesler & A.H. Sm. (as *Lactifluus*, cf. Verbeken, 2001), sect. *Albati* (Bat.) Singer, the same section in which Singer (1986) treated it but without a subgeneric status. Verbeken (1998) accepted sect. *Albati* due to the absence of a pseudoparenchymatous layer in the pileipellis of its members and transferred it to subg. *Lactariopsis* (Henn.) R. Heim. Hesler & Smith (1979) and Bon (1980) argued that the pileipellis structure is a reliable character that suggests natural relationships, but in this context the stipitipellis structure, as part of the basidiome dermis should be considered as well. Taking this into account, *L. deceptivus*, which has different pileipellis, i.e. a loose cutis, but has a stipitipellis (a trichodermis composed of thick-walled elements) comparable to that observed in other *Albati*, can be included in this section and probably represents a subsection. A cladistic analysis, however, should reveal more information about this. We share the opinion of Hesler & Smith (1979), Verbeken (1998) and Basso (1999) in considering the *Albati* a distinct section, but as subg. *Lactariopsis* embraces members with more than one kind of pileipellis structure, or even with a pseudoparenchymatous subpellis (*L. velutissimus* Verbeken) (Verbeken, 1996) we provisionally consider *L. deceptivus* and sect. *Albati* in subg. *Lactiflui,* following Hesler & Smith (1979) and Basso (1999).

The documentation regarding the distribution of *L. deceptivus* in Mexico (Montoya et al., 1990, Montoya & Bandala 1996) as well as the records treated here, indicate that this species is widely spread in the country, from north to south (Guerrero, Oaxaca & Chiapas), associated with *Quercus* and also with conifers. *Quercus oleoides* Schltdl. & Cham. represents one of the most important phytobionts associated with *Lactarius* in Mexico. Trees of *Q. oleoides* have a similar distribution as *L. deceptivus* as well as that of other common *Lactarius* species in Mexico such as *L. hygrophoroides* and *L. indigo*, from the northeast to the south of the country, and also through Central America. Singer et al. (1983) also recorded the two latter species in association with *Q. oleoides* in Costa Rica, and they even cited *L. hygrophoroides* associated with *Q. oleoides* in northern South America.

Lactarius luteolus Peck — Figs. 10–17

Lactarius luteolus Peck, Bull. Torr. Bot. Club 23 (1896) 412.
= *Lactarius echinatus* Thiers, Mycologia 49 (1957) 716.

Pileus 30–55 mm in diameter, plane to planoconvex, cream-yellow to buff-coloured, staining brown to greyish-brown, pruinose to velutinous, dry, rugose. Lamellae crowded



Figs. 12–17. *Lactarius luteolus*. 12–14. Basidiospores (12. *Webster s.n.*; 13. *Thiers 1700*, holotype of *L. echinatus*; 14. *Mc Vaugh 985*); 15. hymenial elements; 16. pileipellis; 17. marginal hymenial elements (*Webster s.n.*). Scale bars: 10 μm, except for 16 = 15 μm.

at first sight but close when excluding the lamellulae, white to cream-yellow, staining brown, lamellulae in different lengths. Stipe 20–45 × 7–12 mm, cream-yellow to buff-coloured, staining brown during the development, pruinose to velutinous, solid. Latex white, staining the cut surfaces brown. Context cream-coloured, staining brown, compact.

Basidiospores 7.2–8.8(–9.6) × 5.6–7.2 μm; RM = 8.1 × 6.4 μm; QM = 1.3, broadly ellipsoid, verrucose (ornamentation 0.4–0.8 μm high), suprahilar plage frequently with amyloid dot; under SEM warts appear isolated, rounded, truncate, subcylindric, broadened towards base, at times aligned and joined at base level. Basidia 52–68 × 6.4–10.4 μm, clavate, tetrasporic. Pleurocystidia septate, versiform; terminal segments 12.8–28 × 4–6.4 μm, subcylindric, clavate, subcapitate, sublageniform; pseudocystidia 2.4–8 μm wide, with refringent contents, buried or at times conspicuous. Marginal elements versiform, septate, conspicuous, frequently projecting beyond the hymenial layer; terminal elements 15.2–20 × 3.2–6.4 μm, clavate, sublageniform, capitate. Pileipellis a trichodermis above a pseudoparenchymatous layer; suprapellis consisting of subcylindric, sinuous, erect, septate, terminal elements 26–240 × 3.2–5.6(–7.2) μm, frequently capitate, thin- or thick-walled (0.8–1.6 μm); subpellis made of subisodiametric cells, 8–36 μm wide, irregularly disposed. Context hyphae 4.8 μm wide, laticifers 4.8–7.2 μm wide, sphaerocytes 24–32 μm in diameter. Hymenophoral trama hyphae 4–8 μm in diameter; laticifers 7.2–11.2 μm wide, sphaerocytes 12–16 μm wide.

Habitat — In mesophytic forest.

Material studied. MEXICO: Jalisco, S Talpa River, La Cuesta, 24.IX.1960, *Ruth Mc Vaugh 985* (MICH).

Other material studied. USA: Massachusetts, East Milton, VIII without day and year, *H. Webster s.n.* (holotype of *L. luteolus* NYS); Texas, Walker Co., Sam Houston National Forest, near Huntsville, 10.VI.1952, *Thiers 1700* (holotype of *L. echinatus* MICH).

The occurrence of *L. luteolus* (subsect. *Luteoli* Pacioni & Lalli, subg. *Lactiflui*) in Mexico is based on the collection of *Mc Vaugh 985*, mentioned above. It was found undetermined at MICH and identified after comparison with the type specimen. The following set of characters distinguish *L. luteolus*: basidiome colour, the brownish staining by the latex, the basidiospores (size and ornamentation), the pileipellis structure, and the septate hymenial elements.

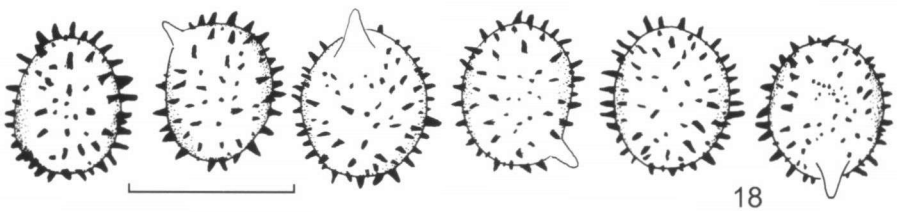
Lalli & Pacioni (1992) treated *L. echinatus* as a synonym of *L. luteolus* and we agree with this synonymy. The study of the respective holotypes indeed confirms this. They share a similar basidiospore range (RM = 8 × 6.4 μm, QM = 1.3 in *L. luteolus*; RM = 8 × 6 μm, QM = 1.4 in *L. echinatus*), pileipellis a trichodermis and septate hymenial elements. Hesler & Smith (1979) and Singer (1990), however, maintained *L. echinatus* as an autonomous species. The specimen collected in Mexico (Tamaulipas: Gómez Farias, 21.XII.1988, F1080303, leg. *J. García & G. Mueller*, F) and determined by Singer (1990) as *L. echinatus* was also examined. This material shows a different set of characters which indicates that it belongs to a different taxon in subg. *Lactarius* (Heilmann-Clausen et al., 1998; Basso, 1999). The present state of preservation of the material, however, makes study difficult. Future collections will help to complement the information on presence of other representatives of this group in Mexico. Therefore, the presence of *L. luteolus* (as *L.echinatus*) in Northeast Mexico, as suggested by Singer (1990), could not be verified.

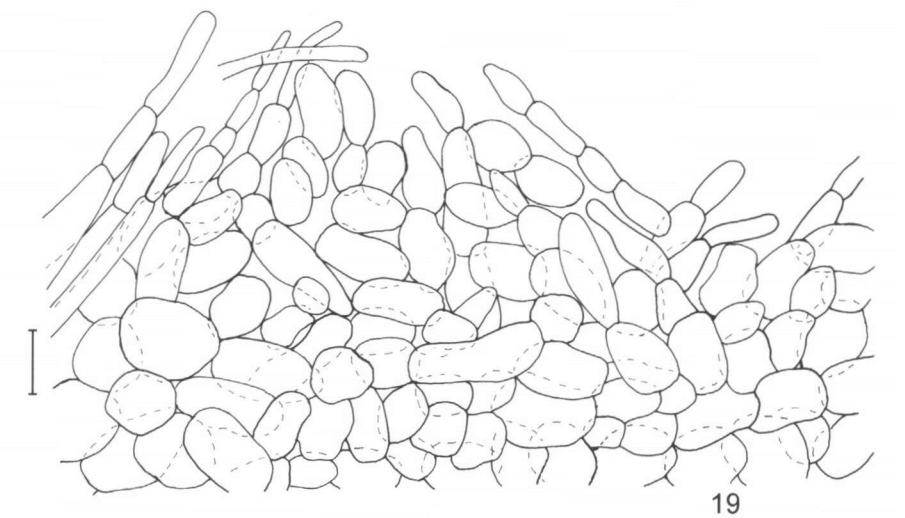
Lactarius rimosellus Peck — Figs. 18–23

Lactarius rimosellus Peck, Bull. N.Y. St. Mus. 105 (1905) 37.

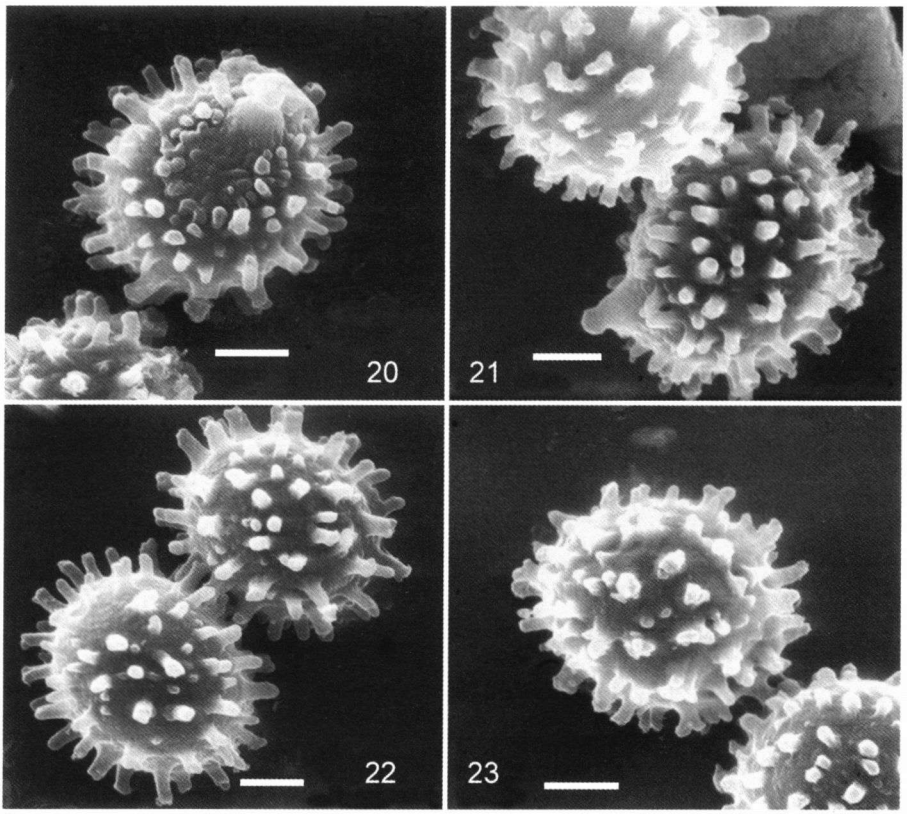
Pileus 15–40 mm in diameter, plane, planoconvex, depressed in the centre, commonly with a papilla, dry, finely areolate to rimose areolate, cracked areas dirty whitish, pileipellis brownish orange (7B5–B6, 7C6–D6), brownish with pinkish tones (7B4–B5); margin striate to crenate, undulate, decurved at maturity. Lamellae close to crowded, yellowish, pinkish beige to pinkish brown (7B4–B3), lamellulae present. Stipe 35–50 × 4–5 mm, subcylindric, straw-yellow to pinkish brown (7B3) base whitish. Latex watery to whitish, unchanging. Context beige to brownish after some minutes exposed, odour agreeable, taste mild. KOH stains the pileus and context yellow-olive.

Basidiospores (6.4–)7.2–8(–8.8) × 5.6–7.2(–8) µm; RM = 7.5–7.8 × 6.3–6.4 µm; QM = 1.19–1.23; broadly ellipsoid, verrucose and with isolate truncate spines of 0.8–1.6 µm high. Under SEM the verrucae appear isolated or rarely connected through their bases, versiform, frequently broadened towards base and cylindric upwards, with truncate apex, conic, rounded or irregular. Basidia 40–48 × 8.8–9.6 µm, clavate, tetrasporic, at times bisporic. True cystidia absent. Pseudocystidia 2.4–4 µm wide, subcylindric,





Figs. 18, 19. *Lactarius rimosellus*. 18. Basidiospores; 19. pileipellis (*Montoya 3216*). Scale bar 10 µm and 20 µm, respectively).



Figs. 20–23. *Lactarius rimosellus* basidiospores under SEM (20 & 22. *Montoya 3216*; 21 & 23. *Peck s.n.*, holotype of *L. rimosellus*). Scale bar = 2 μm.

sinuous, refringent, projected from hymenophoral trama. Lamella edge with marginal elements of 16–28 × 5.6–8 μm, clavate, at times with basidia and some elements similar to monosporic basidia 26–32 × 5.6–7.2 μm. Pileipellis a hymeno-epithelium; elements 18.4–40(–44) × (16–)18.4–28 μm, versiform, subellipsoid to broadly inflate, vesiculose, ovoid, subglobose, at times grouped in mounds in some areas; terminal elements 16–56 × 8–17.6(–24) μm, differentiated in form, pyriform, clavate, ventricose or broadly subcylindric, some filiform (6.4–8.8 μm wide), isolate or disposed in patches. Context composed of hyphae 2.4–5.6 μm wide, laticifers 8–12 μm wide, sphaerocytes 9.6–33.6 μm wide, arranged in rosettes. Hymenophoral trama hyphae 3.2–8 μm wide, laticifers 4–9.6(–12) μm wide, sphaerocytes 8–12(–16) μm in diameter, arranged in rosettes.

Habitat — Among mosses, in a *Pinus* forest.

Material studied. MEXICO: Veracruz, Mpio, Jilotepec, around El Esquilón, 6.X.1993, *Montoya 2184, 2191*; 13.VII.1995, *Montoya 3216* (all in XAL).

Other material studied. USA: Michigan, Winnewana Impoundment, Waterloo Rec. Area, Washtenaw Co.. 23.VIII.1973, *A.H. Smith 84515* (MICH); New York, Suffolk Co., Wading River, 23.VIII.1905, *Peck s.n.*, (holotype of *L. rimosellus*, NYS).

Lactarius rimosellus (sect. *Olentes* Bat., subg. *Russularia* (Fr.) Kauffm.) is distinctive because of its basidiome colour and by the rimose-areolate pileus in combination with the verrucose ornamentation pattern of the basidiospores. The present state of the type specimen makes it difficult to revive the tissues and to study the pileipellis. The pileipellis of collection *Smith 84515* (which Hesler & Smith (1979) considered to be conspecific) was studied and fitted the description of our Mexican material: it agrees with the hymeno-epithelium type described by Heilmann-Clausen et al. (1998). Other macro- and microscopical characters of the Mexican material are in accordance with both collections from the USA.

The distribution of *L. rimosellus* appears to be related to *Pinus* and *Betula* in the USA (Burlingham, 1907; Hesler & Smith, 1979). Fieldwork conducted in the Gulf of Mexico area (State of Veracruz) suggested that *L. rimosellus* is uncommon. It has only been recorded in one location, associated with *Pinus*.

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