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LACTARIUS ZUGAZAE A NEW SPECIES FROM SPAIN

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Moreno G., Heycoop M., Montoya L. & Bandala V.M., 2000: *Lactarius zugazae*, una nuova specie per la Spagna.

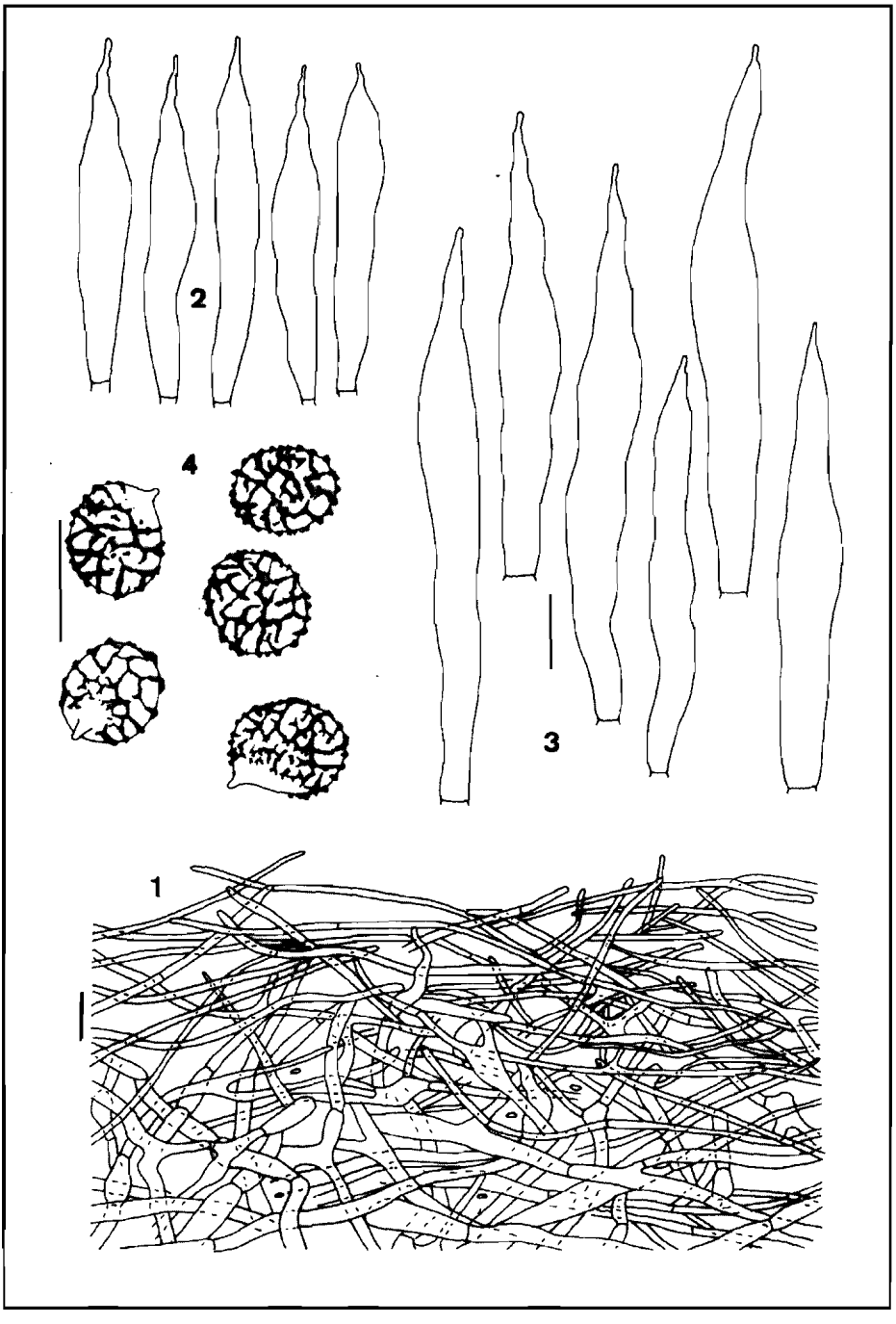
Key words: Mediterranean region, Russulales, Spanish mycobiota, taxonomy.

Abstract: *Lactarius zugazae*, a new species related to members of the section *Russularia* (Fr.) Fr., is described and illustrated. It grows in woods in association with *Quercus ilex* subsp. *ballota* on basic and acid soils in Spanish Mediterranean areas. It is characterized by its robust habit, fasciculate basidiomata, vinaceous reddish colour, rubescent context and characteristic odour; microscopically the shape, ornamentation and size of its basidiospores are characteristic.

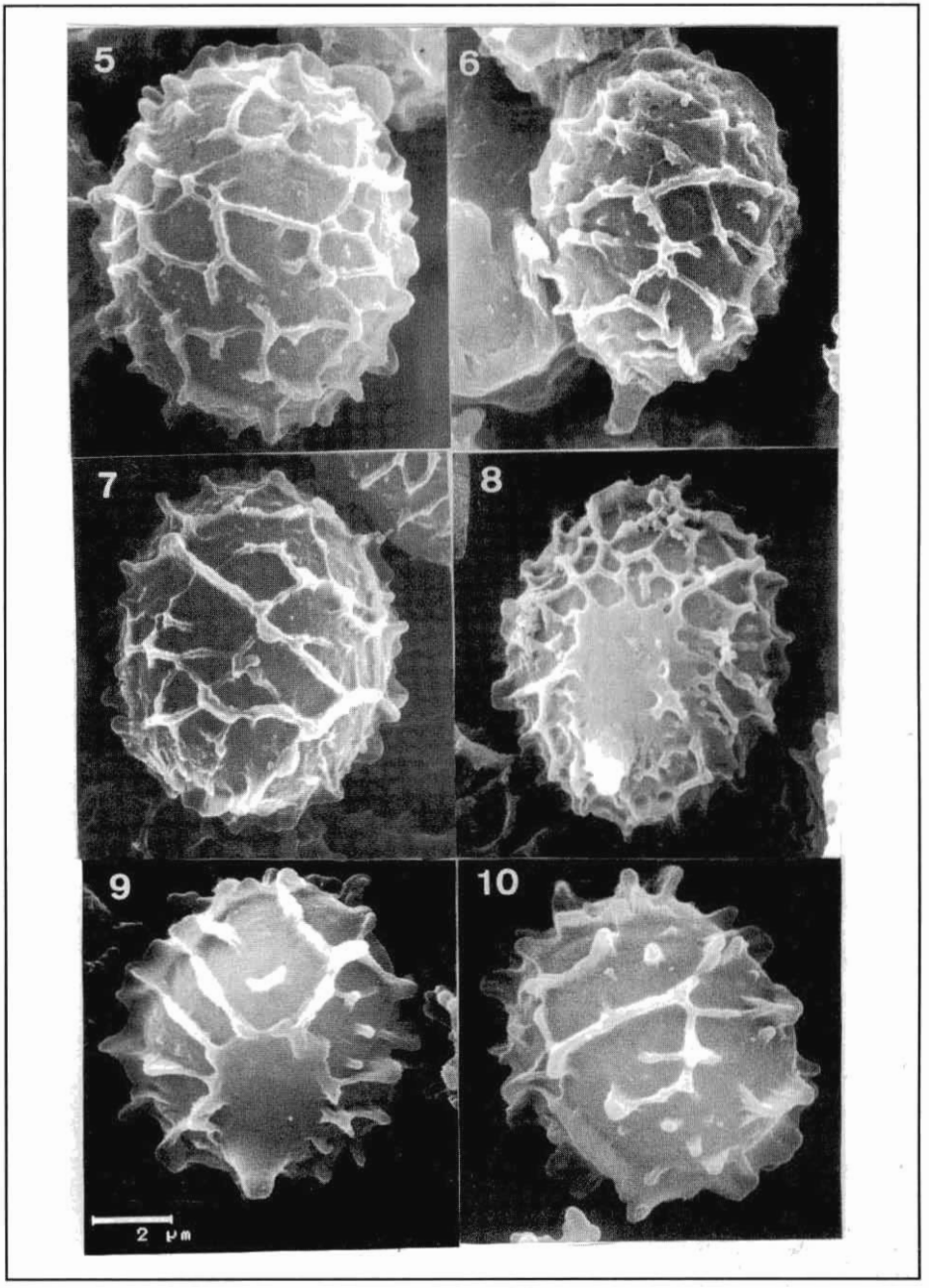
Riassunto: *Lactarius zugazae*, una specie nuova affine alle entità della sezione *Russularia* (Fr.) Fr., è descritta ed illustrata. La specie, che cresce sotto *Quercus ilex* subsp. *ballota* su suolo acido e basico nelle aree mediterranee della Spagna, è caratterizzata dal portamento robusto, la crescita fascicolata, il colore rossastro vinoso, la carne arrossante e l'odore caratteristico; dal punto di vista microscopico, la morfologia, l'ornamentazione e le dimensioni delle spore costituiscono ulteriori caratteri diagnostici.

The Mediterranean ecosystems are dominated by evergreen shrubs and sclerophyllous trees which in the Iberian Peninsula host a high diversity of fungi. The mycobiota of these areas, however, remains poorly known and many new species are being discovered. This is the case of the genus *Lactarius* Pers. from which two new species occuring in the Mediterranean region have been described recently: i.e. *L. mediterraneensis* (LLISTOSELLA & BELLÙ, 1996) and *L. cyanopus* (BASSO, 1999).

The new species described in the present paper has been known for 25 years. In fact, over two decades ago Dr. Álvaro Zugaza collected some *Lactarius* specimens (which he gave to G.M.) for a mycological exhibition organized by the "Sociedad Mico-

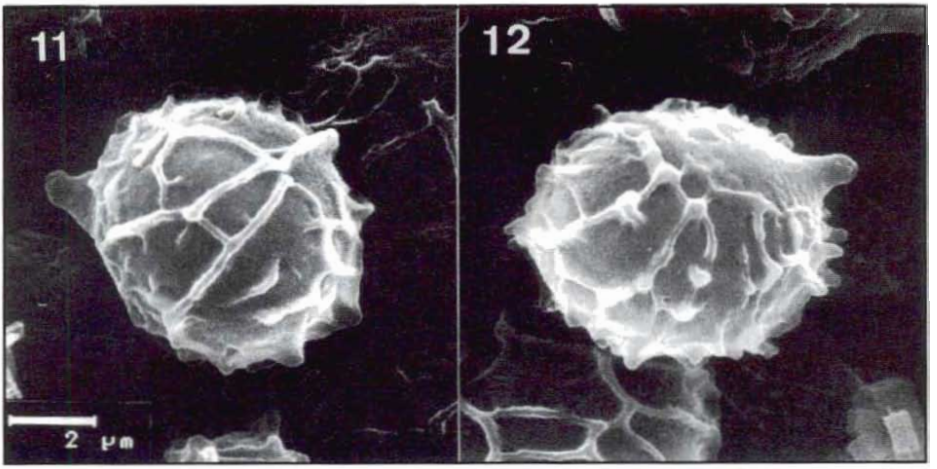


Figs. 1-4 - *Lactarius zugazae* typus (AH 19620). 1. Pileipellis, 2. Cheilocystidia, 3. Pleurocystidia, 4. Spores. (Line drawings L. Montoya and B. Bandala)



Figs. 5-8 - *Lactarius zugazae* typus (AH 19620) Spores broadly ellipsoid, with almost complete reticulum. (Photo G. Moreno).

Figs. 9-10 - *Lactarius quietus* (Montoya 3438). Spores ellipsoid cristulate to subreticulate with a more prominent ornamentation. (Photo G. Moreno)



Figs. 11-12 - *Lactarius rubescens* Bres. (B/1546). Spores ellipsoid cristulate to subreticulate. (Photo G. Moreno)

lógica de Madrid" (former "Sociedad Micológica Castellana"). These samples were collected in the holm oak woods of El Pardo (Madrid) and were characteristic for their robust habit, fasciculate reddish vinaceous basidiomata, rubescent context and typical odour. We have often observed this species over the past years, but always collected by other people and

Fig. 13 - *Lactarius zugazae typus* (AH 19620). Detail of the basidiomata. (Photo G. Moreno)

most of the times the specimens were already old and, therefore, inadequate for an exhaustive macroscopic desciption.

In the autumn of 1999, we were able to study *in situ* fresh fruitbodies of this *Lactarius* species and record additional data for a more detailed description. In a holm oak wood in Almaraz (Cáceres), for example, we were able to observe more than 100 carpophores. After studying the specimens macro and microscopically, we came to the conclusion that they represented an undsecribed species of *Lactarius* and therefore it is proposed as new in this paper. The species is dedicated to Dr. A. Zugaza, former president of the "Sociedad Micológica de Madrid", because of his contribution to Spanish Mycology, especially to its popularization. The type material of *Lactarius zugazae* is kept at the herbarium of the University of Alcalá (AH), and isotypes are deposited both at the private herbarium of Dr. M. Bon in France and at the Herbarium of the Real Jardín Botánico de Madrid (MA-fnngi) Colour codes indicated in the description are based on the colour chart of Kornerup & Wanscher (1967).

Spores were measured in side-view excluding the ornamentation height, which is indicated separately.

Fig. 14 - *Lactarius zugazae* (AH 19761). Detail of the lamellae and stipe apex. (Photo G. Moreno)

LACTARIUS ZUGAZAE G. Moreno, Montoya, Bandala & Heykoop, sp. nov.
(Figs.1-8, 13-16)

Basidiomata robusta, plerumque fasciculata.
Pileus 4-10 cm latus, ab initio subhemisphaericus, deinde convexus vel depressus, rubellus vel brunneo-rubellus, siccus, laevis, hygrophanus, margine rectus vel incurvatus.
Lamellae adnatae vel leviter de-

currentes, latae, densae, ab initio luteoaurantiacae, deinde rubello-griseae, vinaceobrunnescentes.
Stipes 3-10,0 x 1,5-3,0 cm, cylindraceus, versus basim attenuatus, pileo concolor vel pallide roseolus, base obscure roseolovinaceus vel hepatico-rubellus.
Caro pilei cremea vel roseola, crassa, in stipite cremea vel rubella, vinaceobrunnescens; cum KOH 10% cremeoviridis tingens. Latex aquosus, leviter albidus, chartam albam colore cremeoflavo tingens. Odor similis odoris Lactarii quieti, sapor mitis.
Sporae 8-9,2(-9,5) x 6,5-7,5 µm, late ellipsoideae, reticulatae, ornamentum 0,4-0,8(-1,0) µm altum. Basidia 47-55 x 9-11 µm, clavata, 4-sporigera. Pleurocystidia (macrocystidia) 60-72 x 8-10,4 µm, hyalina, fusoidea, plerumque apicibus mucronatis. Cheilocystidia 36-52 x 5,6-6,4 µm, pleurocystidiis similia. Hyphae pileipellis 7,2-12 (-13,6) µm latae, haud in materiam gelatinosam inmersae.
Holotypus: Hispania, Almaraz, Cáceres, *in Querci ilicis silva, in solo basico, 9.XI.1999, leg. C. Celpi, J. de Castro et G. Moreno, AH 19620.*

Basidiomata robust, frequently fasciculate (3-10 fruitbodies), rarely solitary.
Pileus 4-10 cm in diam., at first subhemispherical, later convex to centrally depressed, reddish, pinkish-vinaceous (6B2-B4) to reddish-brown (8D4-D3, 8E4-E5), dry, smooth to slightly innately fibrillose in places (under lens), sometimes cracked or areolated, hygrophanous, with irregularly ondulated and incurved to straight margin.

Lamellae adnate to slightly decurrent, pale yellow-orange (5A2-B3) when young, reddish-grey (6B2-B3) at maturity, turning vinaceous-brown (8A2, 7A2) when cut, dense, broad, moderately thick, sometimes with more or less anastomosed veins, with lamellulae.

Stipe 3-10 x 1.5-3.0 cm, cylindrical, tapering towards the base, brittle, with sponge-like consistency, finely pruinose (under lens), concolorous to pileus, pale pinkish (8A2, 7A3-B4) to dark pinkish-vinaceous (8C5-D5) or strong reddish liver-coloured towards the base; at the apex, close to the insertion of the lamellae sometimes coloured pinkish to purplish-pinkish.

Context thick, cream-coloured to pinkish (5A2) in the pileus, cream-coloured with reddish tinges in the stipe, darker reddish liver-coloured (8D5-E6, 9E5-F5) towards the base, slowly turning vinaceous-brown when cut. Latex very scarce, watery (slightly whitish), turning pale cream-yellowish on white paper or glass. Odour strong, characteristic (recalling the smell of *Lactarius quietus*), taste mild (neither bitter nor acrid). Context staining cream-greenish with KOH 10%.

Basidiospores 8-9.6 x 6.4-7.5(-8) µm (Xm = 8.31-8.72 x 6.92-7.0; Q = 1.20-1.25); in the holotype: 8.0-8.31-9.2(-9.5) x 6.5-6.92-7.5 µm, Q = 1.10-1.20-1.33(-1.36) (n = 26), broadly ellipsoid, with an almost complete reticulum, the network being moderately fine (loose and incomplete in places), 0.4-0.8 (-1.0) µm high.
Basidia 47-55 x 9-11 µm, clavate, 4-spored, sterigmata arcuate, up to 4 µm in height.
Pleurocystidia (macrocystidia) 60-72 x 8-10.4 µm, abundant, fusiform, with mucronate apex, sometimes constricted, hyaline.

Cheilocystidia 36-52 x 5.6-6.4 µm, similar in shape to pleurocystidia. Pileipellis a transition between a cutis and a loose trichoderm, consisting of short, septate, ramified, and not gelatinized cylindrical hyphae, 7.2-12 (-13.6) µm wide.; in distilled water showing clots or dark brown cytoplasmatic precipitations, and sometimes some plate-like granules.

Material examined: Spain: Almaraz, Cáceres, in humus of *Quercus ilex* ssp. *ballota* on calcareous soil, 9.XI.1999, leg. C. Celpi, J. de Castro & G. Moreno, AH 19620 (Holotype). Bohonal de Ibor, Cáceres, in humus of *Quercus ilex* ssp. *ballota* on acid soil, 3.XII.2000, leg. J. Muñoz, AH 19764. Cáceres IX.1999, leg. G. Moreno, Montoya 3583, Montoya 3585 (XAL). Aracena, Huelva, in humus of *Quercus ilex* ssp. *ballota* on acid soil, 13.XI.1999, AH 19620. Madrid, Valdemorillo-Fresnedilla, in humus of *Quercus ilex* spp. *ballota* on acid soil, 21.XI.1999, leg. M. Martín, AH 19761.
Other material studied: *Lactarius rubescens* Bres.: Italy: Gocciadoro, IX.1919, leg. and det. G. Bresadola, B/1546. *Lactarius quietus* (Fr.: Fr.) Fr.: Spain, Pto. de Somosierra, 30.X.1997, Montoya 3438, IX-1999, Montoya 3586 (both at XAL).

OBSERVATIONS

Lactarius zugazae is characterized by its robust habit, frequently fasciculate basidiomata, subhemispherical to convex and thick pileus, reddish vinaceous colours, rubescent context, watery and scarce latex, strong smell and broadly ellipsoid, reticu-late basidiospores. According to the taxonomical framework of HEILMANN-CLAUSSEN et al. (1998), the new species keys out close to members of the subgenus *Russularia* (Fr.) Kauffman, Section *Russularia* (Fr.) Fr because of the dry pileus, the structure of the pileipellis, the odour and colour of the fruitbodies, as well as the presence of macrocystidia. In this section, *Lactarius zugazae* could be mistaken for *L. quietus* (Fr.:Fr.) Fr.; however, according to the descriptions of several authors (MARCHAND, 1980; HEILMANN-CLAUSSEN et al., 1988; BASSO, 1999) and to our own observations on the collections indicated above, *L. quietus* differs in having cristulate to subreticulate basidio-spores (with a more prominent ornamentation, 0.8-1.5 µm. heigh) (Figs. 9-10), different habit (slender basidiomata), a more whitish context which tends to turn vinaceous-brown towards the base of the stipe when cut (Fig. 16), zonate pileus, and white to cream-coloured latex.

The rubescent context and the staining of the latex of *Lactarius zugazae* could point to a relationship with *L. rubescens* Bres. This taxon is considered a synonym of *L. decipiens* by NEUHOFF (1956) and BASSO (1999), but LALLI & PACIONI (1981) accept *L. rubescens* as a distinct species because of its darker fruitbodies and its latex staining paler than in *L. decipiens* ("...per l'odore meno intenso, il viraggio al giallo meno evidente e il colore del cappello leggermente più carico..."). BASSO (1999) reports that "under *Quercus ilex* and *Q. suber*, *L. decipiens* (=*L. rubescens*) shows a darker colour, which is perfectly shown in her watercolour plate (p. 789) as well as in the photograph of MARCHAND (1980) (as *L. rubescens*).

The macroscopic variability observed in the specimens of *Lactarius zugazae* examined encompasses the data

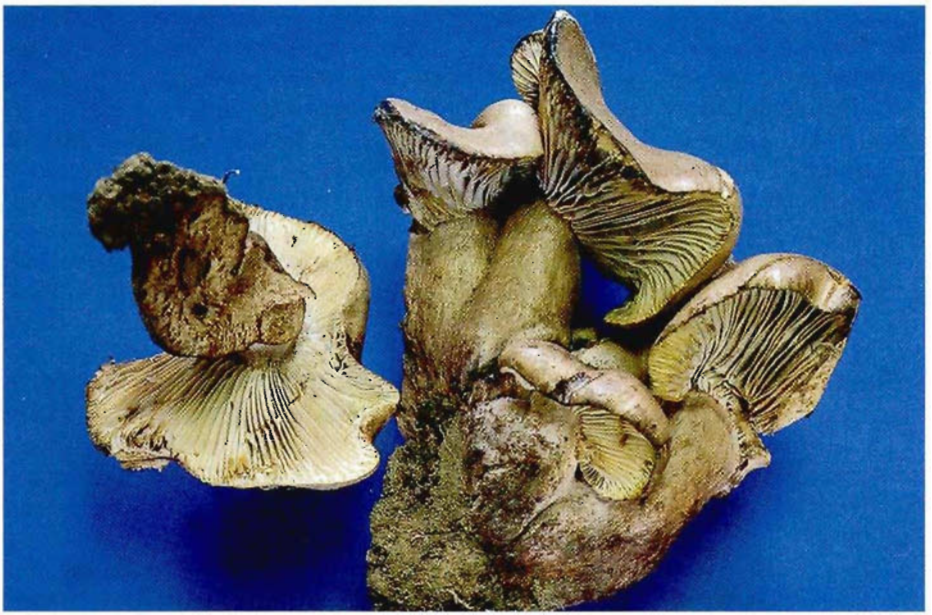


Fig. 15 - *Lactarius zugazae* (Montoya 3583). Fasciculate habit of basidiomata. (Photo V. Bandala)

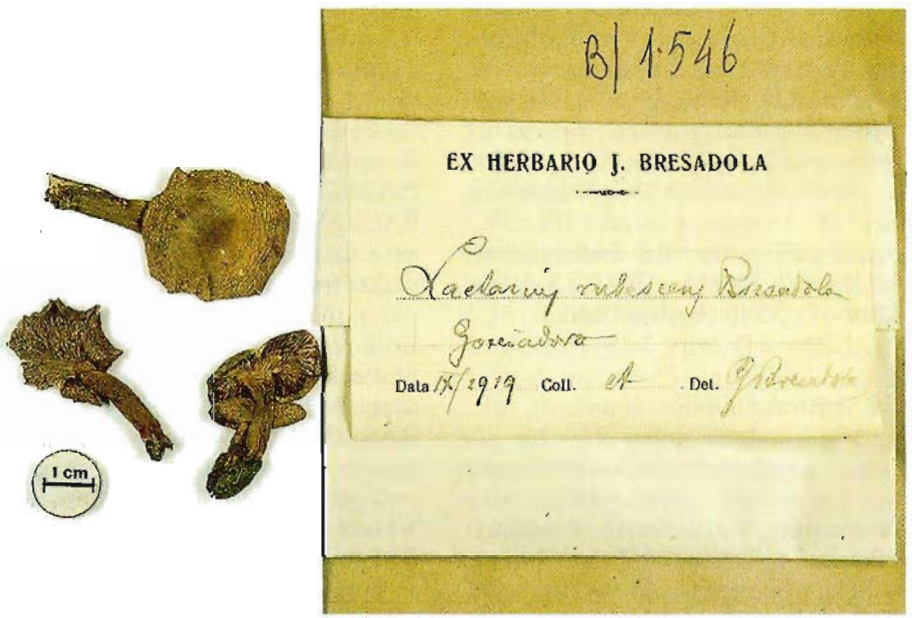


Fig. 16 - *Lactarius zugazae* and *L. quietus* (AH 19620 and Montoya 3438). Detail of the size and context of the stipe and pileus, whitish in *L. quietus* and rubescent in *L. zugazae* (Photo G. Moreno)

Fig. 17 - *Lactarius rubescens* Bres. (B/1546). Herbarium material (Photo G. Moreno)

mentioned above; therefore, we decided to reexamine one of Bresadola's collection of *L. rubescens* (*leg.* and *det.* G. Bresadola, B/1546) previously studied by BASSO (1997). We could observe that it differs from our collections mainly in two major characters (i) habit: the sample consists of three fruitbodies, which however are smaller and more slender than the Spanish specimens [approx. in dry pileus (3-)20-30 mm diam.; stipe (5)18-35 x (2-)3-7 mm]; and (ii) spores: although they share a similar pattern of basidiospore ornamentation, the collection B/1546 has shorter spores [(6.4-)7.2-7.40-8.0(-8.5) x 5.6-6.64-7.0(-8.0) µm; Q = 1.12 (n = 30)] which tend to be more globose. We agree with the opinion of BASSO (1999) that the macro and micromor-phological characters of Bresadola's specimen are similar to those shown by members of *L. decipiens*. In fact, Bresadola's plate (tab. 93, 1881) matches the concept of this latter species. Basidiomata of *L. decipiens*, additionally, differ from *L. zugazae* in their more or less orange colour, without vinaceous tinges, paler and non-rubescent context, and the watery latex which turns yellow on white paper. We, therefore, conclude that the specimen B/1546 corresponds to *L. decipiens* and that the proposal of NEUHOFF (1956) and BASSO (1999) to consider *L. rubescens* a later synonym can be followed for the time being. However, a revision of an earlier specimen authenticated by Bredadola is needed to confirm this synonymy.

Lactarius zugazae is adapted to different edaphic conditions (fruiting on both sandy, acid and basic calcareous soils) always linked to *Quercus ilex* subsp. *ballota*.

In several mycological exhibitions, in Spain, we have observed specimens of *Lactarius zugazae* determined erroneously as *L. rubrocinctus* Fr., probably due to the purplish vinaceous colours which sometimes appear at the apex of the stipe, near the insertion of the gills. Nevertheless, *L. rubrocinctus* differs in having an epithelioid subpellis and a different spore ornamentation which tends to be zebroid (HEILMANN-CLAUSEN et al., 1998; BASSO, 1999).

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