

Studies in *Galiella* (Ascomycota, Pezizales). IV. Typification and identity of *Rhizina spongiosa*

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Summary: A lectotype of *Rhizina spongiosa* is designated and examined. Its identity and taxonomical position in the genus *Galiella* is discussed. Color pictures of dried specimens and microscopic features are provided.

Keywords: *Sarcosomataceae*, type studies, typification.

Riassunto: Viene designato e studiato il lectotipus di *Rhizina spongiosa*. Viene discussa la sua identità e la posizione tassonomica in seno al genere *Galiella*. Vengono inoltre proposte foto a colori del materiale secco e del quadro microscopico.

Parole chiave: *Sarcosomataceae*, studio dei tipi, tipificazione.

Introduction

Rhizina spongiosa was described upon material collected in Cuba by Charles Wright (BERKELEY & CURTIS, 1869). It was transferred by LE GAL (1961) to the genus *Sarcosoma*, after the study of the collections Fungi Cubenses Wrightiani nr. 933 and 654, as reported in LE GAL (1953). PFISTER (1974) after the revision of Fungi Cubenses Wrightiani nr. 654, C. Wright 638 (FH), transferred it in the genus *Galiella* Korf & Nannf. Unfortunately LE GAL (1953) and PFISTER (1974) did not report any microscopic detail of their type studies. Only LE GAL (1953) stated that the ascospores of *R. spongiosa* are very much larger than those of *Galiella thwaitesii* (Berk. & Broome) Nannf. (as *Sarcosoma thwaitesii*).

MASSEE (1896) reported spores measures as 42–45 × 12–14 μm, but it is definitely unclear whether he had really examined the type (nr. 654) because such measurements are identical to those of *Bulgaria trichophora* Massee (MASSEE, 1891), regarded by him to be synonym of *Rhizina spongiosa* and *Rhizina thwaitesii* Berk. & Broome. MASSEE (1896) published also a B/W drawing of what he called *Rhizina spongiosa* (see Plate 1) and described smooth ascospores. PETCH (1910) seems to list this *Rhizina spongiosa sensu* MASSEE (1896) as synonym of *Galiella thwaitesii* (as *Sarcosoma thwaitesii*).

PADEN (1983) examined the type material and four additional Brazilian collections. Under *Galiella spongiosa* he described a species with ascospores 36–65 × 14–21 μm. The Brazilian collections were from Johann Rick's herbarium (in FH) and came from Rio Grande do Sul.

The aim of the present work is to delineate the morphological concept of *Rhizina spongiosa* and discuss its position in the genus *Galiella*.

Material and methods

Morphological study. — The microscopic studies were based on both fresh and dried specimens. Two optical microscopes were used: Olympus CX41 trinocular and Optika B353 trinocular with plan-achromatic objectives 4x, 10x, 40x, 60x,

100x oil immersion. The following main reagents were used: Melzer's reagent, cotton blue, Congo red, 5% KOH. Water mounts were used for the observation of the pigmentation and measurements. At least 30 ascospores were measured from each apothecium.

Taxonomy

Galiella spongiosa (Berk. & M.A. Curtis) Pfister, *J. Agric. Univ. P. Rico*, 58 (3): 363 (1974).

Basionym: *Rhizina spongiosa* Berk. & M.A. Curtis, *J. Linn. Soc., Bot.*, 10: 364 (1869).

Synonym: *Sarcosoma spongiosum* (Berk. & M.A. Curtis) Le Gal, *Bull. Soc. mycol. Fr.*, 78: 214 (1961).

Original diagnosis

654. *Rhizina spongiosa*, B. & C. Magna, crassa; cupulis irregularibus, floccis cirrhatis implexis atro-fuscis vestitis; hymenio pallide fusco; sporidiis fusiformibus. (383, 638, 646.) On bushes "growing vertically." January. Cups 1½ inch across; sporidia .0024 inch long, .0008 broad. A magnificent species.

Typification

As can be seen in the above original diagnosis, BERKELEY & CURTIS (1869) indicated three distinct collections "(383, 638, 646.)", without designating a holotype. According to Art. 9.5 of I.C.N. those collections must be considered as "syntypes". Art. 9.11 indicates that "if no holotype was indicated by the author of a name of a species or infraspecific taxon [...] a lectotype or, if permissible (Art. 9.7), a neotype as a substitute for it may be designated" and Art. 9.12 explains that "in lectotype designation, an isotype must be chosen if such exists, or otherwise a syntype if such exists". The collection FH 00290395 here studied is "nr. 638" and so it likely represents a syntype. For the above reasons, we prefer here to formally select it as lectotype. **Lectotype here designated:** specimen no. 654 (C. Wright 638, Jan. Cuba) in the Farlow Herbarium of Harvard (FH 00465798; barcode 00290395). Mycobank MBT 202870.

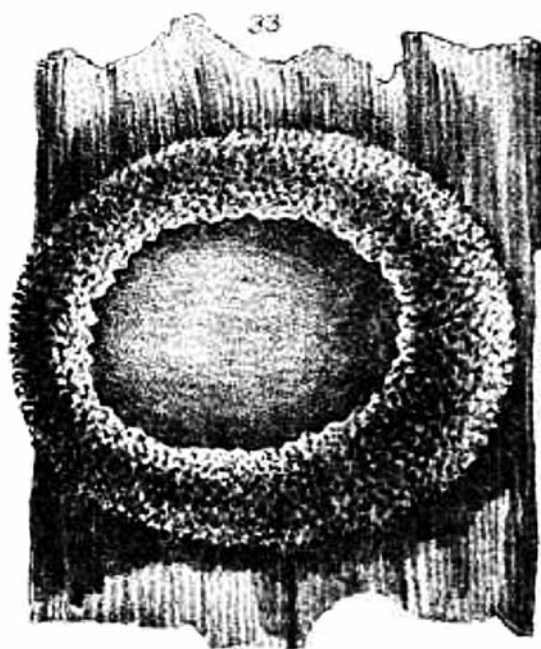
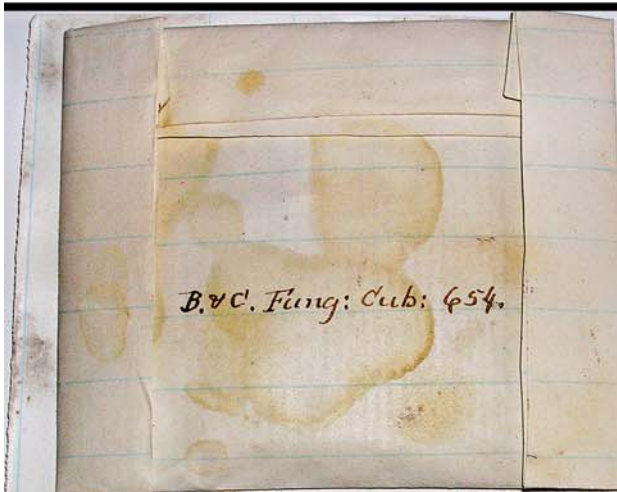


Plate 1 – *Rhizina spongiosa* in MASSEE (1896)



Rhizina spongiosa B. & C.
 Cuba B. & C. Fung. Cub. 654.
 C. Wright (638, 933)

FARLOW HERBARIUM, HARVARD UNIVERSITY
 see Galella spongiosa (B. & C.) in Gen. Hb.
 for slides.

Rhizina spongiosa, B. & C.
 ad frutices.
 Jan:
 Cuba.
 C. Wright (638.)

HERB. W. G. FARLOW.

Rhizina spongiosa B. & C.
 woods. Monte Verde Cuba
 coll. C. Wright No 933

Rhizina spongiosa Berk. & Curt.
 = Galella spongiosa (Berk. & Curt.)
 comb. nov. in sched.

Very similar to *G. thwaitesii* as described by Le Gal except hairs and spores larger. The spores are (52.8) 56-66.2 (72) X 16-20.8 μ m.

Nov. 10, 1972

Donald H. Pfister

Notes by J. H. Ginns, Jr. 17-4, 1968

Rhizina spongiosa

SPORES hyaline, smooth, Meltzer's $\frac{60-65}{20-17.5}$ μ minus $\frac{0}{0}$

CYSTIDIA - - - μ incrustated, clavate

HYPHAE - - - mitic, hyaline, nodose, incrustated

_____ wall, _____ μ diam.

Plate 2. - *Galella spongiosa*. Lectotype of *Rhizina spongiosa* housed in FH Herbarium.
 Scale bar = 1 cm (only for the dried samples). Photos: M. Carbone.

Revision of the lectotype specimen (FH 00290395)

The collection is in good condition and consists of two very well-preserved fruitbodies. They are discoid, up to 4.5 cm in diameter, with a brownish hymenium and a very hairy dark brown external surface.

Microscopic features

Asci mostly collapsed but based on the few seen, on average $600 \times 20 \mu\text{m}$, cylindrical, operculate, inamyloid, eight-spored, with a tapered, flexuous, aporhynchous base. **Paraphyses** not exceeding the asci, $(1.5\text{--}) 2\text{--}3 \mu\text{m}$ wide, cylindrical, septate, sometimes anastomosing, branched below, with apex simple to slightly undulated. **Hymenial hairs** rare and very difficult to find but based on the two seen, cylindrical, as long as the paraphyses, ca. $4 \mu\text{m}$ wide, with a simple apex, and a single septum at the very base. **Ascospores** ellipsoid-subfusoid, $(52\text{--}) 55\text{--}66 \times (14\text{--}) 16\text{--}18.5\text{--}(21) \mu\text{m}$, $Q = (2.8\text{--}) 3\text{--}3.5\text{--}(4)$, walls $1.2\text{--}1.8 \mu\text{m}$ thick, hyaline, warted. Warts rounded to irregular in shape, very shallow, up to $3 \mu\text{m}$ wide, isolated to frequently connected and more frequent on one side of the ascospore; on the other side they become very small and isolated. **Subhymenium** composed of a dense *textura intricata* of cylindrical, frequently septate hyphae. **Medullary excipulum** very gelatinous, of *textura intricata* with cylindrical, septate, hyaline, thin-walled hyphae, $2\text{--}3 \mu\text{m}$ wide; an encrusting subhyaline, extracellular pigment is present in places on the external surface of the hyphae and composed by crystals up to $6 \mu\text{m}$ wide. **Ectal excipulum** very thin, ca. $20 \mu\text{m}$ thick, of *textura subglobulosa* to *angularis* made up of elements up to $10 \mu\text{m}$ wide, dark brown due to the colored thick walls. **External hairs** cylindrical, septate, smooth, up to $7 \mu\text{m}$ wide, up to 1mm long (or more), straight to slightly wavy, with blunt tips. They are dark

brown due to an epimembraneous pigmentation, with wall thickened up to $1 \mu\text{m}$.

Discussion

Rhizina spongiosa shares many macro- and microscopic features with *Galiella rufa* and, at the same time, differs significantly from the main features of the other genera in the family *Sarcosomataceae* Kobayasi (CARBONE *et al.*, 2015). Thus, at least from a morphological point of view, it seems that it is correctly placed in the genus *Galiella*. For this reason we believe that the name *Galiella spongiosa* is definitely the best to use. This position must be evaluated with more precise and molecular techniques.

As reported in the introduction, PADEN'S (1983) spores range of *G. spongiosa* $36\text{--}65 \times 14\text{--}21 \mu\text{m}$ seems to be based on the "holotype" and four Brazilian collections. The range seems very broad for any member of the *Sarcosomataceae*. We assume that the Brazilian collections could represent a different species. In addition, we are not sure if Paden in fact examined the type (at least this collection in FH) because there are no evidences of that in the collection here studied (on the contrary there were Paden annotations in *Urnula mexicana* holotype, see CARBONE *et al.*, 2013).

As Prof. Pfister wrote in his herbarium note (see Plate 2, bottom left figure) the most similar species is definitely *Galiella thwaitesii*. The encrusted hyphae of the medullary excipulum are in fact found in the type of this latter species but *Galiella spongiosa* has definitely larger ascospores with a slightly different type of ornamentation, ectal excipulum and there are also some small differences in the external hairs (for a comparison see LE GAL, 1953, and CARBONE & AGNELLO, 2015a). For this reasons, and due to the geographical distribution, we agree that these two species must be considered independent.

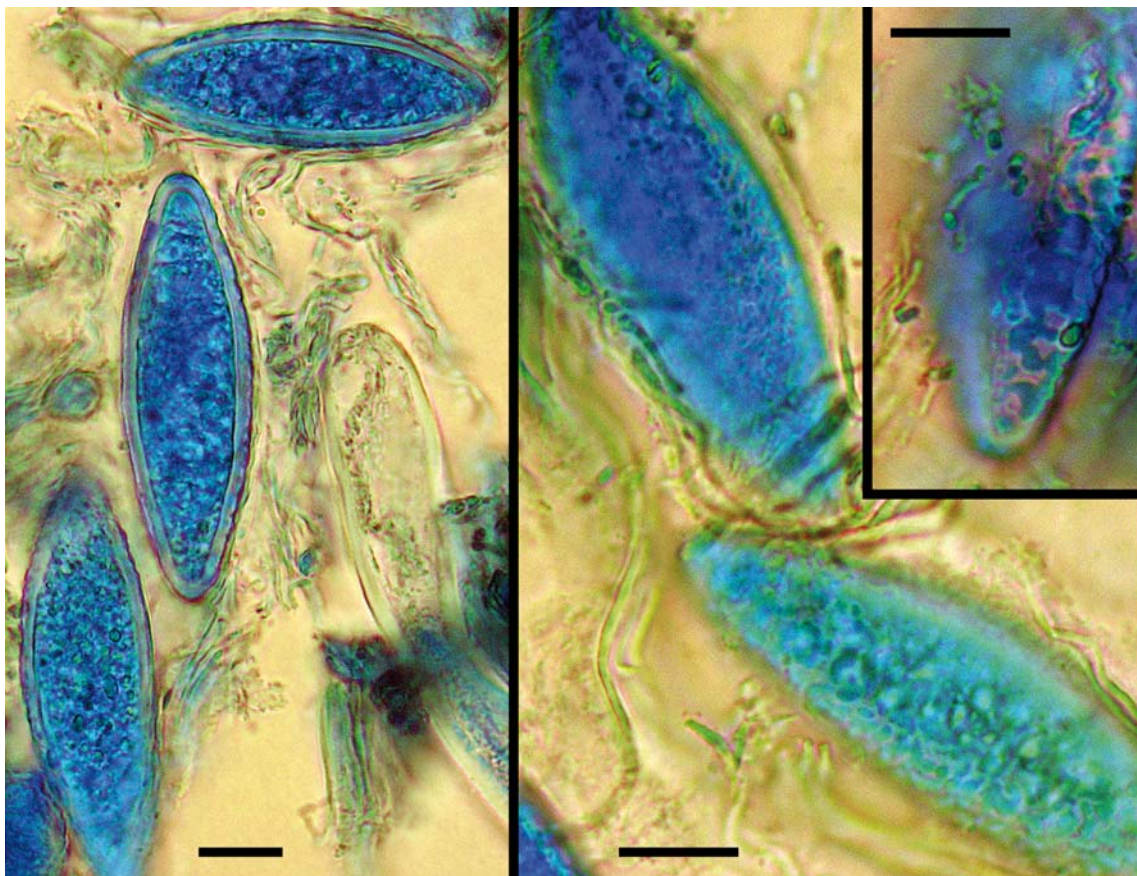


Plate 2. – *Galiella spongiosa*. Ascospores of *Rhizina spongiosa* in Cotton Blue. Scale bars = $10 \mu\text{m}$. Photos: M. Carbone.

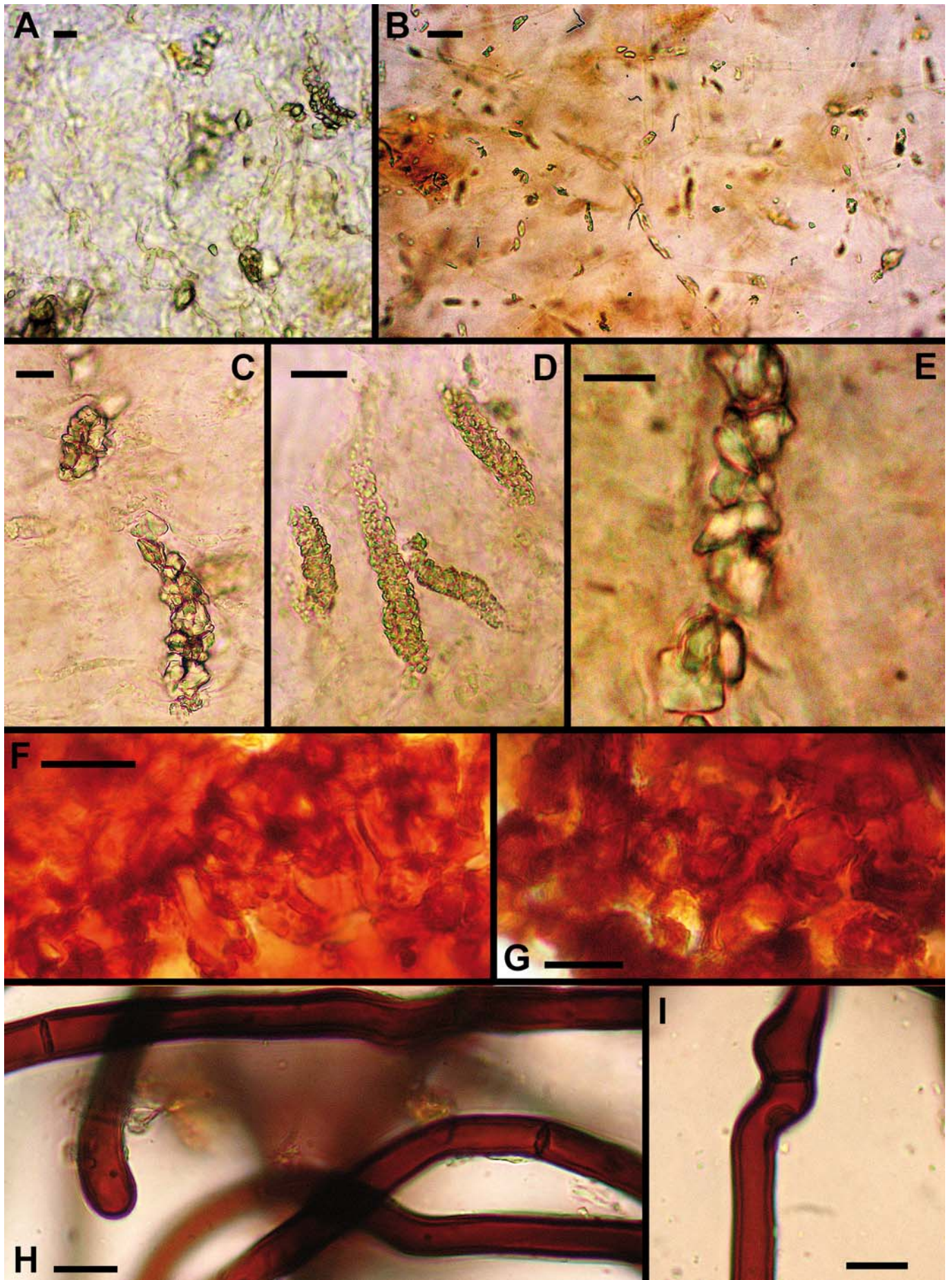


Plate 4. – *Galiella spongiosa*. Lectotype specimen of *Rhizina spongiosa*.

A-E: Medullary excipulum and encrusted hyphae; F-G: Ectal excipulum; H-I: External hairs. Scale bars = 10 μ m. Photos: M. Carbone.

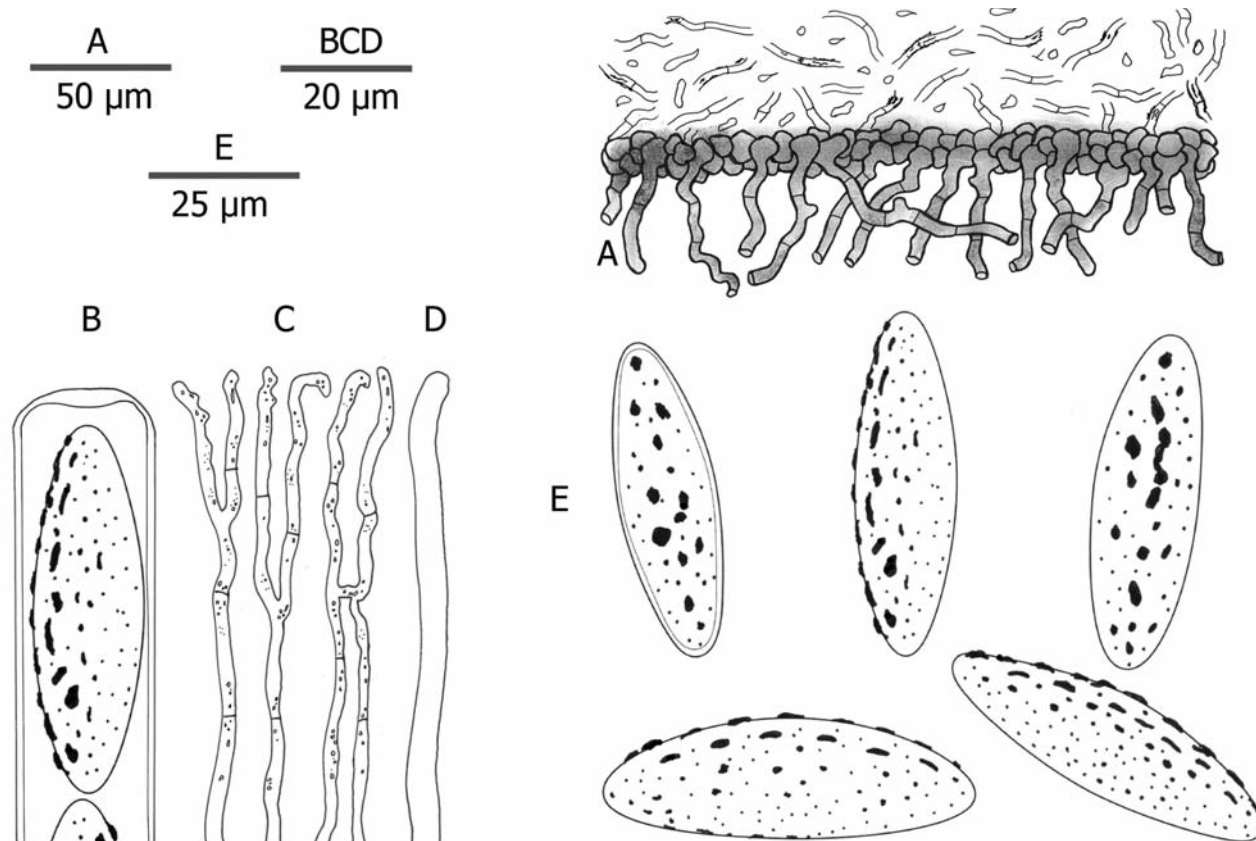


Plate 5 – *Galiella spongiosa*. Microscopic characters. Drawing: Carlo Agnello
A. Excipulum and external hairs; B. Top of ascus; C. Top of paraphyses; D. Top of a hymenial hair. E. Ascospores in CB.

"Sarcosoma" orientale, in the wide sense of CARBONE & AGNELLO (2015b), is another very similar species but it clearly differs in the ascospores morphology, the absence of encrusted hyphae in the medullary excipulum, paler and less crowded external hairs, and finally by a different geographical distribution.

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