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ON A FALSE HYDROPUS, FLAMMULINA MEDITERRANEA, COMB. NOV.

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Re-examination of two collections of *Hydropus mediterraneus* Pacioni & Lalli revealed a number of characters that necessitate the transfer of this species to the genus *Flammulina*.

After the publication of a detailed, illustrated description by one of us (Robich, 1986) of *Hydropus mediterraneus* Pacioni & Lalli, the other (C. B.) suggested a re-examination of material of this species because of its for a species of *Hydropus* rather unusual habit and a certain resemblance to species of the genus *Flammulina*, particularly to the frequently terrestrial *F. ononidis* Arnolds (Arnolds, 1977: 33).

Our re-evaluation of its characters, in particular those of the trama of the stipe and the pileipellis, indeed led us to the conclusion that *H. mediterraneus* has to be transferred to *Flammulina*.

Flammulina mediterranea (Pacioni & Lalli) Bas & Robich, *comb. nov.* — Figs. 1–6

Hydropus mediterraneus Pacioni & Lalli in Micol. ital. 14: 5. 1985 (basionym).

Descriptions & illustrations. — Pacioni & Lalli in Atti Centro Studi Fl. mediterr. (Borgo di Taro) 6: 209–212 ('1984'), 1986; Robich in Boll. Gruppo micol. Bresadola 29: 199, col. photogr. 1986.

Pileus 15–32 mm in diam., first convex, then plano-convex with depressed to weakly infundibuliform centre, sometimes with small pointed umbo, pale to dark brown (orange-brown, about Munsell 5 YR 6/8 and darker, in published photograph), usually somewhat darker at centre and slightly paler at margin, glabrous and viscid, nearly always covered with strongly adhering grains of sand. Lamellae distant (L = 24–28, l = 0–1), fairly broad, subdecurrent to decurrent, thickish, from white to ivory white or greyish-whitish, with entire, concolorous edge. Stipe 40–80(–100) × 2–4 mm, cylindrical, fistulose, elastic; epigeal part only c. 30 mm high, pale brown and somewhat pruinose at apex to distinctly darker brown and subviscid just above the soil; hypogeal part slightly thickened, covered with a fine ochraceous brown down. Context whitish to greyish-brownish. Smell and taste indistinct.

Spores [20/2/2] 11.5–14.8 × 8.4–9.8 μm, Q = 1.35–1.7, $\bar{Q}$ = 1.42–1.47, ellipsoid to subamygdaliform, with small abrupt apiculus, with slightly to distinctly thickened

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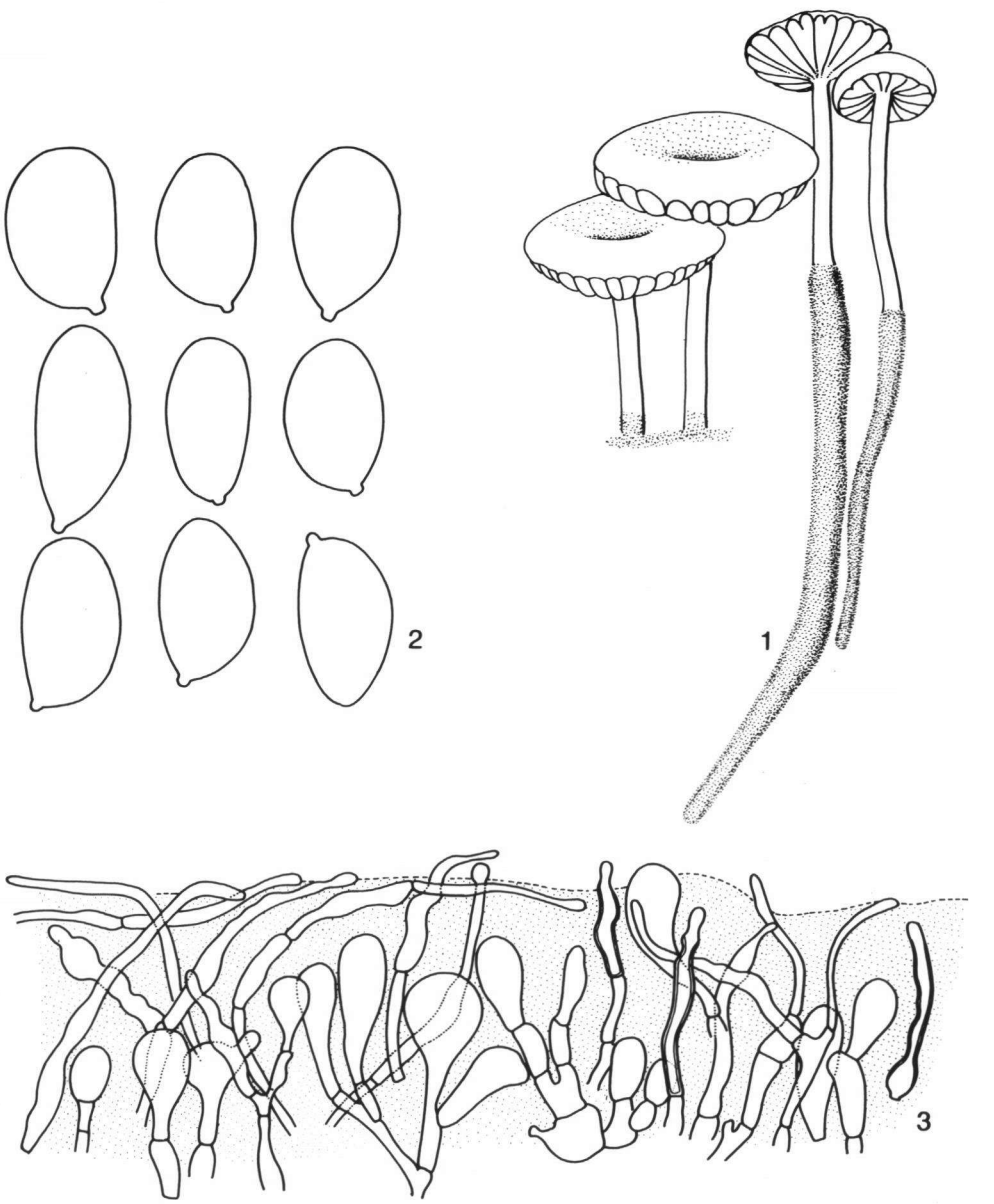


Figs. 1–3. *Flammulina mediterranea*. — 1. Basidiocarps × 1. — 2. Spores × 1500. — 3. Pileipellis × 500.

wall (up to c. 1.0 μm), colourless to very pale yellowish in NH_4OH 10% and KOH 5%, smooth, inamyloid, not to very weakly cyanophilous, slightly metachromatic in Chresyl blue (walls pale purplish lilacinous), congophilous; mature spores binucleate[1]. Basidia 52–80 × 9.8–14.5 μm, 4-spored, slenderly clavate, when young with distinct clamp but later only with kinked basal septum; sterigmata rather broadly conical. Pleurocystidia abundant, (55–)70–145 × 17–27(–32) μm, with 5–10 μm wide neck and usually obtuse, more rarely subcapitate apex, mostly subcylindrical-subfusiform or slenderly to ventricose lageniform, but sometimes utriform or merely ventricose, often with neck tapering upwards, with slightly to strongly thickened wall (up to 3.5 μm) but usually thin-walled at apex, colourless to slightly yellowish in NH_4OH or KOH, sometimes with granular debris on apex, inamyloid, congophilous, metachromatic in Chresyl blue. Cheilocystidia abundant, rendering lamella edge sterile, 40–105 × 13–30 μm, rather variably shaped, ventricose-fusiform or -lageniform, lageniform, clavate or even spheropedunculate, colourless, thin- to slightly thick-walled. Hymenophoral trama regular to subregular, made up of 3–6 μm wide, thin-walled, colourless hyphae; subhymenium ramose, c. 15 μm thick; elements of trama and subhymenium somewhat distant and embedded in gelatinous substance (not very conspicuous). Pileipellis strongly gelatinized, consisting of erect, clavate to almost spheropedunculate cells (14–31 × 5.5–15.5 μm) and more or less erect, hair-like, sometimes septate, very slenderly lageniform to narrowly cylindrical pileocystidia (30–65 × 2.5–7 μm) with their upper parts (but sometimes also complete pileocystidia) bent and repent along surface; pileipellis about 80 μm thick with membranal (also epimembranal?) pigment concentrated in lower half. Stipitipellis with scattered, solitary or clustered, thin-walled, colourless, slenderly lageniform caulocystidia 45–105 × 4–15 μm. Stipititrama regular, monomitic (certainly not sarcodimitic, as broad hyphae are cylindrical and regularly septate), made up of longitudinal hyphae from c. 3 μm wide near surface to c. 12 μm wide at centre, with slightly thickened wall; in longitudinal sections with several longitudinal bands of very abundant small quadrangular crystals. Clamp-connections seen in trama of stipe and at base of young basidia.

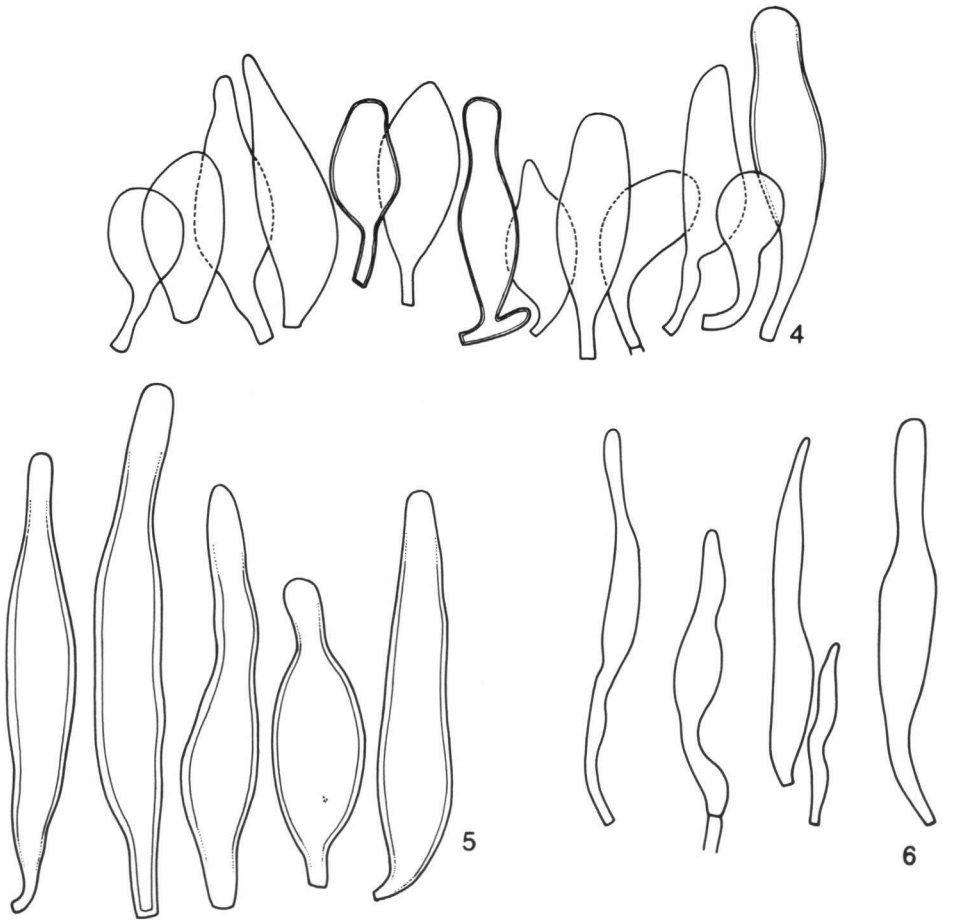
Habitat & distribution. — Terrestrial among grasses (*Ammophila litoralis*) on coastal dunes. Recorded from the east and the west coast of the southern half of Italy, Sardinia, and Tunesia.

Collections examined. — ITALY, prov. Rovigo, Porto Caleri, Dec. 1985, *G. Robich* (L; herb. Robich). — TUNESIA, Tabarka, 12 Dec. 1982, *G. Pacioni* (L; herb. Pacioni).

Note. — The macroscopic description above is a translation of the Italian one published by the second author (Robich, 1986: 199) with some additions; the microscopic description is based largely on the observations by the first author on the collections cited.

The transfer of *Hydropus mediterraneus* to *Flammulina* is necessary because we found that (i) the stipititrama consists merely of longitudinal, septate hyphae ranging in width from 3 to 12 μm and is certainly not sarcodomitic as in *Hydropus* (Singer, 1982: 8; Redhead, 1987: 1557), and that (ii) the pileipellis is an ixohymeniderm with dermatocystidia, a type of pileipellis fitting in well with *Flammulina* but not occurring in *Hydropus* (Singer, 1982: 13).

[1] Spores taken from the lamellae of dried material and coloured in aceto-carmine after treatment in Clémençon's mordant often showed irregular dark bodies, but in about 25% two distinct nuclei were present. Apparently in many spores nuclear division was in progress.



Figs. 4–6. *Flammulina mediterranea*. — 4. Cheilocystidia. — 5. Pleurocystidia. — 6. Caulocystidia. (All Figs. × 500.)

In fact, keying out the present species with Singer's key to the tribus of the Tricholomataceae (Singer, 1986: 209) one arrives immediately at tribus Pseudohiatuleae and in the key to the genera of that tribus (because of the viscid pileipellis) at *Flammulina*.

It should be noted, however, that Singer (l.c.: 434) describes the hypoderm of *Flammulina* as gelatinized but does not mention the fact that the pileipellis itself is strongly gelatinized and should be called an ixotrichoderm or an ixohymeniderm according to the shape of its main elements. Moreover it should be mentioned that in his key to the genera of tribus Pseudohiatuleae the hymenophoral trama of *Flammulina* is called

weakly 'bilateral'[2] and in his description of that genus weakly and inconsistently 'bilateral'. In the experience of the first author the hymenophoral trama of *Flammulina* is regular to subregular in sporulating basidiocarps and diverging only in very young basidiocarps where this is probably a remnant of the primordial divergency occurring in many agarics.

Among the European species of *Flammulina, F. mediterranea* is somewhat aberrant on account of the following characters:

(i) Its pileipellis is not an ixotrichoderm as in *F. velutipes, F. ononidis*, and *F. fennae*, but an ixohymeniderm because its main elements are not elongate or dendroid cells as in these three species (Bas, 1983: figs. 4 and 12; Arnolds, 1977: fig. 14), but clavate to spheropedunculate cells. However, *F. callistosporioides* (Sing.) Sing. from South America also has an ixohymeniderm (Singer, 1964: fig. 6).

(ii) The stipe of *F. mediterranea* is not densely pubescent or velutinous as in the other European species, but pruinose only at the apex and glabrescent. But again, the same situation is found in *F. callistosporioides* (Singer, 1964: 183).

(iii) The basidiocarp of *F. mediterranea* tends to become omphalioid, but that does not seem to be of great importance as in *F. velutipes* as well as in *F. fennae* flattened to depressed mature pilei are not uncommon.

(iv) *Flammulina mediterranea* seems to grow on subterranean parts of the grass *Ammophila*, whereas other species of the genus grow always on wood or woody plants. A long root-like base of the stipe can be found also in basidiocarps of the other three European species when they grow on a subterranean substrate.

(v) The spores of *F. mediterranea* are larger (especially wider) than in any other species of *Flammulina.*

On account of the large spores and basidia and the presence of a pseudorhiza one might be tempted to transfer *Hydropus mediterraneus* to the genus *Xerula* (sensu Dörfelt = including *Xerula radicata*) instead of to *Flammulina*. In *Xerula*, however, the context of the stipe is sarcodimitic (except in the very tiny *X. kuehneri*, see Boekhout & Bas, 1986: 51), there is intracellular pigment in the cells of the pileipellis, and the pileipellis is a denser, more regular hymeniderm.

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[2] In accordance with Reijnders (1963: 263) we prefer here the term 'divergent' and wish to preserve the term 'bilateral' for the secondary divergency of the hymenophoral trama in *Amanita.*

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