

REDESCRIPTION OF RHODOPHYLLUS SCABIOSUS (FR.) QUÉL.

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(With 10 Text-figures)

On September 21st 1975 Mr. J. Geesink, Den Helder, found a few carpophores of a species of *Rhodophyllus* in the Wieringermeer and mailed them to the Rijksherbarium at Leiden for identification. Although the carpophores arrived in fragments Dr. C. Bas was able to identify them as *Rhodophyllus jubatus* (Fr.) Quél. He noticed, however, that the spore sizes are smaller ($6.6-7.4 \times 5.6-5.9 \mu\text{m}$) than those mentioned for this species in the literature.

In January 1976 we showed Dr. Bas the dried and intact material of five well-developed specimens, obviously of the same species, that we had found on September 25th 1975 under oak shrubs at Overveen. Although the spore sizes of these specimens are also smaller ($7.2-8.1 \times 5.4-6.3 \mu\text{m}$) than those given in the literature for *R. jubatus* and although the lecythiform cheilocystidia differ from those depicted by Kühner & Romagnesi (1953: 198, fig. 277) for the 'Jubati typiques', we also had identified the specimens as *R. jubatus*.

While comparing the dried material of the two collections mentioned above with the dried material of a collection found by Dr. Bas on October 20th 1963 in the dunes of Oostvoorne and marked *R. jubatus* in the Rijksherbarium, we noticed further that the caps of the above two collections are coarser fibrillous than the caps of the Oostvoorne collection, the white underlayer showing distinctly between the bundles of fibres. We then decided to carry out a close examination of all the available material marked *R. jubatus* present in both the Rijksherbarium (3 collections) and our own herbarium (7 collections, among which three from Scotland and one from Wales). All 10 collections are accompanied by elaborate descriptions of the macroscopical characters.

As it turned out, the specimens of the four most recent collections (Voorschoten, 12 Sept. 1974; Santpoort, 20 Sept. 1974; Wieringermeer, 21 Sept. 1975; Overveen, 25 Sept. 1975) differ in four respects from those of the other six collections, which sufficiently answer the identification of *R. jubatus*.

The four recent collections have the following distinctive characters:

1. The network of dark brown fibres and bundles of fibres on the caps is distinctly coarser, conspicuously showing the white underlayer; this is mentioned especially in the descriptions of the fresh material of three of the four collections and it is still visible on the dry material of the fourth. The fibrous network, moreover, is more squamulose, especially at the centre.

2. The stems distinctly broaden towards their base, either very gradually or only at

the, consequently subbulbous, base. (In the other six collections the stems are cylindrical.)

3. The spores are smaller and more isodiametric (Fig. 4; mean sizes $7.4-7.6 \times 6.1-6.2 \mu\text{m}$) than those of the other six collections (Fig. 5; mean sizes $8.6-9.1 \times 6.3-6.7 \mu\text{m}$)¹. It should be mentioned that with regard to the length of the spores the latter figures are somewhat lower than those given in the literature for *R. jubatus* by J. E. Lange (1936: 93), Favre (1948: 47), and Moser (1967: 154), viz. $9-10.5 \times 5-6.5 \mu\text{m}$; whereas Ricken (1913: 283), Bresadola (1929: pl. 551¹) and Kühner & Romagnesi (1953: 199) give still somewhat larger spores (up to $9-12 \times 6-7 \mu\text{m}$).

4. The cheilocystidia are tibiform to lecythiform and the capitula often somewhat elongate or even rhomboid, frequently carrying a very short ($1/2-1 \mu\text{m}$) to long (up to $7.5 \mu\text{m}$) appendix. Those in the other six collections consist of both clavate and lecythiform cells often with up to $17 \mu\text{m}$ large globose capitula (Figs. 9, 10).

These four very distinct differences between the carpophores of the four recent collections and those of the six earlier ones led us to conclude that the former belong to a species different from *R. jubatus* (Fr.) Quél. A search of the literature disclosed that the four collections represent *R. scabiosus* (Fr.) Quél., a species that has more or less disappeared from recent literature.

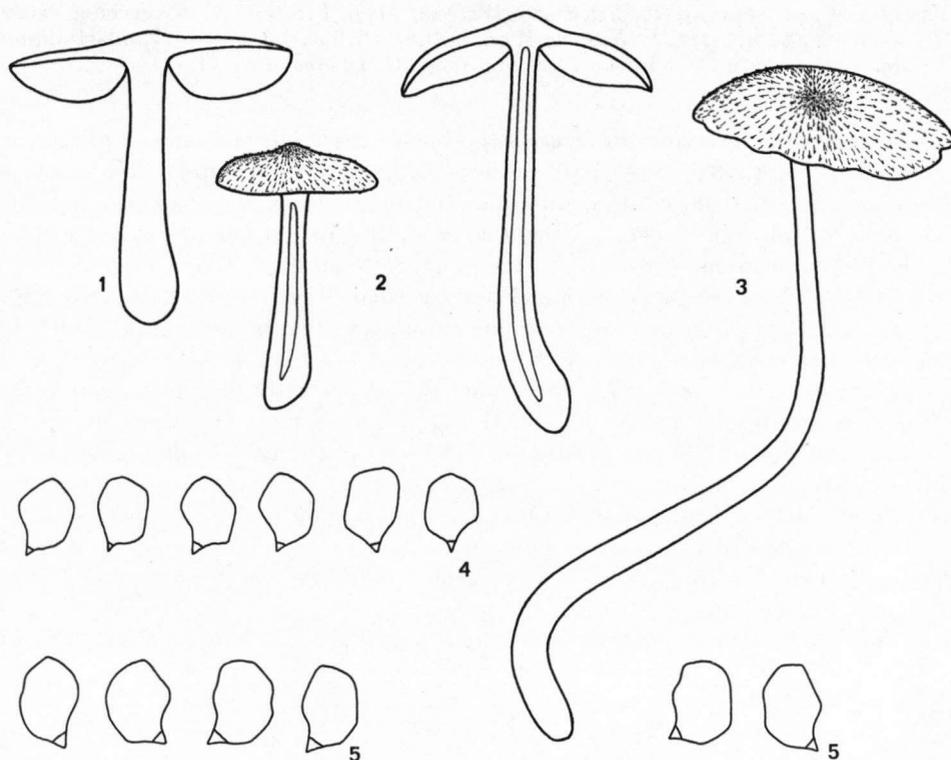
RHODOPHYLLUS SCABIOSUS (Fr.) Quél.—Figs. 1-4, 6-8

Agaricus scabiosus Fr., Spicil. Plant. neglect.: 3. 1836 (Epicr.: 145, 1838; Monogr.: 272, 1863; Hym. europ.: 193, 1874). — *Entoloma scabiosum* (Fr.) Quél. in C. r. Ass. franç. Av. Sci. (Grenoble, 1885) 14(2): 445. 1886. — *Rhodophyllum scabiosus* (Fr.) Quél., Ench. Fung.: 58. 1886.

Cap 22-65 mm in diam., in early stages plano-conical, soon convex to plano-convex, with very distinct but sometimes only small umbo, entirely coarsely fibrillose-squamulose, with blackish brown to very dark brown (Munsell 10 YR 2/2, 3/2; 7.5 YR 4/2) bundles of fibres and appressed to erect squamules strongly contrasting with the whitish flesh showing in between, tomentose-scaly at umbo, neither striate nor hygrophanous. Veil absent. Gills rather crowded, ventricose, emarginate to very narrowly adnate, 4-6 mm broad, broadest part close to stem, at basal half (as well as interlamellar surface of cap) distinctly veined, in early stages pinkish grey (M. 7.5 YR 6/2), at maturity brownish pink (M. 5 YR 5/3; 2.5 YR 4/4, 5/4); edge white to sometimes concolorous. Trama of 'washed' gills under binocular lens pale brown (M. 10 YR 7/4), paler (M. 10 YR 7/3) towards edge. Stem 30-65(-100) \times 2.5-6 mm, either gradually thickening towards base or subbulbous (base 3-10 mm wide), sometimes flattened because of longitudinal groove on either side, brownish but paler than cap (M. 7.5 YR 4/2), whitish at base, longitudinally fibrillose-striate, hollow, not pruinose at apex. Flesh of cap in centre 1-3.5 mm thick, whitish to very pale greyish brown; flesh of stem whitish. Smell and taste indistinct, not farinaceous.

Spores angular, almost isodiametric, $7.2-8.1(-8.6) \times 5.4-6.8(-7.2) \mu\text{m}$ (mean values $7.4-7.6 \times 6.1-6.2 \mu\text{m}$), with large hilar appendix, practically colourless under microscope. Basidia 30-56 \times 9-10 μm , 4-spored, clampless. Pleurocystidia absent. Cheilocystidia fairly scarce to locally numerous, intermixed with basidia, tibiform to lecythiform, $27.5-55(-67.5) \times 2.5-17.5 \mu\text{m}$, with $2.5-7.5(-10) \mu\text{m}$ wide capitulum

¹ Of each collection 20 spores have been measured.



Figs. 1-4. *Rhodophyllus scabiosus*. — 1-3. Habit sketches ($\times 1$). — 1. 12 Sept. 1974. — 2. 20 Sept. 1974. — 3. 25 Sept. 1975. — 4. Spores ($\times 1212$), 25 Sept. 1975.
 Fig. 5. *Rhodophyllus jubatus*, 20 Oct. 1963. — Spores ($\times 1212$).

either globose with or without a minute apical protuberance ($1/2-1 \mu\text{m}$), or globose to rhomboid with small to long ($1-7.5 \mu\text{m}$) apical appendix, intermixed with a very small number of sublageniform, subfusoid or subcylindric, small and hardly noticeable non-capitate cheilocystidia often with thin and pointed neck and very acute apex ($30-45 \times 5-10 \mu\text{m}$, at apex $-2 \mu\text{m}$); all cheilocystidia colourless and thin-walled, but some capitula slightly thick-walled and rarely covered with a thin film of mucus. Hymenophoral trama regular, composed of colourless, $3.2-14.4 \mu\text{m}$ wide hyphae and scattered, broad, ellipsoid cells, $11-24 \times 8-16 \mu\text{m}$, without incrustations. Cap cuticle consisting of long hyphae usually constricted at septa, made up of cells measuring $35-150(-300) \times 10-25 \mu\text{m}$, usually colourless but terminal 1-3 ellipsoid to obovoid cells very often brown owing to vacular, diffuse or coagulated pigment. Clamps absent.

HABITAT.—On rich (sandy) humus in deciduous woods (*Quercus*, *Fraxinus* or mixed) especially at inland side of dunes. Rare.

COLLECTIONS EXAMINED.—NETHERLANDS, prov. Noord-Holland: Wieringermeer, Robbenoord, 21 Sept. 1975, *J. Geesink* (L); Santpoort, estate 'Duin en

Kruidberg', 20 Sept. 1974, *E. Kits van Waveren* (herb. E.K.v.W.); Overveen, estate 'Elswout', 25 Sept. 1975, *E. Kits van Waveren* (herb. E.K.v.W.); prov. Zuid-Holland: Voorschoten, estate 'ter Horst', 12 Sept. 1974, *M. E. Noordeloos* (L).

Fries first described *Agaricus* (*Entoloma*) *jubatus* (1821: 196) and later *A.* (*Entoloma*) *scabiosus* (1836: 3; 1838: 145), both species belonging to the group *Leptonidei* ('pileus absolute siccus, sed flocculosus, subsquamosus nec hygrophanus') of the subgenus *Entoloma*. He obviously regarded them as two different but closely related species, as in his publications (1838: 145; 1863: 272; 1874: 193) *A. scabiosus* is always followed immediately by *A. jubatus*. Fries regarded *A. jubatus* as quite a common species, but *A. scabiosus* he found only once (be it excellently developed) so that he regretted not knowing about its variability.

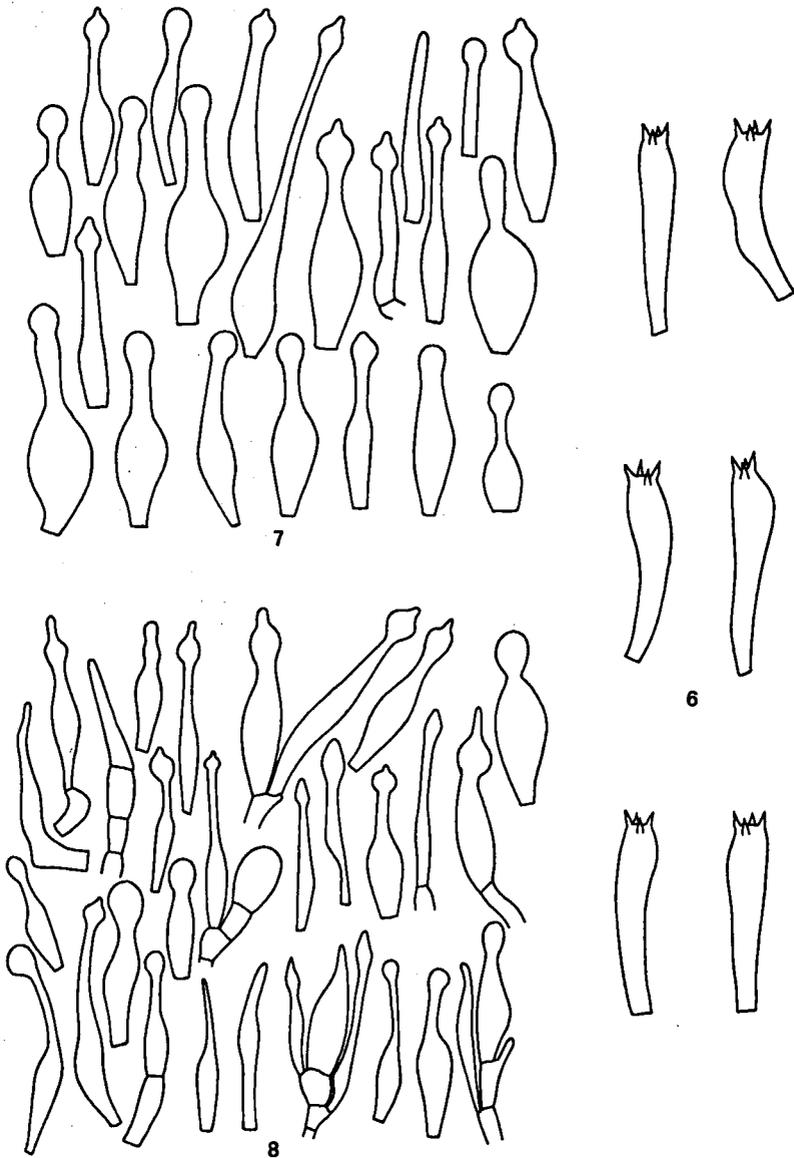
Since Fries, *Rhodophyllus* (*Entoloma*) *scabiosus* has virtually disappeared from the literature, possibly because of its rarity. The species is mentioned only by Quélet (1886a: 445, 1886b: 58, and 1888: 183), Ricken (1913: 284) and Bresadola (1929: pl. 550). Kühner & Romagnesi (1953: 200, note 11), giving a short description obviously based on Fries, state that they have never come across this species.

Adopting the rather elaborate descriptions of both *A. scabiosus* and *A. jubatus* in Fries' Monografia (1863: 272) as a basis for comparison, the two species differ as follows:

1. Fries describes *A. scabiosus* as a much larger species than *A. jubatus* but his figures are not very convincing: for *A. scabiosus* stem $75 \times 4.5-7$ mm and cap 50 mm in diam., for *A. jubatus* stem $50-75 \times 4.5-7$ mm and cap 25-50 mm 'et ultra latus.' In our four collections of *R. scabiosus* the sizes for the cap were 22-65 mm, those for the stem $30-100 \times 2.5-6$ mm, whereas in our six collections of *R. jubatus* these figures were 14-40 mm for the cap and $30-80 \times 3.5$ mm for the stem.

2. The shape of the cap is the same for both species but the structure of their surfaces is distinctly different. For *A. scabiosus* Fries describes the cap as having its entire surface rough from floccose acute, erect, crowded papillae. In *Epicrisis* (1838: 145) and *Hym. europ.* (1874: 193) the papillae are called 'squamis papillosis'. For *A. jubatus* the surface is described as floccose-squamose and/or fibrillose. With this in mind it is significant that we described the cap of our 1974 collection as 'densely minutely scaly by black-brown erect scales, entire surface covered with dense network of black-brown fibres, bundling into small scales on a white background' and the cap of our 1975 collection as 'adpressed minutely scaly by very dark brown minutely warty fibres on a white underlayer'. On the other hand we described the surface of the caps of our six collections of *R. jubatus* as finely woolly and only the umbo in four out of the six collections as minutely tomentose-scaly.

3. In Monografia Fries describes the colour of the cap of *A. scabiosus* as 'murino-fuligineus', in *Hym. europ.* as 'fuligineus', whereas in all his descriptions of *A. jubatus* the cap is simply called 'murino' (mouse-grey). In three out of our four collections of *R. scabiosus* the colour of the fresh cap is described as very dark greyish brown or even black-brown (particularly at the umbo), whereas in the six collections



Figs. 6-8. *Rhodophyllus scabiosus*. — 6. Basidia ($\times 575$), 25 Sept. 1975. — 7, 8. Cheilocystidia ($\times 575$). — 7. 25 Sept. 1975. — 8. 20 Sept. 1974.

of *R. jubatus* the colour was merely called greyish brown or dark greyish brown. On examination of the dried material the difference was even more pronounced. The colour of the finely radially fibrillose top layer of the cap in *R. jubatus* is bronze-brown, whereas the colour of the coarser fibrillose network in *R. scabiosus* is distinctly darker.

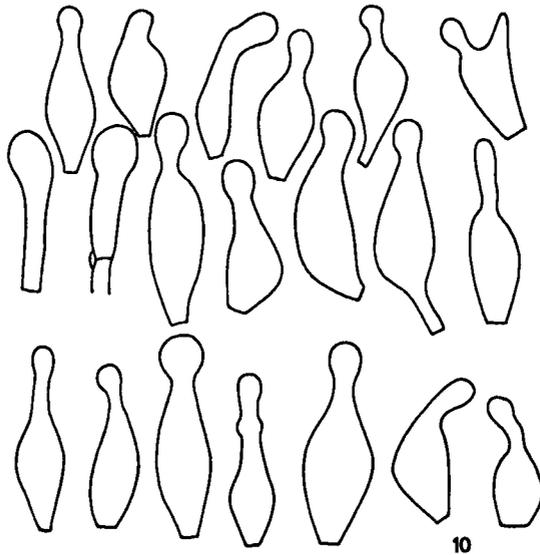
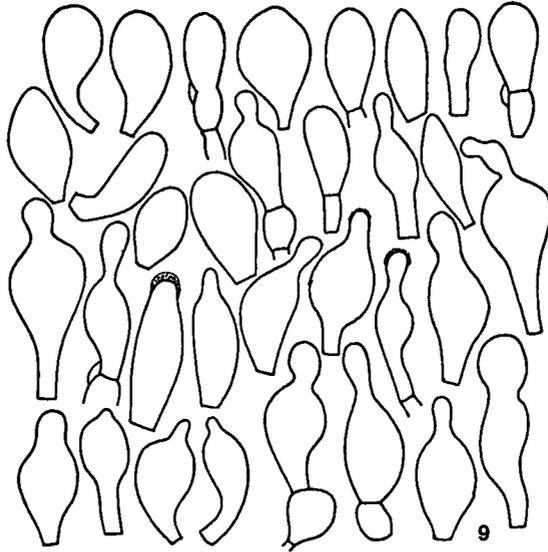
4. Fries describes the colour of the gills of *A. scabiosus* as whitish, then grey flesh-coloured, but those of *A. jubatus* as at first dark smoke-coloured, not greyish brown, later dark smoke-coloured, becoming purplish. This tallies closely with our observations on both species. The colour of the gills in our four collections of *R. scabiosus* varied from pale pinkish grey (M. 7.5 YR 6/2) to reddish brown (M. 2.5 YR 4/4, 5/4; 5 YR 5/3), whereas in all six collections of *R. jubatus* the colour was described as fairly to strikingly greyish brown with hardly a trace of pink (only for the collection of 10 Sept. 1963 were the Munsell charts used in describing the colour of the gills: 10 YR 4/3, 4/2 = dark brown).

5. With Fries the characters of the stem do not differ significantly for the two species (hollow, surface fibrose and brown). In Hym. europ. the stem of *A. scabiosus*, however, is called 'subaequali', which must indicate that it becomes thicker towards its base, as in none of the species of this group do the stems become thicker towards the apex. This is a most interesting point as in all four of our collections of *R. scabiosus* the stems either gradually became thicker towards their base or were even subbulbous. The stems of the specimens of our six collections of *R. jubatus* were always cylindrical.

6. For *A. jubatus* Fries never mentioned fragility of the carpophores, but for *A. scabiosus* he stated that the whole carpophore is extremely fragile ('totus fungus admodum fragilis', the latter word even in italics). This again tallies very well with our four collections of *R. scabiosus*. The specimens mailed by Mr. Geesink to the Rijksherbarium, although carefully packed, arrived in fragments, while most of the specimens from our rich collection of Sept. 25th 1975 had been partly or even considerably damaged in the field.

Quélet (1886a: 445; 1886b: 58, and 1888: 183) gives descriptions of what he first calls *Entoloma*, later *Rhodophyllus scabiosus*, which tally sufficiently with those given by Fries. However, he adds spore sizes (10–12 μm) which are larger than those we found in our material. Ricken (1913: 284) gives an excellent description of *Entoloma scabiosus* which fully corresponds with the description given above, adding as a new feature that the spores can be more or less isodiametric: 'eiförmig-viereckig, 8–10 \times 6–8 μ auch rundlich 7–8 μ (Herpell)'.

Bresadola (1929) gives descriptions and coloured plates of both *Entoloma scabiosum* (pl. 550) and *E. jubatum* (pl. 551). The fruit-bodies of his *E. scabiosum* are described and depicted with a strongly sulcate-striate, cylindrical to subcylindrical stem and its spores are said to measure 10–13 \times 6–8 μm , the plate indeed showing strongly elongate spores. On account of these three characters, but especially the size and shape of the spores, we believe that *E. scabiosum* sensu Bresadola does not represent the species we described above, although the scaliness, the colour of the cap and the



Figs. 9, 10. *Rhodophyllus jubatus*. — Cheilocystidia ($\times 575$). — 9. 20 Oct. 1963. — 10. 22 Sept. 1967.

colour of the gills tally well with Fries' concept of *Agaricus scabiosus* and with our four collections of this species. Bresadola himself states that *Entoloma scabiosum* as he described and depicted it is close and similar to *E. jubatum* but distinguishable by its grooved stem and much more angular spores, and that it should be regarded as a variety of *E. jubatum*.

In literature there is, however, some doubt about the identity of *E. jubatum* sensu Bresadola (e.g. Favre, 1948: 49), probably on account of the rather strongly squamulose cap. Because of the relatively pale colour of the cap ('griseus vel griseo-murinus') and the fairly large spores (9-11 × 6-7 μm), however, it is certainly not conspecific with *Rhodophyllus scabiosus* as described above.

We have not studied material of Möller's *Entoloma fusco-tomentosum* from the Faerøes, a species certainly closely related to both *Rhodophyllus jubatus* and *R. scabiosus*. From Möller's description (1945: 251) and particularly his plate 3c we gather that the surface of the cap is chiefly tomentose, not outstandingly scaly, and that no white underlayer is showing between bundles of fibres. On account of these characters of the cuticle and the habitat (in grass on slopes) we suppose that *R. fusco-tomentosum* is not conspecific with *R. scabiosus*, although it has in common with this species the size and shape of the spores (8-9 × 6-7 μm), the clavate base of the stem, and the very dark brown cap. If, however, Möller's species would turn out to be conspecific with *R. scabiosus* its name would fall into the synonymy of the latter species.

In conclusion we believe we have rediscovered Fries' *Agaricus scabiosus*, renamed *Rhodophyllus scabiosus* by Quélet (1886: 85). As a new characteristic of this species Ricken (1913: 284) added its small and almost isodiametric spores, and we were able to add as another new characteristic the peculiar shape of the tibiform and lecythiform cheilocystidia, of which the globose, ellipsoid or rhomboid capitula often carry a subcylindric appendix at the top.

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