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NOTES ON THE GENUS PSATHYRELLA—VI

Four controversial species of Psathyrella: P. fibrillosa, P. frustulenta, P. clivensis, and P. obtusata

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(With 34 Text-figures)

Examination of four collections of *Psathyrella frustulenta* sensu A. H. Smith and four of *P. frustulenta* sensu Romagn. revealed that the former species is distinguished from the latter by its strongly developed veil and habitat (woods) and that there are considerable microscopic differences between the two (spore size, number and shape of pleurocystidia, pattern of cellular lining of gill edge). The former species is to be regarded as conspecific with *Agaricus frustulentus* Fries, the latter as conspecific with *P. clivensis* (Berk. & Br.) P. D. Orton. It is argued that the name *P. fibrillosa* was misapplied by J. E. Lange and A. H. Smith to a species for which the name *P. friesii* is introduced. Descriptions of *P. friesii*, *P. frustulenta*, *P. clivensis*, and *P. obtusata* are given.

In the autumn of 1976 we had the good fortune of finding three species of *Psathyrella*, which enabled us to clear nomenclatural problems round *P. fibrillosa* (Pers. ex Fr.) sensu J. E. Lange and sensu A. H. Smith, *P. frustulenta* (Fr.) A. H. Smith sensu A. H. Smith, *P. frustulenta* (Fr.) A. H. Smith sensu Romagn., and *P. obtusata* (Fr.) A. H. Smith. Smith himself already stated that *P. fibrillosa* does not have a clear and widely accepted concept in Europe by present-day mycologists, reason why he used the name tentatively. Close comparison of the Friesian descriptions of *Agaricus fibrillosus* with the descriptions furnished by Lange and by Smith disclosed that the epithet 'fibrillosus' is misapplied by the latter authors. A new name, *P. friesii*, is introduced for the species they describe under that name.

We were enabled to compare our own four collections of *P. frustulenta* sensu A. H. Smith with material of four collections of *P. frustulenta* sensu Romagn. which Prof. Romagnesi very kindly sent us from his own herbarium. Through the courtesy of Dr. R. Watling we received from the herbarium of the Royal Botanic Garden Edinburgh the material of the two collections of *P. clivensis* (Berk. & Br.) P. D. Orton, mentioned by Orton (*1960*: 369) in his description of that species, so that we were able to include this species in our study also.

For our methods of examining the fruit bodies, particularly the microscopic characters, the reader is referred to our previous papers (Kits van Waveren *1968*: 132; *1971a*: 249; *1972*: 24). Spore measurements are given both as a range and

as a mean value added between brackets. For the description of the colours of the macroscopic structures and the spores (mounted in water, NH_4OH 10% or KOH 5% and studied with oil immersion in a rather strongly lit field of view) we used the Munsell Soil Color Charts, edition 1971 (abbreviated in the text to M.), and the code designating its colours.

With regard to the pigmentation of the fruit bodies we have, as previously, confined ourselves to studying only the pigmentation of the hymenophoral trama for reasons given in our earlier paper (Kits van Waveren, *1976*: 346). Again we emphasize the importance of paying special attention to the pattern of the cellular lining of the sterile gill edge. Doing this turned out to be particularly rewarding in *P. obtusata* and *P. clivensis*, where this pattern is very characteristic.

ACKNOWLEDGEMENTS

We are greatly indebted to Prof. H. Romagnesi for very kindly sending us material of four collections of *P. frustulenta* (Pers. ex Fr.) sensu Romagn., and for keeping up a very lively and instructive correspondence with us about this interesting species. We also wish to thank very much indeed the Director of the Herbarium, Royal Botanic Gardens, Kew for enabling us to study the type specimens of *P. cortinarioides* P. D. Orton, and the Director of the Royal Botanic Garden Edinburgh for sending us material of *P. clivensis* (Berk. & Br.) P. D. Orton.

Psathyrella friesii Kits van Wav., *spec. nov.*—Figs. 1, 6–10

Psathyra langei Sing. *in* Collect. Bot. I **3**: 244. 1947 (not validly published).

MISAPPLIED NAMES.—*Agaricus fibrillosus* (Pers. ex Fr.) sensu Lambotte *in* Fl. mycol. Belge I: 216. 1880. — *Psathyra fibrillosa* (Pers. ex. Fr.) sensu J. E. Lange, Fl. agar. dan. **4**: 94, pl. 152 D. 1939. — *Psathyrella fibrillosa* (Pers. ex Fr.) Maire sensu A. H. Smith *in* Mem. N.Y. bot. Gdn **24**: 233. 1972; non *Agaricus fibrillosus* Pers., Syn. fung. 424. 1801; non *Agaricus fibrillosus* Pers. ex Fr., Syst. mycol. I: 297. 1821; Epicr. 233. 1838; Monogr. Hym. Suec. I: 442. 1863; Hym. eur. 308. 1874.

SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—Ricken, Blätterp., pl. 67, fig. 1. 1913 (as *Psathyra fibrillosa*). — J. E. Lange, Fl. agar. dan. **4**: 94, pl. 152 D. 1939 (as *Psathyra fibrillosa*). — A. H. Smith *in* Mem. N.Y. bot. Gdn **24**: 233, pl. 64b and 69b. 1972 (as *Psathyrella fibrillosa*).

Carpophora parva vel statura media, terrestria, solitaria. Pileus 15–25 mm latus, e paraboloideo convexus, badiofuscus, hygrophanus, haud roseatus. Velum album, insigne, maturitate etiam appendiculatum. Lamellae griseo-sepiaceae, purpureo-tinctae, late adnatae, acie albae. Stipes 40—75 × 2—4 mm, haud radicans, albus. Sporae 7.7—8.1 × 4.1—4.5 µm, in cumulo purpureo-nigrae, sub micr. badiofuscae. Pleurocystidia 40—55 × 10—14 µm, numerosa, fusiformia vel sublageniformia, pedicellata. Cheilocystidia 27—45 × 11—18 µm. Cellulae spheropedunculatae et clavatae 17.5—30 × 8—12 µm, numerosae. Trama hymenophori colorata.

TYPUS: The Netherlands, prov. Overijssel, Oldenzaal, estate 'Roderveld', 12 Oct. 1976, *E. Kits van Waveren* (L).

CHIEF CHARACTERISTICS. — Carpophores small to medium sized, solitary, terrestrial. Cap 15–25 mm in diam., paraboloid, later more convex, dark reddish brown, hygrophanous, without pink, with white, very distinct and in mature specimens often even appendiculate veil; gills greyish brown with trace of purple, broadly adnate, with white edge; stem 40–75 × 2–4 mm, not rooting, white; spore print purplish black; spores 7.7–8.1 × 4.1–4.5 μm, in water and NH_4OH 10% fairly dark reddish brown; pleurocystidia 40–55 × 10–14 μm, numerous, fusiform to sublageniform, pedicellate; cheilocystidia 27–45 × 11–18 μm, moderately numerous to scattered; spheropedunculate and clavate cells 17.5–30 × 8–12.5 μm, numerous; hymenophoral trama coloured.

MACROSCOPIC CHARACTERS. — Cap 15–25 mm in diam., paraboloid, later more convex, with small and vague or fairly distinct umbo (up to 7 mm in diam.), striate up to 2/3 from margin upwards, dark reddish brown (M. 5 YR 3/2), in marginal area dark brown (M. 7.5 YR 4/4), soon just brown all over, hygrophanous, drying out to pale brown (M. 10 YR 7/4) without pink, at centre at first ochre (M. 7.5 YR 5/4), finally pale ochre (M. 7.5 YR 7/6), dry surface rugulose, slightly micaceous.

Veil white, very distinct, leaving many very small networks and patches of bundled fibrils reaching up to half-way from margin upwards, in some caps even up to umbo often distinctly appendiculate, forming denticles and flocci at margin even in mature specimens, contrasting sharply against brown colour of cap; surface of stem covered along its entire length—except for apex—with loose, small velar fibrils and bundles of fibrils (no scales).

Gills 3–4 mm broad, ventricose, ascending, broadly adnate, greyish brown (M. 10 YR 5/2), browner towards base (M. 10 YR 5/3), both colours mixed with a trace of purple, with white, minutely fimbriate edge.

Stem 40–75 × 1.5–3 (apex) × 2–4 (just above base) mm, thickening towards slightly swollen base (up to 5 mm), straight, not rooting, hollow, white, minutely longitudinally striate, with shiny surface and pruinose apex.

Flesh of cap up to 2 mm thick in centre, dark brown (M. 10 YR 3/3) with some reddish (M. 5 YR 4/2); flesh of stem pale brown, darkening towards base, at base brown (M. 7.5 YR 5/4), with white, thin, superficial layer. Smell none.

Spore print in thin layer dark reddish purple, in thick layer purplish black.

Trama of 'washed' gill, mounted in NH_4OH 10% under binocular lens brown (M. 10 YR 5/4) in a fairly narrow zone along base, remainder of trama pale brown (M. 10 YR 6/3), very pale brown (M. 10 YR 7/3) near and at edge.

MICROSCOPIC CHARACTERS.—Spores 7.7–8.1 × 4.1–4.5 μm (average 8 × 4.5 μm), ellipsoid-amygdaliform, in water and NH_4OH 10% fairly dark reddish brown (M. 2.5 YR 3/6), in KOH 5% dark brownish grey (± M. 10 YR 4/2), not opaque, with small (± 1.5 μm) but distinct, not truncate apical germ pore, small hilar appendix.

Basidia 20–22 × 8–9 μm, 4-spored.

Pleurocystidia 40–55 × 10–14 μm, numerous, very uniform, fusiform to sublageniform with fairly short and usually rather broad pedicel and acute to sub-obtuse apex, thin-walled, colourless, without mucus or crystals.

Cheilocystidia 27–45 × 11–18 μm, moderately numerous to scattered, rather thick-set, fusiform to sublageniform, thin-walled, colourless, without mucus or crystals, intermixed with large numbers (80–90% of total number of marginal cells) of often rather large spheropedunculate and clavate cells, 17.5–30 × 8–12.5 μm. Gill edge sterile.

Caulocystidia (apex of stem) 40–60 × 10–15 μm, fairly numerous, isolated or in small clusters, sublageniform.

Pigmentation of hymenophoral trama under microscope ('washed' gill mounted in

NH_4OH 10%) pale brown from membranal pigment, paler towards edge, very pale near and at edge, neither yellow hyphal septa nor encrustations.

Cuticle of cap cellular, 1–2 cells deep layer of colourless, globose or subglobose, vesiculose cells, 16–40 μm in diam.

Clamps on hyphae of stem and caulocystidia.

HABITAT.—Solitary, terrestrial in grass alongside footpath in mixed coniferous and deciduous wood.

COLLECTION EXAMINED.—THE NETHERLANDS: prov. Overijssel, Oldenzaal, nature reserve 'Het Roderveld', 12 Oct. 1976, *E. K. v. W.* (holotype, L).

In keying out the species described by us above, one arrives with both Lange (*1939*: 94) and Smith (*1972*: 233) at *P. fibrillosa*, their descriptions corresponding sufficiently and well with ours.

With Lange *P. fibrillosa* is a medium sized fungus (cap 20–35 mm in diam., stem ± 80 mm long) of which the cap is loosely-fibrillose towards the edge, no scaliness being mentioned. In contradistinction to Fries's description of *A. fibrillosus* the colour of the cap is called 'watery brownish-grey, umbo of a purer brown' and on plate 152 D this colour is even distinctly reddish brown (M. ± 2.5 YR 5/4). The colour of the gills is called 'dark fuscous' and on plate 152 D it is brown-purplish (M. ± 10 R 6/2, 5/2; 2.5 YR 5/2), whereas with Fries it is purplish black, no brown being mentioned. The colour of the spore print is 'dark bister to sepia' (= some shade of very dark brown with a slight reddish hue) and with Fries black-purple. Lange's plate is sufficiently in accordance with our species as described above.

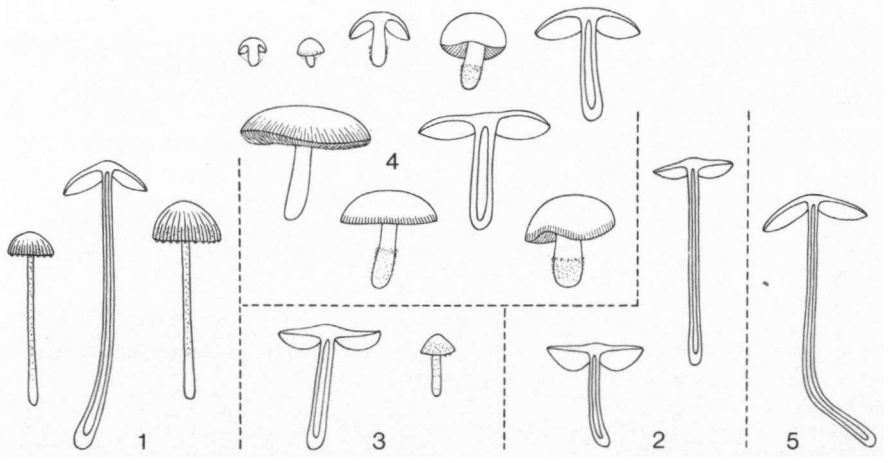


Fig. 1. *Psathyrella friesii*, 12 Oct. 1976. — Habit sketch (×0.5).

Figs. 2–4. *Psathyrella frustulenta*. — 2. 11 Oct. 1976. — 3. 13 Oct. 1976. — 4. 27 March 1977. — Habit sketches (×0.5).

Fig. 5. *Psathyrella obtusata*, 21 Oct. 1976. — Habit sketch (×0.5).

Lange described the marginal cells as somewhat bottle-shaped with a shorter neck, and plate 152 D shows lageniform cystidia. The pleurocystidia, however, were described as sparse and roundish, which—we feel—must have been an erroneous observation as roundish pleurocystidia are unknown in the genus *Psathyrella* and as—if both cheilo- and pleurocystidia are present—the latter always roughly of the same shape as the cheilocystidia.

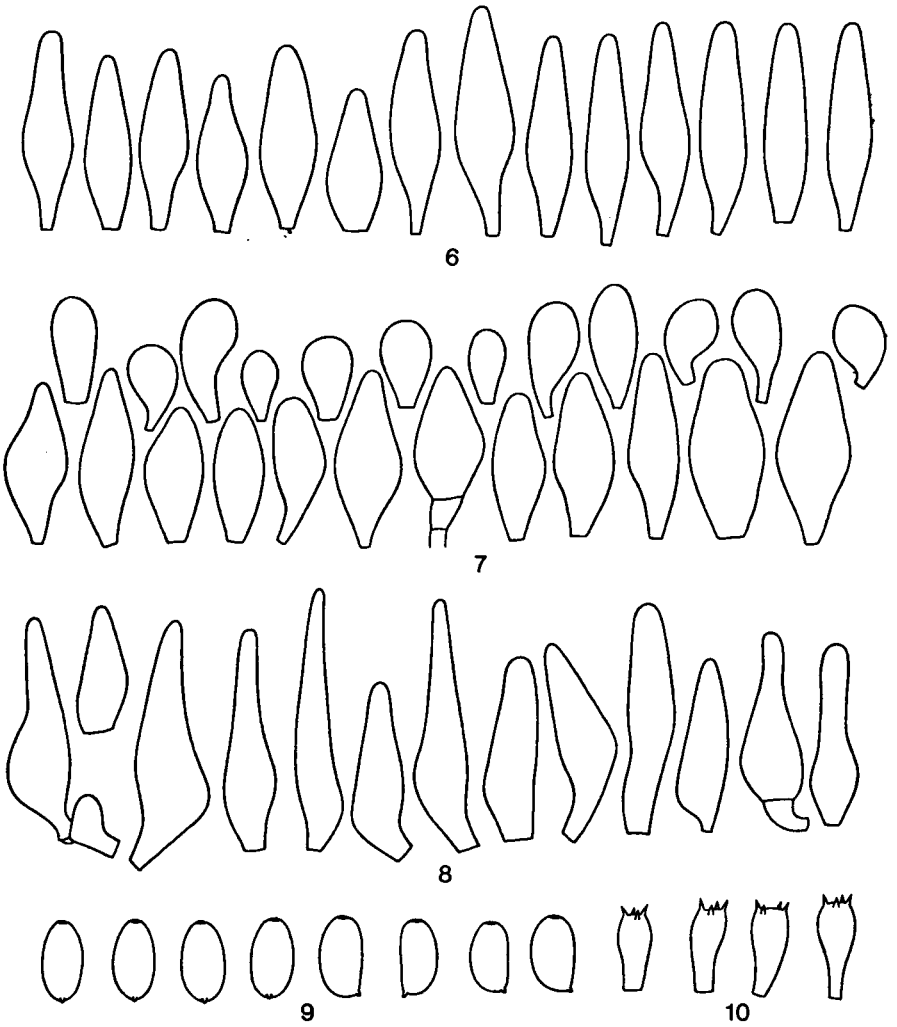
Singer (*1947*: 244), realising that *P. fibrillosa* (Pers. ex Fr.) sensu Lange did not represent *A. fibrillosus* Fr., without giving a description renamed it *Psathyra langei* Sing., but this name was not validly published.

With Smith (*1972*: 233) the cap of *P. fibrillosa* is at first covered with small fascicles of whitish fibrils but soon glabrous, and the stem is at first covered with scattered fibrils in squamules or patches and also soon glabrous. This description, however, is rather an understatement as the photographs of *P. fibrillosa* on plate 64 b and 69 b show a strongly developed and even appendiculate veil in the young specimens, and in mature specimens distinct velar remnants at and even up to some distance from the margin of the cap. This is in full agreement with Fries's descriptions of *A. fibrillosus*, but the colour of the cap is called 'buckthorn brown' to 'cinnamon brown' fading to 'grayish-buff to pallid' against 'lividus' with Fries (*1874*: 308). Smith called the colour of the gills 'pallid buff, becoming dark bister and finally nearly fuscous' against 'purpureo-nigris' with Fries (*1874*: 308). The habit of *P. fibrillosa* as shown on plate 64 b and 69 b corresponds with Lange's description and his plate 152 D (less velar development, however, with Lange) and our own description. With Smith the pleurocystidia are fusoid-ventricose and not vesiculose-clavate (see Ricken below).

For Fries, who already in his Observationes Mycologicae (*1815*: 181) adopted Persoon's *A. fibrillosus* (*1801*: 424), the outstanding character of this species must have been the strongly developed, even scaly velar coating of both cap and stem (e.g. in 1815: 181 cap 'squamis albis fibrillosus stipitis instar vestitus', stem 'totus fere squamulis villoso-fasciculatis albis obsitus'; in 1863: 442 cap 'interdum primitus squamulosus', stem 'undique squamulis fibrilloso-fasciculatis patulis, albis'). The words 'squamoso' and 'squamuloso' being used by Fries for both cap and stem, warrants the conclusion that the species must have been coarsely scaly.

But Fries called the cap very pale greyish to even whitish even in the young stage (e.g. in *1815*: 181 cap 'junior albus, dein sordidus albidus 1. lividus'; in *1863*: 442 cap 'lividus l. albescens') and the colour of the gills grey in the beginning, later purplish black, no brown being mentioned (e.g. in *1815*: 181 gills 'primo cinereo, dein purpurascenti-nigricantes'; in *1863*: 442 gills 'cinereo nigro-purpurascentes'). The colour of the spore print was called black or black-purple.

At one time we believed that—because of the strong development of the veil, described by Fries—he might have been dealing with what we nowadays know as *P. squamosa* (Karst.) Moser. Other reasons for this assumption were that in *P. squamosa* the attachment of the gills also is very broad and that a fungus corresponding with *P. squamosa* figures in none of Fries's publications, whereas it is hard to believe that it did not occur in those days in Sweden (the species is quite common in the Nether-



Figs. 6–10. *Psathyrella friesii*, 12 Oct. 1976. — 6. Pleurocystidiogram (×575). — 7. Cheilocystidiogram (×575). — 8. Caulocystidiogram (×575). — 9. Sporogram (×1210). — 10. Basidiogram (×575).

lands and was described from Finland). But in *P. squamosa* the colour of the gills is distinctly brownish and the colour of the cap also is not in agreement with Fries's descriptions of the colour of the cap in *A. fibrillosus*.

Authors in recent literature either abstained from giving an interpretation of *A. fibrillosus* Fr. or described a species which they named *P. fibrillosa* but in some im-

portant respects distinctly differed from Fries's species. Kühner & Romagnesi's descriptive key (*1953*: 353) for the genus *Psathyrella* (*Drosophila*) does not comprise *P. fibrillosa*, and Dennis, Orton & Hora (*1960*: 186) excluded *P. fibrillosa* 'pending clearer definition'.

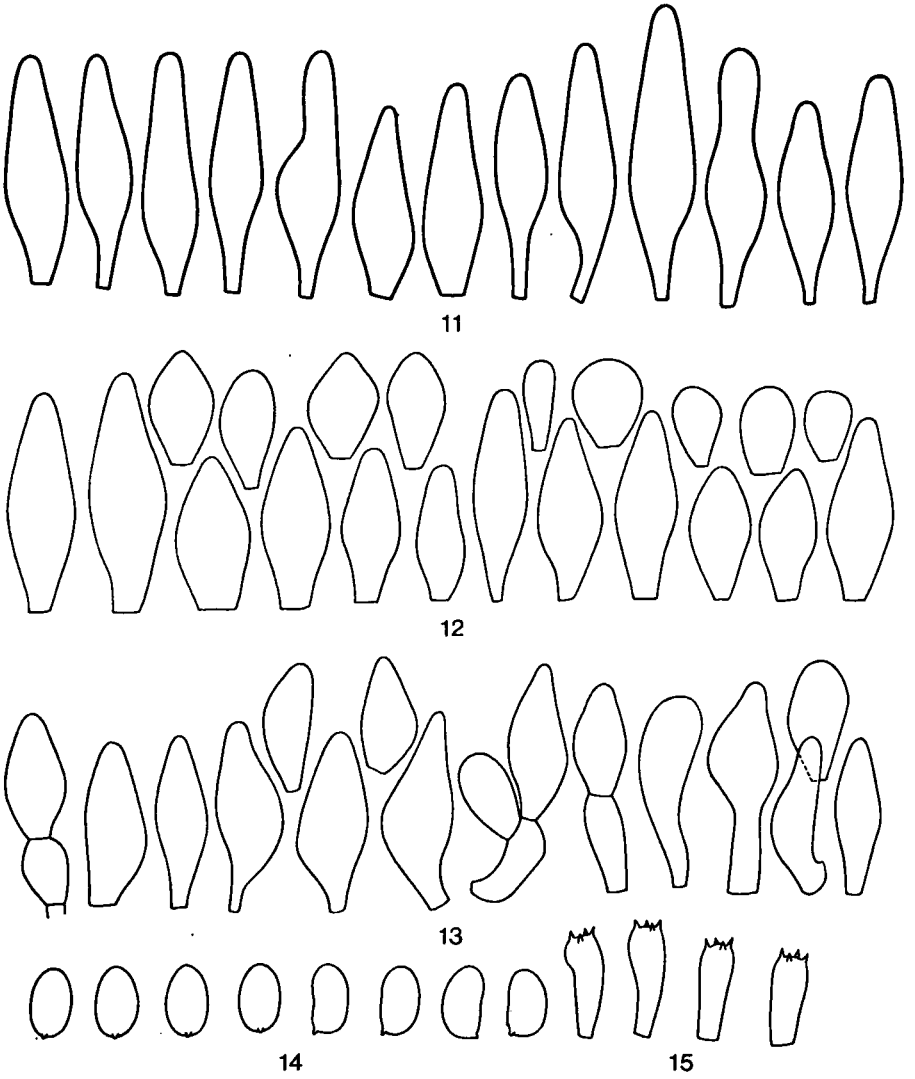
In conclusion, from the above it is clear that for reasons of distinct differences in colour of cap, gills and spore print *A. fibrillosus* Pers. ex Fr. cannot be conspecific with *P. fibrillosa* sensu J. E. Lange and sensu A. H. Smith, the latter species fully corresponding with the species described by us above and therefore as a new species: *P. friesii*.

The description given by Ricken (*1913*: 258) for *Psathyra fibrillosa* agrees with Fries's descriptions in the sizes of cap and stem, in the colour of the cap ('grau', provided 'grau' is taken in the sense of sordid grey and not of sordid brown) and in the description of the veil. But the gills with Ricken are narrowly adnate and on his plate 67[1] the colour of the cap is sordid brown (M. 10 YR 5/4). Moreover it is stated in italics that the cap is furrowed (hence the German name 'gefurchter Faserling') and that the colour of the gills is chocolate-reddish (!). With Ricken the cellular lining of the gill edge does not consist of lageniform cells as with Lange and Smith, but of vesiculose-clavate cells, like in *P. spadiceo-grisea*. Indeed, Ricken states that the presence of a veil in *P. fibrillosa* (on his plate 67[1] shown as concentric zones of small whitish non-appendiculate flocci up to half-way the centre of the cap) is almost the sole difference with *P. spadiceo-grisea*. From these data it is clear that *P. fibrillosa* sensu Ricken is neither conspecific with *A. fibrillosus* Fr., nor with *P. fibrillosa* sensu J. E. Lange and sensu A. H. Smith, alias our new species (see also observations on *P. obtusata*). Moser's description (*1967*: 221) of *P. fibrillosa* is obviously copied from Ricken; unfortunately Moser did not mention the shape of the marginal cells.

The literature contains many descriptions under the epithet fibrillosa of the species here under discussion, but they are either copies or summaries of the Friesian descriptions or not in sufficient agreement with the species as described by Fries.

As a matter of course we felt having to base the above considerations and particularly the colours of cap, gills and spore print in the descriptions of Fries, Lange and Smith on the litteral texts. The process of drying in many species of *Psathyrella*, however, sets in so quickly that the colour of the cap, which at the onset is distinctly dark reddish brown, very often has already turned into some shade of (sordid) brown when the specimens are collected, the dark reddish hue already having disappeared (see Kits van Waveren *1976*: 346). Lange's description of *P. fibrillosa* and his plate 152 D furnish a good example. In his description he called the colour of the cap 'brownish gray, umbo of a purer brown' but on plate 152 D the caps are distinctly reddish. We very much doubt whether the 'buckthorn brown to cinnamon-brown' colour of the cap, fading to 'grayish cinnamon-buff to pallid' as reported by Smith is the true colour of the caps of *P. fibrillosa* sensu Smith in its fresh stage. These colours, however, still differ from and are distinctly browner than the colours mentioned by Fries for *A. fibrillosus*, who in none of his descriptions mentioned any shade of brown. In the really fresh stages the colour of the caps of the species as described by Smith is almost certain to having been darker and more reddish brown.

The descriptions of the colour of the gills, given by Fries, 'purpureo-nigris', distinctly differ from those given by Ricken (chocolate-reddish), Lange (dark fuscous and on plate 152 D even reddish brown), Smith ('pallid buff, dark bister, finally nearly fuscous') and us (greyish brown with a trace of purple).



Figs. 11–15. *Psathyrella frustulenta*, 13 Oct. 1976. — 11. Pleurocystidiogram (×575). — 12. Cheilocystidiogram (×575). — 13. Caulocystidiogram (×575). — 14. Sporogram (×1210). — 15. Basidiogram (×575).

The only author to mention the colour of the spore print is Lange, who called it dark bister to sepia (= very dark brown with a reddish hue). With Fries the colour of the spore print of *A. fibrillosus* is 'atro-purpur' (*1838*, 1874) or black (*1815*). The correct assessment of the colour of the spore print in *Psathyrella*, however, depends on whether the colour is taken from a thin or very thick layer of spores. In our own collection the colour was very dark purple, almost black, when taken from the ridges of the spore print formed between the gills, but distinctly dark reddish purple alongside these ridges. We do not know how and from what part of the spore print Fries took his colours.

PSATHYRELLA FRUSTULENTA (Fr.) A. H. Smith
Figs. 2–4, 11–18

Agaricus frustulentus Fr., Epicr. 209. 1838; Monogr. Hym. Suec. **1**: 442. 1857; Hym. europ. 307, 1874. — *Pannucia frustulenta* (Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: 513. 1879. — *Psathyra frustulenta* (Fr.) P. Karst. *in* Medd. soc. fenn. **5**: 18. 1879. — *Drosophila frustulenta* (Fr.) Quél., Enchir. 117. 1886. — *Psathyrella frustulenta* (Fr.) A. H. Smith *in* Contr. Univ. Mich. Herb. **5**: 45. 1941.

TYPE LOCALITY: Sweden.

EXCLUDED.—*Drosophila frustulenta* (Fr.) Quél. sensu Romagn. *in* Bull. Soc. mycol. Fr. **91**: 189. 1975 (=*Psathyrella clivensis* (Berk. & Br.) P. D. Orton.

SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—Ricken Blätterp. 259. 1913. — J. E. Lange, Fl. agar. dan. **4**: 95, pl. 151 D. — Bresadola, Icon. mycol. **18**: pl. 866[2]. 1931 (excluded spore sizes and cystidia). — Moser *in* Gams KryptogFl. 220. 1967. — A. H. Smith *in* Mem. N.Y. bot. Gdn **24**: 217. 1972.

CHIEF CHARACTERISTICS.—Carpophores small to medium sized, terrestrial against small pieces of wood, in woods, solitary; cap 10–30 mm in diam., paraboloid, later convex without or with vague to fairly distinct umbo, reddish brown, hygrophanous, dry cap pale brown without pink; veil strongly developed; gills whitish when young, later conspicuously brown with whitish edge; stem 15–30 × 2–3.5 mm, not rooting, white; spore print brown; spores 6.3–7.7(–8.1) × 3.6–4.5 µm, in water and NH_4OH 10% light brown with distinct germ pore (callus); pleurocystidia 40–70 × 10–16 µm, very numerous, fusiform; cheilocystidia (15–)22–47(–55) × 10–17.5 µm, numerous and intermixed with variable numbers of spheropedunculate cells, 12.5–30 × 7.5–17.5 µm; hymenophoral trama distinctly coloured.

MACROSCOPIC CHARACTERS.—Cap in young stages (10 mm in diam). paraboloid, later up to 30 mm in diam. and spreading to convex and plane without or with vague to fairly distinct umbo, striate up to 1/4-half-way from margin upwards, dark reddish brown (M. 5 YR 3/2) with marginal area reddish brown (M. 5 YR 4/3, 4/4, 5/4), hygrophanous, drying out to pale greyish brown or pale brown (M. 10 YR 7/4, 6/3, 6/4) and at centre at first ochreous (M. 7.5 YR 6/6, 10 YR 7/6) but in the end very pale ochre; dry surface rugulose, slightly micaceous and without pink.

Veil white, strongly developed, in young specimens cap covered up to even at centre with a dense coating of fibrils, networks, patches and adpressed flocci of fibrils, rendering the surface in some places even white from the veil, which in places may be appendiculate; stem also covered with a thick velar coating; in mature specimens still many very distinct radially arranged velar fibrils and velar networks up to 3–5 mm

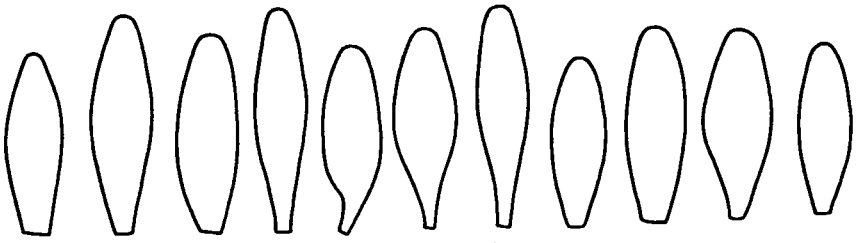
from margin on the cap, and lower 1/3 of stem showing many bundles of fibrils and usually also some flocci which may feign an annular zone.

Gills 3–5(–7) mm broad, in young stages whitish to exceedingly pale brown (M. 10 YR 8/3), in mature stages strikingly brown (M. 5 YR 4/4, 7.5 YR 5/4) in basal half, somewhat paler towards edge, ventricose, ascending, narrowly to fairly broadly adnate, somewhat crowded, with white and minutely fimbriate edge.

Stem 25–50 × 2–3.5(–5) mm, cylindrical but very slightly thickening towards base, straight, not rooting, hollow, minutely longitudinally striate, white, with slightly pruinose apex.

Flesh of cap 2–3 mm thick at centre, dark reddish brown (±M. 7.5 YR 4/2), later dark brown (M. 10 YR 3/3); flesh of stem light brown with thin white superficial layer. Smell none.

Spore print strikingly pale reddish brown (M. 5 YR 5/3).



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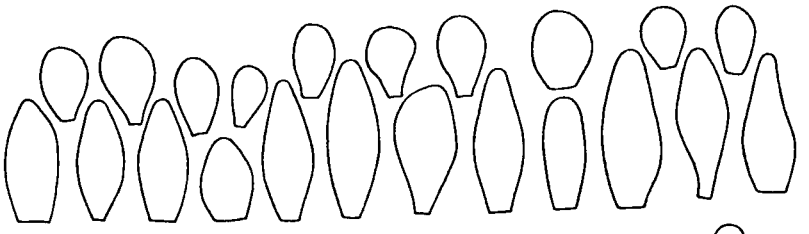

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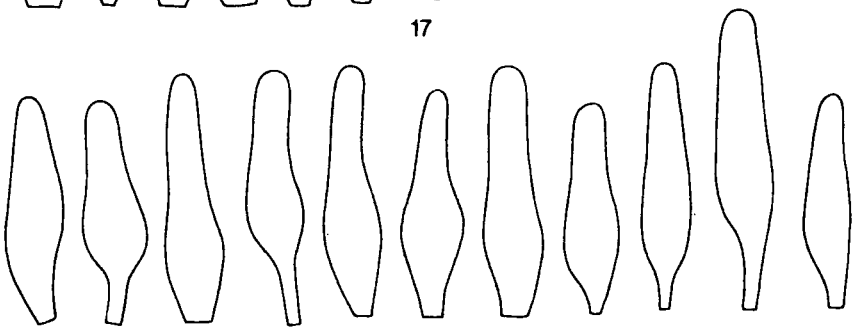

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Figs. 16, 17. *Psathyrella frustulenta*, 11 Oct. 1976. — 16. Pleurocystidiogram (×575). — 17. Cheilocystidiogram (×575).

Fig. 18. *Psathyrella frustulenta*, 27 March 1976. — Pleurocystidiogram (×575).

Trama of 'washed' gill, mounted in NH_4OH 10% under binocular lens, conspicuously coloured but degree and hue variable; either equally golden yellowish brown from base to edge (M. 10 YR 5/4 or paler) or dark yellowish brown (M. 10 YR 5/6) in basal third, yellowish brown (M. 10 YR 5/4) in central part and pale brown (M. 10 YR 6/3, 7/4) towards and at edge (brown colour of gills chiefly due to pigmentation of trama).

MICROSCOPIC CHARACTERS.—Spores 6.3–8.1 × 3.6–4.5 μm (averages 6.9–7.6 × 4–4.4 μm), ellipsoid-amygdaliform and distinctly phaseoliform, in water and NH_4OH 10% strikingly pale brownish yellow with a reddish hue (M. 7.5 YR 6/6), in KOH 5% pale yellowish brown (slightly paler than 10 YR 5/6), not opaque, with indistinct, practically absent germ pore (callus) and small hilar appendix.

Basidia 17.5–29 × 7.5–10 μm, 4-spored.

Pleurocystidia 40–70 × 10–16 μm, very numerous, fusiform to subfusiform with distinct pedicel and subacute to obtuse apex, thin- or very slightly thick-walled, colourless, without mucus or crystals.

Cheilocystidia (15–)22–47(–55) × 7.5–17.5 μm, numerous, fusiform, the vast majority more thick-set and with broader and shorter pedicel than the pleurocystidia, thin-walled, colourless, without mucus or crystals; intermixed with fairly large but locally sometimes smaller numbers of spheropedunculate cells, 12.5–30 × 7.5–17.5 μm, very few with slightly thickened walls. Gill edge sterile.

Caulocystidia (apex of stem) 27–47 × 10–17.5 μm, fairly numerous, isolated or in small clusters; shape and size very variable; similar to cheilocystidia; few spheropedunculate and clavate cels.

Pigmentation of hymenophoral trama under microscope ('washed' gill mounted in NH_4OH 10%) distinctly brown from membranal pigment throughout the entire gill, colour becoming fainter towards edge; quite a number of yellow hyphal septa, very few very small encrustations.

Cuticle of cap cellular, 2–3 cells deep layer of colourless globose or subglobose vesiculose cells, 24–48 μm in diam.

Clamps on hyphae of stem and caulocystidia.

HABITAT.—Solitary, terrestrial against small pieces of wood, in woods.

COLLECTIONS EXAMINED.—THE NETHERLANDS: prov. Overijssel, Oldenzaal, estate 'Roderveld', 11 Oct. 1976, *E. K. v. W.* (L); Delden, estate 'Twickel', area 'Broeriet', 13 Oct. 1976, *E. K. v. W.* (L); prov. Noord-Brabant, Hooghalen, 16 Oct. 1976, *P. B. Jansen* (herb. Jansen); Vlijmen, 27 March 1977, *W. Hanegraaff* (herb. Hanegraaff).

Already on examination of the gills with the binocular lens and microscope this species can easily be recognised by the following striking combination of characters: (i) the golden yellowish brown colour, usually equable from base to edge of the 'washed' gill mounted in NH_4OH 10% and viewed under the binocular lens against a well lit white background, (ii) the small phaseoliform and pale spores, (iii) the absent to scarcely noticeable (callus) germ pore, and (iv) the striking abundance of the pedicellate fusiform pleurocystidia (in *P. clivensis* utriform).

Fries described *A. frustulentus* for the first time in Epicrisis (*1838*: 209), giving a full description in Monographia (*1857*: 442) and a slightly abbreviated one in Hym. europ. (*1874*: 307). The outstanding features of this species as described by him are: (i) the fairly pale rust-red colour of the cap ('aquose ferrugineus'), (ii) the at first white, then pale yellowish brown but finally brown colour of the crowded gills (in

1857: 442 gills 'aquose cinnamomeo fuscescentes', in *1874*: 307 gills 'ex albo aquose cinnamomeus'), (iii) the rather strongly developed veil (in *1857*: 442, cap 'margine l. circa marginem albido-floccosus', stem 'fibrillosus l. flocculis albis adspersus'; in *1874*: 307, cap 'circa marginem albo-floccoso, stem 'flocculoso'), (iv) the dark rust-brown spore print ('fuscoferrugineus') and (v) the habitat in woods (*1857*: 'ad glearum silvaticarum'). Fries at first (*1838*) placed the species in the subgenus *Galera* because of the colour of the spore print; in 1857 Fries stated that the species stands between the Dermini and Pratelli; in 1874 that the species is abnormal because of its dark rust-brown spore print, the watery structure and 'collore hyaline' of the *Psathyras*, and that among the species of the subgenus *Galera* there are none that are related.

Our notes, made immediately after having collected this species on Oct. 13th 1976, correspond in every way with Fries's descriptions: (i) the cap we described as 'reddish brown (M. 5 YR 4/3)', (ii) the gills of the young specimen as 'crowded and whitish to extremely pale brown', those of the mature specimens as 'brown, ± M. 7.5 YR 5/4', (iii) the veil of the young specimen as 'a very dense velar coating from fibrils and networks of fibrils which in places causes the cap to be white and in one place even is appendiculate', (iv) the colour of the spore print as 'brown, M. 5 YR 5/3' (= reddish brown, and (v) the habitat as under *Quercus* in a deciduous wood. In all respects this collection agreed with the Friesian descriptions and so do the other three which later came at our disposal.

The descriptions and interpretations of Fries's species in the literature show considerable uniformity. With Ricken (*1913*: 259), who called *P. frustulenta* a well defined species and whose description of the species agrees with the ones given by Fries, the gills and spore print are cinnamon-brown, the spores are small and almost round (6–7 × 4.5 µm), and the cystidia fusiform. Buch's (*1952*: 268) description is in accordance with Fries's; with him the spores also are small (6–7 × 5(–6) µm). Lange's description (*1939*: 95) also agrees with the Friesian ones; with him the spores are oval and, as depicted on plate 151 D, distinctly phaseoliform (not mentioned in the text), measuring 7 × 4.25 µm, the cheilocystidia sparse and bottle-shaped, no pleurocystidia mentioned. The young specimen depicted on his plate 151 D shows a rather dense velar coating on both cap and stem. With Bresadola (*1931*: pl. 866[2]) the gills are not crowded but 'subdistantes', but otherwise his description agrees with the ones given by Fries. Both Bresadola's description and plate picture the stem as densely flocculose-scaly from velar remnants. With Bresadola, however, the spores are larger, 8–10 × 4.5 µm, and the cystidia are said to be 'clavato-ventricosa, substipitata'. Moser (*1967*: 220) referred to Lange's plate 151 D and from his descriptive key it is clear that he regarded *P. frustulenta* as a species having a copious veil, a medium sized (10–25 mm in diam.) cinnamon to weak coffeebrown cap, pale brown gills and small spores (7–8 × 4–5 µm).

A. H. Smith's recent description of *P. frustulenta* (*1972*: 217) is in accordance with the descriptions mentioned above. In describing the colour of the cap he used several designations for the various shades of cinnamon-brown, stating that some-

times old remoistened caps are 'russet (dark cinnamon brown)', which for us is a strong indication that in really fresh specimens the colour of the caps (as in our own material) must have been reddish brown. With Smith the gills are crowded and when young white or whitish, later they become 'russet' to 'cinnamon brown', and the entire surface of the cap is at first covered by a superficial coating of white fibrils, which become arranged into recurved scales, margin sometimes appendiculate with patches of the broken veil, lower part of stem covered with squamules or patches of white fibrils, which made Smith rank the species with subgenus *Pannucia*! This description of the veil agrees remarkably well with our own findings. Smith did not give the colour of the spore print, but going by his description of the colour of the gills and the cinnamon-ochraceous colour of the spores in KOH under the microscope it must have been brown. With Smith the spores also are small, 7–8.5 × 4.5–5.5 μm, but he did not mention a phaseoliform shape. The pleurocystidia are abundant and 'broadly fusoid-ventricose'. With his description of the macroscopical characters Smith is in complete agreement with Fries's descriptions of this—because of its brown colours—remarkable and in the field striking species, which according to Smith is to be found in woods ('under ferns on conifer needles').

From the data in the literature it is difficult to form an opinion about the true habit of *P. frustulenta* sensu Smith, which—as in our own material—seems to be rather variable. The sizes of the cap, as given in the literature, are fairly uniform, viz. between 10 and 30 mm, exactly our own figures. The figures for the sizes of the stem, however, vary somewhat, viz. from 50 × 1–1.5 mm (Moser) to 30–90 × 2.5–4 mm (Smith), our own figures being 25–50 × 2–3.5(–5) mm. *P. frustulenta* sensu Smith is very closely related to *P. clivensis*, and the habit of the latter species is beautifully demonstrated on Cooke's plate 1183/969.

Romagnesi (*1975*: 189) published a different interpretation of *Agaricus frustulentus* Fr. He stated that on account of the information provided by Orton (*1960*: 369) about *P. clivensis* (Berk. & Br.) P. D. Orton he had concluded that that species is conspecific with his version of *A. frustulentus* Fr., and also that his interpretation of Fries's species differs from the one given by Smith (*1972*: 217). With both conclusions we fully agree. The question then of course rises whether *P. frustulenta* sensu Romagn. (=*P. clivensis*) or whether *P. frustulenta* sensu A. H. Smith represents the true *A. frustulentus* Fr. In trying to solve this question one has to go solely by the macroscopic characters (the microscopic characters of both species are completely different as will be shown later). Of these Romagnesi stated that the sole detail, not being in accord with his interpretation is that Fries called the gills of *A. frustulentus* 'confertis', whereas Romagnesi in his material found them to be 'peu serrées ou espacées'. We fully agree with Romagnesi that the crowdedness of the gills is a minor detail, the crowdedness of the gills in several species of *Psathyrella* varying within one and the same species.

There are, however, we think two major differences between *A. frustulentus* as described by Fries and *Drosophila frustulenta* as described by Romagnesi:

(1) The veil, as described by Romagnesi, must be regarded as rather rudimentary

as it was merely found reduced to a few sparse plushes at the margin of the cap in only one specimen (Romagnesi *1975*: 189), no velar remnants being described for the stem. Later, however, we learned from Prof. Romagnesi (in lit.) that in his original description of his best collection he had described the veil as 'Beau voile marginal blanc pur mouchetant la marge, relativement assez fourni, mais très fugace et vite complètement disparu; les primordiums sont pourvus d'un voile marginal blanc de neige qui ne couvre pas le sommet'. This description, we feel, still does not cover the velar development as it was described by Fries and the strong velar development we noticed in our own collections, in which sometimes semi-mature specimens showed velar flocci even reaching the centre of the cap (in two collections some specimens even showed an annular zone on the stem). Romagnesi's description of the veil is in line with the rudimentary velar development in *P. clivensis* (considered conspecific with *P. frustulenta* sensu Romagn. by Romagnesi) as described by Orton (in the original description of *P. clivensis* by Berkeley & Broome the presence of a veil is not even mentioned).

(2) In our opinion there is a very distinct difference in habitat between *A. frustulentus* Fr. and *Drosophila frustulenta* sensu Romagn. According to Fries *A. frustulentus* grows along gravel roads in woods ('ad glaream viarum silvaticarum') and Smith's specimens and ours also were found in woods. *P. frustulenta* sensu Romagn. on the other hand grows according to the author in the grass and moss of grassland and waste land on chalk soil, usually outside woods, which is precisely the habitat given by Orton for *P. clivensis* ('chalk grassland'). Romagnesi believes there is no real difference between these two habitats, stressing that both come down to open ground. We cannot agree with this statement, believing that it is the substrate in which the carpophores grow that matters, and not whether the place where they grow is open or not.

Having ascertained on the basis of the macroscopic characters (development of the veil and habitat) that *A. frustulentus* Fr. and *P. frustulenta* sensu Romagn. (=*P. clivensis*) very probably are two different species, we can now turn to the microscopic characters. These proved to be totally different for the two species.

Prof. Romagnesi very kindly sent us for examination a full specimen of his collection *719* and fragments of his collections *219*, *980* and *1004* of *P. frustulenta* sensu Romagn. Pleurocystidia (fairly abundant in *Romagnesi 719* and *1004*), basidia and spores were found in all four collections, marginal cells only in *Romagnesi 719* and *1004* (abundant). Orton (*1960*: 369) examined the type specimens of *P. clivensis* and found the characters of the spores and the original description of the macroscopic characters in full agreement with those of a *Psathyrella* found fairly frequently on chalk grassland in Surrey. From the Herbarium Royal Botanic Garden Edinburgh we received on loan the two collections mentioned by Orton (*1960*: 369). The microscopic characters of the four collections of *P. frustulenta* sensu Romagn. and the two of *P. clivensis* turned out to be fully identical and totally different from those of our four collections of *P. frustulenta* sensu A. H. Smith.

The spores of *P. frustulenta* sensu Romagn. measure according to Romagnesi

8.5–10.5 × 5.7–6.5 μm (our own measurements: 8.1–10.8 × 5.4–6.3 μm), those of *P. clivensis* according to Orton 9–11(–12) × 5.5–6.5(–7) μm (our own measurements: 8.1–10.8 × 5.4–6.3 μm). The spores of *P. frustulenta* sensu Smith are distinctly smaller (with Smith 7–8.5 × 4.5–5.5 μm; our own measurements: 6.8–7.2 × 4.1–4.5 μm) and distinctly phaseoliform, whereas in Romagnesi's material of *P. frustulenta* sensu Romagn. and in Orton's material of *P. clivensis* we only rarely came across a dubiously subphaseoliform spore (accordingly Romagnesi called these spores subphaseoliform and Orton called them 'rarely slightly phaseoliform'). The spores depicted by Romagnesi have a distinctly bulging adaxial face.

The pleurocystidia in Romagnesi's collections of *P. frustulenta* sensu Romagn. are distinctly utriform and in *Romagnesi 719* many cystidia are even capitate; their shape however varies a great deal (see Figs. 27, 28, 29) and they are only moderately numerous. Orton described the shape of the pleurocystidia in *P. clivensis* as rather obtusely lageniform or fusiform but in the material we examined we found them to be utriform (see Figs. 19, 24) and moderately numerous as in *P. frustulenta* sensu Romagn. In our collections of *P. frustulenta* sensu Smith on the other hand we found the pleurocystidia, as described by Smith, fusiform or fusoid-ventricose (see Figs. 11, 16) and very numerous.

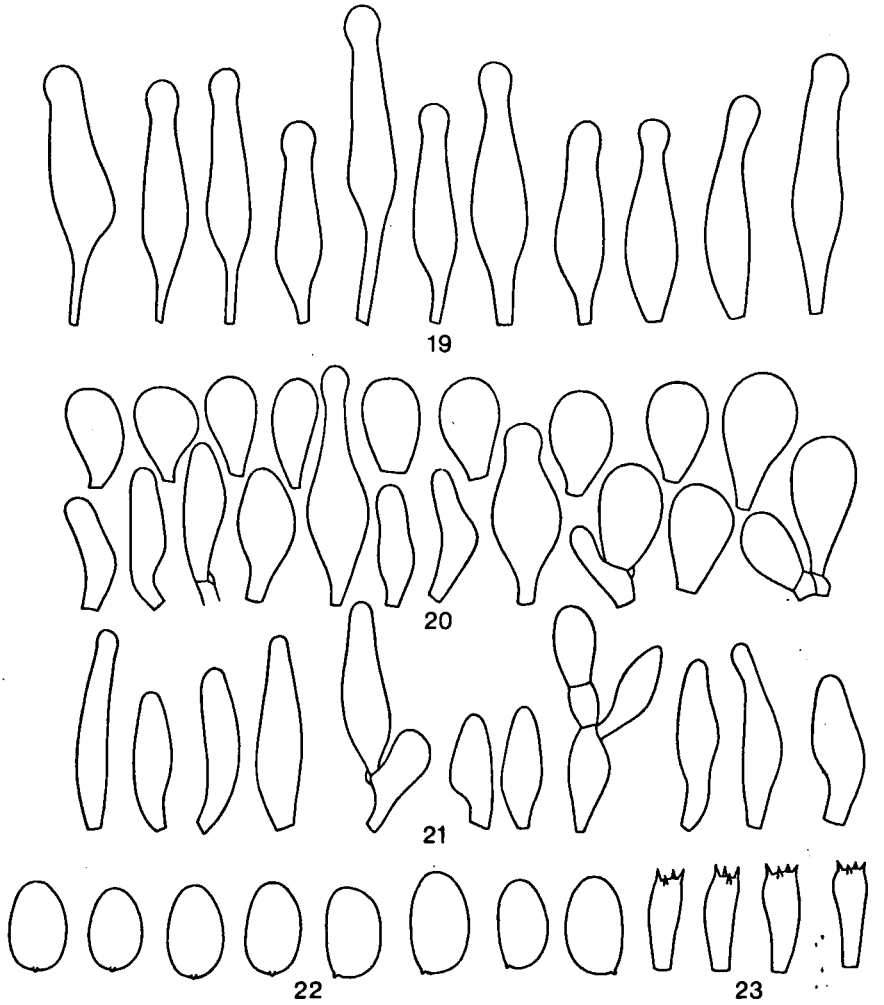
The marginal cells in both collections of *P. clivensis* and in the two collections (*No. 719* and *1004*) of *P. frustulenta* sensu Romagn. in which a gill edge was obtained, consisted almost exclusively of spheropedunculate and clavate cells, intermixed with only very few to scarcely any pleurocystidioid cheilocystidia (Orton even mentioned for the marginal cells only clavate or pyriform cells). On the other hand, in our four collections of *P. frustulenta* sensu Smith these cheilocystidia were numerous, intermixed with fairly large but locally smaller numbers of spheropedunculate cells. The overall picture of the cellular lining of the gill edge of *P. frustulenta* sensu Smith and *P. frustulenta* sensu Romagn. are thus very different.

In conclusion we believe that because of its strongly developed veil and habitat (woods) *P. frustulenta* sensu Smith fully answers Fries's original descriptions of *A. frustulentus*, and therewith represents that species. *P. frustulenta* sensu Romagn., although in all other macroscopic features greatly resembling Fries's species differs from it by its much lesser development of the (rudimentary) veil and by habitat. Comparison of the two taxa showed that very distinct microscopic differences also exist (spore size and shape, shape and number of pleurocystidia, pattern of cellular lining of gill edge). The macroscopic and microscopic characters of *P. frustulenta* sensu Romagn. turned out to be identical with those of *P. clivensis*, with which species *P. frustulenta* sensu Romagn. is conspecific, as already pointed out by Romagnesi (*1975*: 191).

On account of the description in the 'Flore analytique' (Kühn. & Romagn. *1953*: 363) of *P. empyreumatica* (Berk. & Br.) Kühn. & Romagn. we fully agree with Romagnesi (*1975*: 191) that the species described under that name, ranked in a section of subgenus *Psathyra* with little veil, growing in grassland and having spores measuring 8.5–10.2 × 5.2–6 μm, is also conspecific with *P. clivensis*. The description in the

'Flore' does not mention the colour of the spore print (it must have been brown as the spores are stated to be remarkably pale under the microscope) and the shape of the pleurocystidia. The original *Agaricus empyreumaticus* Berk. & Br. is a different species again (see Orton *1960*: 371).

As we had suspected from the description Orton (*1960*: 369) gave of his *P. cortinarioides*, our examination of the type material revealed this species to be identical



Figs. 19–23. *Psathyrella clivensis*, 10 Nov. 1958. — 19. Pleurocystidiogram (×575). — 20. Cheilocystidiogram (×575). — 21. Caulocystidiogram (×575). — 22. Sporogram (×1210). — 23. Basidiogram (×575).

with *P. frustulenta* sensu Smith. Macroscopically (crowdedness and colour of the gills) the exsiccata were fully identical with the dried specimens of our four collections of *P. frustulenta* sensu Smith and microscopically they also fully answered that species. Orton did not mention the absence of a germ pore and the abundance of the pleurocystidia but his figure 359 depicts phaseoliform spores without a germ pore and the pleurocystidia turned out to be strikingly abundant. Unfortunately Orton did not mention the important colour of the spore print, but going by the pale brown colour of the spores under the microscope it must have been brown. Contrary to Orton who stated not having seen clamps, we found on examination of the superficial layer of the apex of the stem numerous clamps (also mentioned by Smith) both on the hyphae and moderately numerous caulocystidia. On account of these findings we believe *P. cortinarioides* to be conspecific with *P. frustulenta* sensu Fr., A. H. Smith and the material described by us above.

PSATHYRELLA CLIVENSIS (Berk. & Br.) P. D. Orton—Figs. 19–26

Agaricus clivensis Berk. & Br. *in* Ann. & Mag. Nat. Hist. III **7**: 376. 1861. — *Psilocybe clivensis* (Berk. & Br.) Massee, Brit. Fung. Fl. **1**: 378. 1892. — *Psathyrella clivensis* (Berk. & Br.) P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 369. 1960.

MISAPPLIED NAMES.—*Drosophila empyreumatica* (Berk. & Br.) Kühn. & Romagn. sensu Kühn. & Romagn., Fl. anal.: 363. 1953. — *Drosophila frustulenta* (Fr.) Quél. sensu Romagn. *in* Bull. trimest. Soc. mycol. Fr. **91**: 189. 1975.

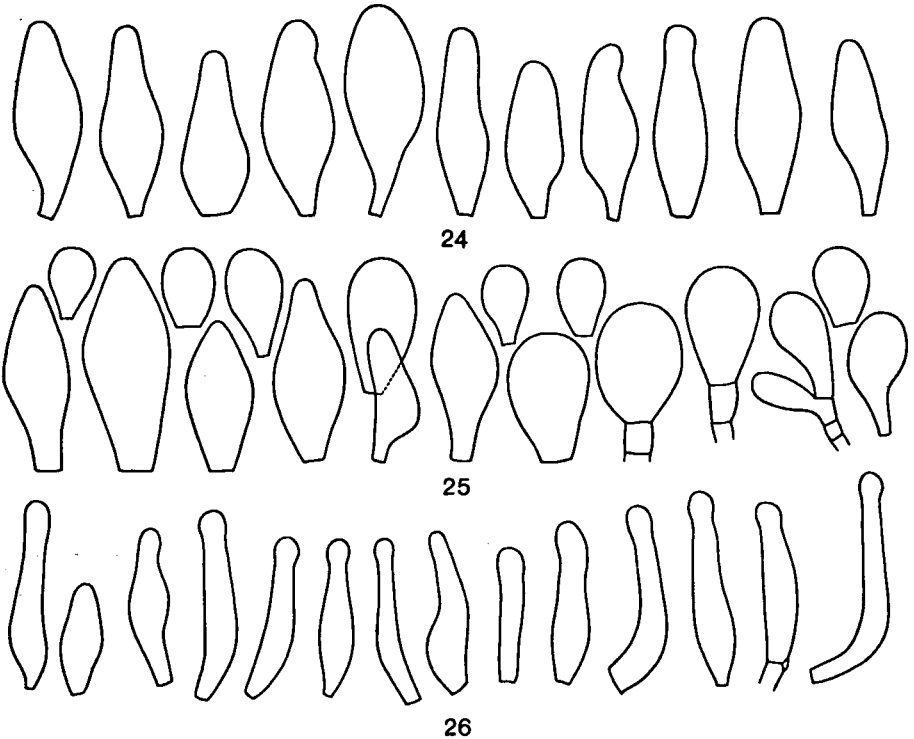
EXCLUDED.—*Psathyrella clivensis* sensu A. H. Smith *in* Mem. N.Y. bot. Gdn **24**: 318 (=?).

SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—Cooke, Ill. Brit. Fungi **7**: pl. 1183/969. 1888–1890; Orton *in* Trans. Br. mycol. Soc. **43**: 369. 1960; Romagnesi *in* Bull. trimest. Soc. mycol. Fr. **91**: 189. 1975 (as *Drosophila frustulenta*); Kühner & Romagnesi, Fl. anal.: 363. 1953 (as *Drosophila empyreumatica*).

CHIEF CHARACTERISTICS.[1]—Carpophores small to medium sized, terrestrial in chalk grassland, solitary; cap 12–30 mm in diam., broadly hemispherical then convex, umber or dark date brown, hygrophanous, dry cap pale ochraceous or whitish, without pink; veil rudimentary; gills whitish when young, later pale umber, with white edge; stem 25–40 × 1.5–3 mm, not rooting, white; spore print clay-umber; spores 8.1–9.9 (–10.8) × 5.4–6.3 μm, in water and NH_4OH 10% pale brownish yellow, with very indistinct germ pore (callus); pleurocystidia 37–60(–75) × 10–17.5 μm, moderately numerous; cheilocystidia 30–50 × 9–20 μm, very scarce, gill edge almost exclusively covered with spheropedunculate and clavate cells, 17.5–32 × 7.5–22 μm; hymenophoral trama distinctly coloured.

MACROSCOPIC CHARACTERS.[1]—Cap 12–30 mm in diam., convex or conico-convex then expanded-convex, sometimes slightly umbonate, often broadly hemispherical, not or slightly striate, rather smooth and shiny when moist, amber or date brown,

[1] Macroscopic characters have been copied from Orton's description. The characters of the trama of the gills and microscopic characters are based on our examination of the two collections mentioned by Orton.



Figs. 24–26. *Psathyrella clivensis*, 23 June 1956. — 24. Pleurocystidiogram (×575). — 25. Cheilocystidiogram (×575). — 26. Caulocystidiogram (×575).

hygrophanous, drying to whitish, pale ochraceous or pale tan often with darker centre; dry surface matt and more or less atomate, sometimes cracking in places.

Veil white, rudimentary, margin of cap only at first with a few very fugacious fibrils. Gills whitish or pale clay then pale clay-umber or coffee colour, sometimes finally with slight violaceous tinge, adnate often with tooth, more or less ventricose, subcrowded.

Stem 25–40 × 1.5–3 mm, equal or slightly thickened at base, white or whitish then discolouring pale dirty brownish from base up, hollow, scattered white silky striate, with apex white pruinose and base white tomentose.

Flesh of cap rather thick at centre, concolorous, drying whitish, often horny date brown over gills; in stem hyaline-whitish. Smell none.

Spore print clay-umber.

Trama of 'washed' gill mounted in NH_4OH 10% under binocular lens conspicuously coloured, yellowish brown (M. 10 YR 5/6) in basal 1/2 or 2/3, gradually paler towards edge and at edge pale brown (M. 10 YR 7/4).

MICROSCOPIC CHARACTERS.[1]—Spores 8.1–9.9(–10.8) × 5.4–6.3 µm (averages 9.2–9.3 × 5.6–5.7 µm), ellipsoid-amygdaliform, rarely subphaseoliform, in water and

[1] See note 1 on p. 297.

NH_4OH 10% pale brownish yellow with a reddish hue (M. 7.5 YR 6/6), in KOH 5% pale yellowish brown (M. 10 YR 5/6), not opaque, with indistinct, practically absent germ pore (callus) and very small hilar appendix.

Basidia 20–30 × 7.5–10 μm, 4-spored.

Pleurocystidia 37.5–60(–75) × 10–17.5 μm, moderately numerous, utriform (but shape variable), thin-walled, colourless, without mucus or crystals.

Cheilocystidia 30–50 × 9–20 μm, very scarce (sometimes even seemingly absent), subutriform or fusiform with obtuse apex or sometimes sublageniform, thin-walled, colourless, without mucus or crystals. Spheropedunculate and clavate cells 17.5–32 × 7.5–22 μm, in very great numbers, practically exclusively forming the cellular lining of the gill edge. Gill edge sterile.

Caulocystidia (apex of stem) 30–45 × 7.5–11 μm, moderately numerous, isolated or in small clusters, shape and size very variable.

Pigmentation of hymenophoral trama under microscope ('washed' gill mounted in NH_4OH 10%) very distinctly brown from membranal pigment, strongest at base, gradually less towards edge, few yellow hyphal septa and very few very small encrustations.

Cuticle of cap cellular, 2–3 cells deep layer of colourless globose or subglobose, vesiculose cells, 16–32 μm in diam.

Clamps on hyphae of stem and caulocystidia.

HABITAT.—Solitary in chalk grassland.

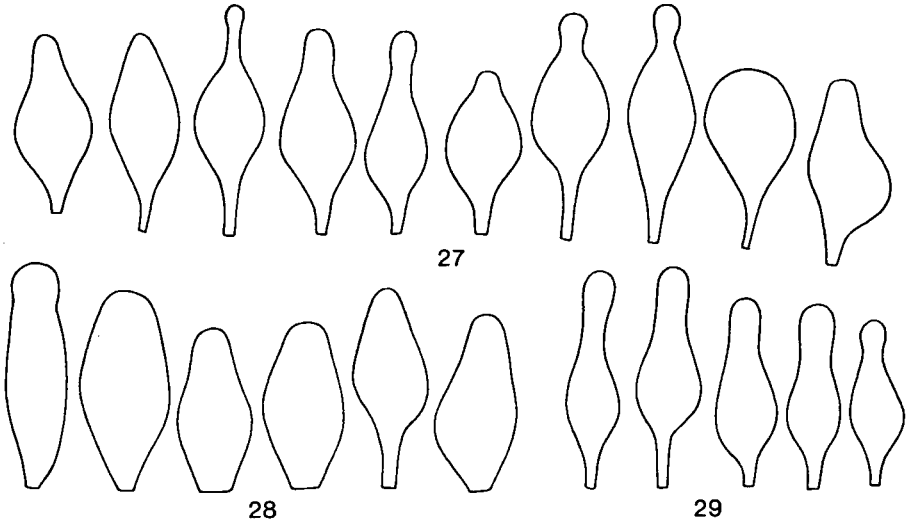
COLLECTIONS EXAMINED.—GREAT BRITAIN: Surrey, Juniper Hill, Mickleham, 23 June 1956, *P. D. Orton 939* (E); Surrey, Epsom Downs, 10 Nov. 1958, *P. D. Orton 1699* (E).

For a lengthy discussion on this species in relation to *P. frustulenta* see p. 293. Romagnesi's description of *P. frustulenta* fully corresponds with the above description, and accordingly Romagnesi regards his *P. frustulenta* conspecific with *P. clivensis*. We have taken the description of the macroscopic characters from Orton as with *P. clivensis* we are dealing with a species, first described from Great Britain and as it was Orton who rediscovered and redescribed the species in 1960.

Smith (*1972*: 318) gave under the epithet *P. clivensis* a description of an apparently different species found only once. His description mentions a few characters, that are not in accordance with Orton's description, with Romagnesi's description of his *P. frustulenta*, and with our observations on Orton's collections. With Smith the spores present a very distinct germ pore (Smith's fig. 623), they are said to be 'obscurely bean-shaped' (but all spores depicted in profile show a very distinct bulging adaxial face), the pleurocystidia are by no means utriform but are called 'fusoid-ventricose, apex subacute to obtuse' and they are depicted as lageniform, the cheilocystidia are abundant and the habitat was 'on humus near a beaver pond'.

PSATHYRELLA OBTUSATA (Pers. ex Fr.) A. H. Smith—Figs. 30–34

Agaricus obtusus Pers., Syn. Fung.: 428, 1801. — *Agaricus obtusatus* Pers. ex Fr., Syst. mycol. 1: 293. 1821; Epicr.: 232. 1838; Monogr. Hym. Suec. 1: 441. 1857; Hym. europ.: 306. 1874. — *Psilocybe obtusata* (Pers. ex Fr.) Kummer, Führ. Pilzk.: 71. 1871. — *Psathyra obtusata* (Pers. ex Fr.). Gillet, Hym. France: 591. 1874. — *Psathyra obtusata* (Pers.) P. Karst. *in* Medd. soc. fenn. 9: 47. 1882 ('obtusa'). — *Drosophila obtusata* (Pers. ex Fr.) Quél., Fl. mycol.: 59. 1888. — *Psathyra spadiceo-grisea* var. *obtusata* (Pers. ex Fr.) Quél., Enchir. Fung.: 117. 1886. — Type locality: Sweden.



Figs. 27–29. *Psathyrella frustulenta* sensu Romagn. — Pleurocystidiograms (×575). — 27. 19 April 1959. — 28. 18 Aug. 1968. — 29. 12 May 1968.

Psathyra rufescens Petch *in* Ann. Roy. bot. Gdn Peradeniya **9**: 126. 1924?

MISAPPLIED NAMES.—*Psathyra obtusata* sensu Ricken, Blätterp.: 261. 1913 (=*Psathyrella* spec.). — *Drosophila obtusata* sensu Romagn. *in* Rev. Mycol. **2**: 246. 1937 (=*Psathyrella* spec.).

SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—Schaeff., Fung. Bav. Icon., pl. 60 figs. 1–3. 1762. — Cooke, Ill. Brit. Fungi, pl. 615/593. 1884–1886. — J. E. Lange, Fl. agar. dan. **4**: 98, pl. 152 A. 1939. — Wakefield & Dennis, Common Brit. Fungi: 201, pl. 79, fig. 2. 1950. — Kühn. & Romagn., Fl. anal.: 363. 1953. — Hongo *in* Mem. Fac. Lib. Arts Educ. Shiga Univ. **11**: 40. 1961. — A. H. Smith *in* Mem. N.Y. bot. Gdn **24**: 385. 1972. — Romagnesi *in* Bull. Soc. mycol. Fr. **91**: 197. 1975.

CHIEF CHARACTERISTICS.—Carpophores small to medium sized, solitary, terrestrial. Cap 20–25 mm in diam., convex without umbo, strikingly brown, hygrophanous, dry very pale brown without pink, with white, rudimentary veil; gills strikingly pinkish brown, with white edge; stem 60–75 × 2–3 mm, not rooting, white; spore print brown with purplish hue; spores 7.2–8.1 × 4.5–5 µm, with germ pore, in water and NH_4OH 10% yellowish brown with a trace of reddish, subphaseoliform; pleurocystidia 35–50 × 9–15 µm, very numerous, fusiform; marginal cells almost exclusively consisting of fairly large (20–30 × 12.5–20 µm) spheropedunculate and clavate cells, intermixed with very few spheropedunculate cells equipped with a short subcylindrical neck; hymenophoral trama coloured.

MACROSCOPIC CHARACTERS.—Cap 20–25 mm in diam., conico-convex without umbo, striate up to 2/3 from margin upwards, central half strikingly brown (between M. 7.5 YR 4/4 and 5/4), peripheral half much lighter (M. 10 YR 6/4) but with darker striation (M. 7.5 YR 5/4), hygrophanous, drying out to very pale brown (M. 10 YR 8/4) without pink, dry surface rugulose, distinctly micaceous.

Veil white, distinct but scanty; velar fibrils and minute fibrillous networks on surface of cap only in one mm broad zone along margin; surface of lower 2/3 of stem covered with quite a few velar fibrils.

Gills 3–4 mm broad, strikingly pinkish brown, colour of weak chocolate (M. 5 YR 5/3–6/3), moderately ventricose, rather broadly adnate, with white edge.

Stem 60–75 × 2–3 mm, slightly thickening towards base, somewhat undulating, not rooting, hollow, white with smooth surface and pruinose apex.

Flesh of cap 2 mm thick at centre, concolorous (M. 10 YR 4/3 with a trace of reddish), flesh of stem very pale brown with thin white superficial layer. Smell none.

Spore print brown with a purplish hue.

Trama of 'washed' gill, mounted in NH_4OH 10% under binocular lens, in basal half greyish with only a trace of brown (M. ±10 YR 7/2), brown (M. 10 YR 5/3) only in a very narrow strip at the very base, in peripheral half almost colourless (brown colour of gills chiefly due to colour of spores).

MICROSCOPIC CHARACTERS.—Spores 7.2–8.1 × 4.5–5 μm (averages 7.4 × 4.6 μm), ellipsoid-amygdaliform and subphaseoliform, in water and NH_4OH 10% yellowish brown (M. 7.5 YR 5/6) with a trace of reddish (darker than in *P. frustulenta*), not opaque, with small (±1 μm) and moderately distinct, not truncate apical germ pore and small hilar appendix.

Basidia 17.5–22 × (9–)10 μm, 4-spored.

Pleurocystidia 35–50 × 9–15 μm, very numerous, fusiform with short and fairly broad pedicel and acute to subacute apex, thin-walled, colourless, without mucus or crystals.

Spheropedunculate and clavate cells 20–30 × 12.5–20 μm, very numerous and densely packed, vesiculose, thin-walled, without mucus or crystals, intermixed with very few spheropedunculate cells equipped with a short subcylindrical neck (cheilocystidia), 30–37 × 12.5–16 μm. Gill edge sterile.

Caulocystidia (apex of stem) mostly in large clusters and very numerous, shape and size very variable, similar to both types of marginal cells, globose, subglobose and clavate cells (20–47 × 15–25 μm) and globose cells equipped with a short subcylindrical neck (22–40 × 10–15 μm), also quite a few elliptical and subcylindrical cells.

Pigmentation of hymenophoral trama under microscope ('washed' gill mounted in NH_4OH 10%) distinctly brown from membranal pigment at base of gill, colour getting much fainter towards edge, very faint in peripheral half, a fair number of yellowish hyphal septa and very few very small encrustations in basal half.

Cuticle of cap cellular, 2–4 cells deep layer of colourless globose or subglobose vesiculose cells, 24–48 μm in diam.

Clamps on hyphae of stem and caulocystidia.

HABITAT.—Solitary, terrestrial under *Fagus* and *Quercus*.

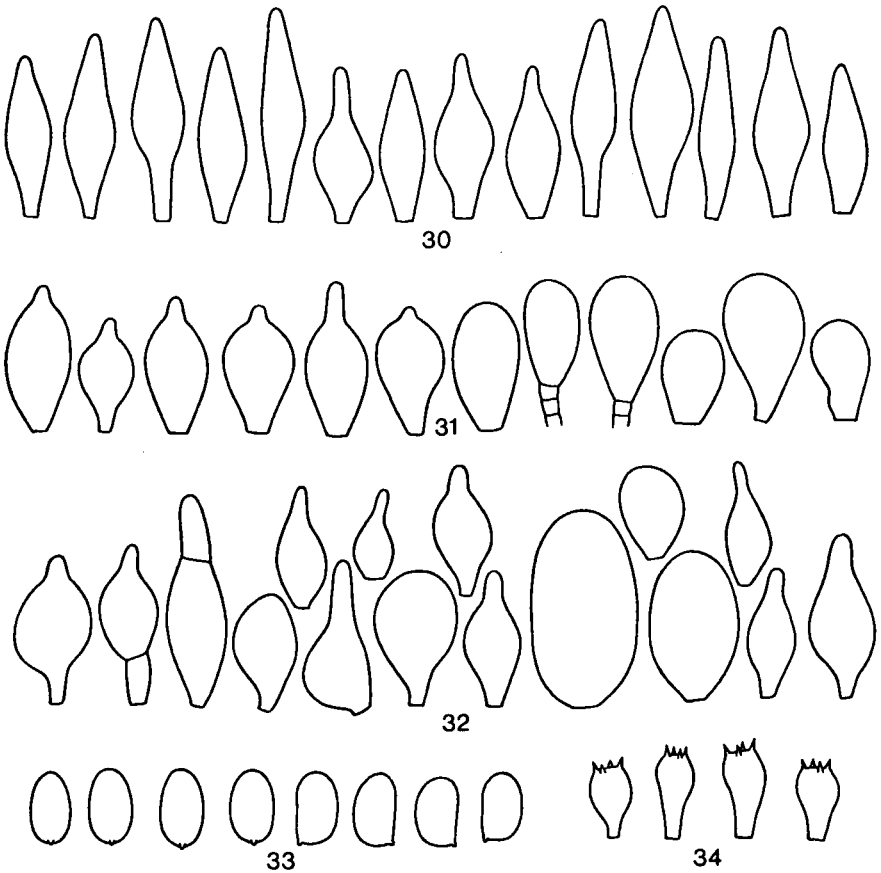
COLLECTION EXAMINED.—THE NETHERLANDS: prov. Noord-Holland, Overveen, estate 'Elswout', 21 Oct. 1976, *E.K.v. W.* (L).

The three most recent and full descriptions of *P. obtusata* are those by J. E. Lange (*1939*: 98), A. H. Smith (*1972*: 385), and Romagnesi (*1975*: 197).

Romagnesi (*1975*: 197) pointed out that A. H. Smith described a *P. obtusatus* with small spores (6–7 × 3.5–4 μm) and a 'drab grey colour' of the gills, and correctly stated that therefore that fungus is very much different from the European species. Romagnesi's statement, however, pertains to the 1941 description by Smith which—also in other respects—differs from the description given by Romagnesi (*1975*: 197)

for *P. obtusatus* and from Smith's 1972 description of that species, in which the spores are said to measure 7–9 × 4–4.5 μm and the colour of the gills is said to be pallid brown, becoming reddish brown to purplish brown, which is completely in line with the descriptions given by Lange, Romagnesi, and us.

In Smith's 1972 description the colour of the dry cap, the width of the gills and—most important of all—the colour of the spore print are lacking. Romagnesi's description is complete except for the fact that the abundance of the pleurocystidia (one of the characteristic features of the species) is not mentioned. Otherwise both descriptions are in full accordance and they agree with Lange's description (*1939*: 98). All three authors referred the species to Fries's descriptions of *A. obtusatus*.



Figs. 30–34. *Psathyrella obtusata*, 21 Oct. 1976. — 30. Pleurocystidiogram (× 575). — 31. Cheilocystidiogram (× 575). — 32. Caulocystidiogram (× 575). — 33. Sporogram (× 1210). — 34. Basidiogram (× 575).

As a matter of course the question arises whether indeed the species described by Lange, Smith, Romagnesi (and many more authors), and us, is conspecific with *A. obtusatus* as described by Fries. The two outstanding macroscopic characteristics of *A. obtusatus* as described by Fries are the brown colour of the cap (in *1821*: 'dilute badio'; in *1838* and *1874*: 'umbrinus'; in *1857*: 'spadiceo l. umbrino-fuscus') and the brown colour of the gills (in *1821*: 'umbrinis'; in *1838* and *1874*: 'pallido umbrinis'; in *1857*: 'cinereo-fuscae dein umbrinae'). It is a great pity that Fries did not give the colour of the spore print in *A. obtusatus*, which must have been some shade of brown. Among the small and medium sized species of *Psathyrella* those with distinctly brown gills are striking in the field. In the colour of cap and gills and in all other macroscopic features the descriptions by Fries on the one hand, and by Lange, Smith, and Romagnesi on the other hand are in complete agreement except, however, for the veil.

Whereas Fries emphasizes the absence of a veil in this species, Smith states that the surface of the cap is at first covered with scattered fibrils, but soon glabrous, and that the lower portion of the stem is sparsely covered with whitish fibrils. Romagnesi reports the presence of a 'voile partiel léger, en forme de cortine blanche, assez nette sur les jeunes, mais totalement évanescente'. Lange neither mentions nor depicts (plate 152 D) the presence of a veil. From these descriptions it is obvious that the veil in *P. obtusata* is rudimentary and very evanescent. Smith, having been able to examine material from no less than 26 collections, and Romagnesi no doubt having come across the species frequently as he calls it very common, they both must have been able to study the species in all its stages. Fries, on the other hand, although he did see the species himself, calls it 'rarissime', so that it is quite likely that he only very rarely examined material of *A. obtusatus*. This may well account for the fact that he never noticed traces of a veil.

In conclusion we feel with Smith, that the absence of a veil, mentioned in the Friesian descriptions of *A. obtusatus* should not stand in the way of regarding Fries's species as conspecific with P. obtusata as described by Lange, Smith, Romagnesi, and us. This view is supported by the great resemblance between the carpophores depicted on Schaeffer's plate 60, figs. 1–3 (*1762*; cited by Fries!) and on Lange's plate 152 D, both plates depicting, also in the opinion of Romagnesi, *P. obtusata* very well.

Psathyrella obtusata as described by Ricken (*1913*: 261) has the same macroscopic characters as *P. obtusata* as described by Fries, Lange, Smith, and Romagnesi, but the spores are said to be elliptical and not phaseoliform, and the cellular lining of the gill edge with Ricken consists of lancet- to flasklike cells. With Lange, Smith, Romagnesi, and us this cellular lining consists almost exclusively of spheropedunculate and clavate cells, intermixed with an occasional globose cell, bearing a short subcylindrical neck. Therefore the interpretation of *P. obtusata* (Fr.) sensu Ricken remains obscure.

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