

NOTES ON THE GENUS PSATHYRELLA—III

Unorthodox approach and key to section *Atomatae*

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(With 40 Text-figures)

The species of the genus *Psathyrella* listed by Romagnesi (1953: 355) in the groups of *Atomatae* and *Pronae* are brought into one section, section *Atomatae*. This section is divided into a coprophilous and a non-coprophilous group. Fifty-four collections of species, belonging to this section were examined, including type material of *Drosophila picta* Romagn., *D. orbitarum* Romagn., and *D. albidula* Romagn.; herbarium material of *Psathyrella atomata* (Fr.) Quél. and *Drosophila infida* Quél., received from Prof. H. Romagnesi; type material of *Psathyrella coprophila* Watling, *P. fimetaria* Watling, and *P. vinosofulva* Orton. A new species, *P. Romagnesii* Kits van Wav. and a new variety, *P. prona* var. *utriformis* Kits van Wav. are described and it is argued that the latter name is to replace the name *P. vinosofulva*. It is argued that *Agaricus atomatus* Fr. is a nomen dubium, while *D. albidula*, and *D. picta* are to be regarded as mere forms of *P. prona*, that *D. orbitarum* is a mere colour variant of *P. prona*, and that *D. infida* is identical with *P. prona*. *Psathyrella prona* f. *cana* Kits van Wav. is proposed for what hitherto has always been known as *P. atomata* (sensu Bresadola and Lange). It is also argued that *P. coprophila* and *P. fimetaria* are conspecific. A key to the species of this section is given.

Of the species belonging to Romagnesi's *Atomatae* and *Pronae* (Romagnesi, 1953: 355, 356¹), *P. coprobia* (J. E. Lange) A. H. Smith and *P. stercoraria* (Kühn. & Joss.) Moser are exclusively coprophilous and moreover well defined, so that—like Moser (1967: 215) does in his key—we propose to separate these species together with the also coprophilous species *P. coprophila*, recently described by Watling (1971: 146) as the coprophilous group. All other species, listed by Romagnesi in his two groups are basically non-coprophilous and are very closely related. Both these coprophilous and non-coprophilous groups are here united to form a single section, the *Atomatae* (Romagn.) Sing.

Before giving descriptions of the coprophilous species, we will first give a full description of *P. prona* (based on 21 collections), to be followed by a critical discussion of a number of its characters. We will then argue the position of the other species of the non-coprophilous group.

¹ Romagnesi did not indicate what rank should be assigned to his "groupes." In the following these groups will be referred to only by their name.

For our methods of examining the pleuro- and cheilocystidia, the shape, size and colour of the spores, the basidia and the pigmentation of the hymenophoral trama, the reader is referred to our previous papers (Kits van Waveren, 1968: 132; 1971: 249). Owing to lack of space it was impossible to depict full cystidiograms in the present paper. Spore-measurements are given both as a range and as a mean value added between brackets like we did previously (Kits van Waveren, 1971: 249). Pleurocystidia, hitherto believed to be rather scarce and scattered in the species of this section (Singer, 1962: 511), turned out to occur in fairly large numbers when isolated gills (deprived of their edges and preferably coloured by Congo Red 1 %) were disrupted into a large number of very small pieces with the aid of a broken razor blade and a dissecting needle under the binocular lens, the fragments finally being brought under a coverslip and further disrupted by tapping the slip. For the description of the colours of the macroscopic structures and the spores (mounted in water and studied with oil immersion with a rather strongly lit field of view) we used 'Munsell Soil Color Charts' (abbreviated in the text to M.) and the code designating its colours. In the lists of collections examined, the author's name is abbreviated to E. K. v. W. It is assumed that Romagnesi wrote the chapter on the genus *Drosophila* in the 'Flore analytique' (Kühn. & Romagn., 1953), reason why only his name is quoted when our text refers to this chapter.

We are greatly indebted to Prof. H. Romagnesi for very kindly sending us fragments of a number of type and other specimens from his own herbarium, to the Director of The Herbarium, Royal Botanic Gardens, Kew, for lending the type specimen of *P. vinosofulva*, to Dr. R. Watling for sending us type material of his two recently described coprophilous species, to Dr. H. S. C. Huijsman and Mr. P. B. Jansen for making available to us collections from their herbarium, and to Mr. J. Daams for supplying us on several occasions with fresh material from hothouses.

PSATHYRELLA (Fr.) Quéél. Section *ATOMATAE* (Romagn.) Sing.

Carpophores small, cap up to 18–20(–25) mm in diam., stem up to 55–65(–80) mm long; caps some shade of brown to grey and striate when moist, hygrophanous, paler and often more or less pink on drying; veil present but very fugacious; stem often flexuous, bulbous, not rooting; hymenophoral trama very slightly to distinctly coloured by membranous pigment; spores dark reddish brown in water, with large, conspicuous germ pore; basidia 4-, but often 2- and rarely 1-spored; pleurocystidia fairly numerous; gill edge sterile with very numerous spheropedunculate cells and much less numerous cheilocystidia.

TYPE: *Psathyrella prona* (Fr.) Gillet.

It should be noted that it is Romagnesi (1944: 53) who selected *Drosophila prona* (Fr.) Quéél. sensu Ricken as type for his section *Atomatae*. *Psathyrella atomata* would have been a more logical choice.

PSATHYRELLA PRONA (Fr.) Gillet var. *PRONA*—Figs. 1—11

Agaricus pronus Fr., Epicr. 239. 1838; Monogr. Hym. Suec. 1: 450. 1857; Hym. europ. 315. 1874; Icon. sel. 2: 39, pl. 139 fig. 3. 1879. — *Psathyrella prona* (Fr.) Gillet, Champ. France Hym. 618. 1878; Tabl. anal. Hym. pl. 589. 1890–1898. — *Coprinarius pronus* (Fr.) Quéél.,

Enchir. 120. 1886. — *Drosophila prona* (Fr.) Quéf., Fl. mycol. 57. 1888. — *Psathyra prona* (Fr.) J. E. Lange in Dansk bot. Ark. 4 (9): 16. 1936.

Agaricus exopolitus Fr., Epicr. 239. 1838; Hym. europ. 315. 1874.

Psathyrella subprona Cleland. in Trans. Proc. R. Soc. S. Austr. 51: 306. 1927.

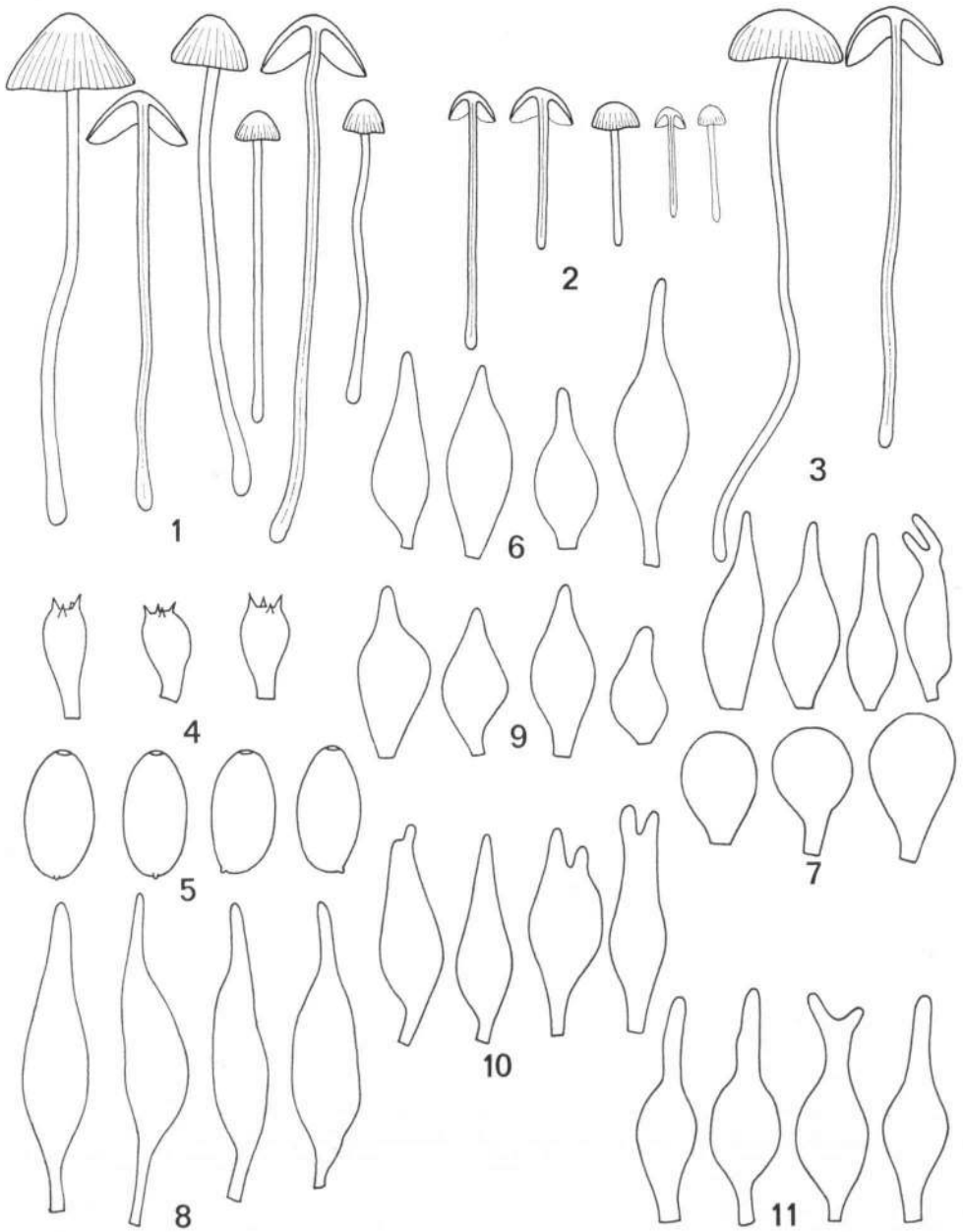
SELECTED DESCRIPTIONS AND ILLUSTRATIONS. — Gillet, Champ. France Hym. 618. 1878; Tabl. anal. Hym. pl. 589. 1890. — Cooke, Ill. Brit. Fungi 5: pl. 656 (640). 1886–1888. — Bresadola, Icon. mycol. 18: pl. 890. 1931. — Ricken, Blätterp. 265: pl. 68 fig. 6. 1915. — J. E. Lange, Fl. agar. dan. 4: 101, pl. 155 C and C'. 1939. — Kühn. & Romagn., Fl. anal. 356. 1953.

MACROSCOPIC CHARACTERS.— *Cap* both in the early and later stages paraboloid or conico-paraboloid, conical, sometimes hemispherical, sometimes with slight umbo in final stages usually spreading to convex-paraboloid or convex-hemispherical, 6–20(–25) mm in diam. and 5–10 mm high; in early stages (cap 3–6 mm) already somewhat striate and strikingly chocolate brown to dark brown (M. 7.5 YR 3/2, 4/2), sometimes even reddish brown (M. 5 YR 3/3, 4/3, 4/2), especially at central 2/3 of cap; later strongly sulcate-striate up to 1/2–2/3(–3/4) from margin inwards, centre and striae rather dark brown to greyish brown (M. 10 YR 3/4, 3/3, 3/2, 4/3, 4/2, 5/3, 5/2 and paler towards margin), striae light brownish grey (M. 10 YR 6/2), overall colour in final stages very often predominantly grey (M. 10 YR 4/1, 5/1, 6/1) with only apex showing a trace of brown (M. 10 YR 5/2); hygrophanous, drying out to pale grey (M. 10 YR 6/1, 7/1) or almost white or very pale brownish grey, alutaceous (M. 10 YR 6/2) or very pale brown (M. 10 YR 8/2, 8/3, 8/4, 7/2, 7/3), very often via reddish brown or dark reddish brown (M. 5 YR 5/3, 5/2) turning to some shade of very distinct pink (M. 5 YR 6/2, 6/3, 7/2; 7.5 YR 8/2, 8/4) or even pale red (M. 10 R 5/3, 5/2, 6/3), usually moderately to strongly micaceous and slightly to moderately rugulose.

Veil very poorly developed; in mature specimens remnants normally very scanty if not altogether absent, consisting of only a few scattered minute fibres or very small bundles of fibres on surface of cap near margin, never appendiculate and rarely reaching further inwards from margin; in very early stages often more distinct, and then fibres or sometimes networks of fibres reaching up to 2/3 from margin inwards and/or connecting cap and stem.

Gills 2–3 mm broad, large gills numbering (13–)15–20, moderately crowded, in some specimens subdistant because of their small number (13–15), very broadly adnate either without, but usually with a distinct small decurrent tooth, rounded near and sometimes protruding below margin of cap, further up with straight edge and distinctly ascending, in early stages at basal 1/3 of gill usually pale brown (M. 10 YR 6/4, 6/3 or even 5/3), sometimes even yellowish brown (M. 10 YR 5/6, 5/4) at base itself, the remainder very pale brown (M. 10 YR 7/3, 7/2) to whitish but soon greying (M. 10 YR 6/2) towards edge, later grey (M. 10 YR 5/1) with a trace of purple (M. 5 YR 5/1) and near base with brown tinge (M. 10 YR 6/2, 5/2, 4/2), finally dark grey (M. 10 YR 4/1), purplish grey (M. 5 YR 4/1) or purplish black (M. 10 YR 2/2, 3/1, 5 YR 3/1) all over, but often still near base with trace of brown (M. 10 YR 6/2 in somewhat younger stages and 10 YR 5/2, 4/2 later on), these brown shades easily overlooked but also not infrequently indeed practically absent and gills then merely grey or very dark grey; edge in early stages white, later conspicuously red; sometimes, however, predominantly white with red tinges restricted to either edges of only some gills or short stretches of (some) edges near margin of cap or near stem, rarely entirely white (in which case microscopical examination sometimes still reveals short stretches of red edge near margin of cap).

Stem (13–)18–65(–80) × (0.5–)1–1.5(–2) mm, equally thick, hollow, straight but



Figs. 1—11

very often slightly to conspicuously flexuous, with base not rooting but distinctly bulbous ("bulbilleux") and usually covered with a thin whitish tomentose layer, rarely with short white hairs, white usually only in upper part ($1/2-1/5$ of total length, but sometimes all over), lower part slightly coloured, isabelline or very pale brown (M. 10 YR 8/2, 8/3, 7/3, 6/3), rarely distinctly brown (M. 7.5 YR 4/4), slightly darkening towards base; surface shining and at lower part sparsely covered with scattered longitudinally arranged white velar fibres; apex pruinose.

Flesh in centre of cap 0.5–1.5 mm thick, dark greyish brown (M. 10 YR 3/3, 4/2, 4/3, 4/4, 5/2), in upper part of stem white (often in apex with narrow reddish zone along attachment of gills) but pale brown lower down, browner or greyer brown in base of stem. Smell and taste indistinctive.

Spore print purplish black to black.

Pigmentation of gills under binocular lens: Trama of washed gills distinctly coloured but to a variable extent; in basal $1/4-1/3$ of width of gills pale brown (M. 10 YR 6/3, 6/4, 7/4), in a very narrow zone along base of gills sometimes even browner (M. 10 YR 5/3 or slightly paler than M. 7.5 YR 5/6), in remaining part (and sometimes in entire gill) very pale brown and increasingly paler towards edge (M. 10 YR 7/4, 7/3), near the edge and sometimes even entire gill practically colourless (M. 10 YR 7/2 or 2.5 Y 7/2).

MICROSCOPIC CHARACTERS.— *Spores* ellipsoid-amygdaliform, in specimens with exclusively 4-spored basidia (11.7–)12.6–15.3(–15.8–17.1) \times 6.3–8.1 μ (13.7 \times 7.1 μ), in specimens with both 4- and 2-spored basidia 12.6–15.8 \times 6.3–8.1 μ (14.1 \times 7.3 μ), in specimens with exclusively 2-spored or 2- and 1-spored basidia (12.6–)14.4–17.1(–18) \times (6.3–)6.8–8.1 μ (15.7 \times 7.4 μ), in water dark to very dark reddish brown (M. 2.5 YR 2/4, 3/4, 3/6; 5 YR 3/3, 3/4) and opaque to sub-opaque, with large apical germ pore (1.8–2 μ , sometimes 2.5 μ wide), with comparatively small hilar appendix.

Basidia 4-, 2- or 1-spored, (17.5–)20–30(–35) \times (10–)11–13(–15) μ .

Pleurocystidia moderately to fairly numerous, rarely scarce, size and shape variable, lageniform, with neck usually rather long and either subcylindrical (width 2–3 μ) or tapering towards acute apex, more or less sharply delimited from or broadening towards and gradually passing into ventricose cell-body, with apex rarely forked into two fingerlike protuberances, 35–65(–80) \times 10–17.5(–20) μ ; cell wall of normal thickness and colourless.

Marginal cells: Gill edge sterile and usually very densely packed with normally rather large, but sometimes small, spheropedunculate cells (12.5–)15–50 \times 7.5–20(–25) μ , mixed with lageniform cheilocystidia, (25–) 35–65(–70) \times 7.5–17.5 μ , the latter usually being absent or very scarce near margin of cap, but conspicuously increasing in number towards stem and from about midway gill edge usually rather densely packed, the number of spheropedunculate cells simultaneously becoming smaller, to 50 % or less of total number of marginal cells, and their size also decreasing.

EXPLANATION OF FIGURES 1–11

Figs. 1–11. *Psathyrella prona* var. *prona*. — 1–3. Habit sketches (1: Haarzuilens, 31 Oct. 1969; 2: Rannoeh, 31 Aug. 1965; 3: Bockelo, 29 July 1967). — 4–7. Elements from the Haarzuilens collection (4: basidia; 5: spores; 6: pleurocystidia; 7: marginal cells). — 8–11. Pleurocystidia (8: Nuenen, 6 Oct. 1962; 9: 's-Graveland, 8 April 1970; 10: Bôle, 12 July 1966; 11: Denekamp, 5 July 1963). (Habit sketches, \times 1; spores, \times 1212; all other elements, \times 575.)

Pigmentation of hymenophoral trama under microscope in washed gills distinctly pale brown by membranal pigment but sometimes practically colourless near gill edge, increasingly brown towards base, where pigmentation normally moderately and rarely even fairly strong; yellow hyphal septa more or less abundant and small encrustations present (sometimes very scarce, on other specimens rather abundant).

Cuticle of cap cellular; cells 25–50 μ .

HABITAT.—In grass by roadsides, in parks, meadows, muddy cart-tracks in woods, sometimes on compost, also around and on dung in strongly manured meadows and rarely just on dung. Sometimes subcespitose. (April–)June–November. Fairly common.

COLLECTIONS EXAMINED.—4-spored form:—

NETHERLANDS: Denekamp, Estate “Singraven”, 4 August 1962, E. K. v. W. (L); Boekelo, 29 July 1967, E. K. v. W. (L); Wageningen, Plant physiological Research Centre, 20 Nov. 1963, S. de Boer (L); Haarzuilens, Estate “De Haar”, 31 Oct. 1969, E. K. v. W. (L); Vleuten (hothouses), 31 March 1972, J. Daams (L); Amsterdam, Amsterdamse Bos, 21 June 1961 and 12 August 1967, E. K. v. W. (L); Dorst, 25 April 1965, P. B. Jansen (Herb. Jansen); Nuenen, 5 Oct. 1962, E. K. v. W. (L).

SCOTLAND: Perthshire, grounds of Rannoch School, 31 August 1965, E. K. v. W. (L).

SWITZERLAND: Bôle, 28 June 1961 and 2 June 1965, H. S. C. Huijsman (L).

2-spored form:—

NETHERLANDS: Doetinchem, Estate “Bijvanck”, 20 June 1953, H. S. C. Huijsman (L); Amsterdam, Amsterdamse Bos, 27 July 1960, E. K. v. W. (L).

SWITZERLAND: Bôle, 12 July 1966, H. S. C. Huijsman (L).

4- and 2-spored form:—

NETHERLANDS: Denekamp, Estate “Singraven”, 5 July 1963, E. K. v. W. (L); 's-Graveland, Estate “Boeckesteyn”, 8 April 1970, J. Daams (L); Amsterdam, Amsterdamse Bos, 19 July 1962, E. K. v. W. (L).

2- and 1-spored form:—

NETHERLANDS: Leiden, 23 Sept. 1969, C. Bas 5140 (L).

SWITZERLAND: St. Cèrgue, 23 Sept. 1966, E. K. v. W. (L).

1. Observations on various characters of *Psathyrella prona*

A.—The colour of the gill edge.

Romagnesi made the colour of the gill edge the chief key character for separating the species of his *Atomatae*, having a white gill edge, from those of his *Pronae* in which the edge is red. In the species of *Psathyrella* which are supposed to possess a red gill edge, the red zone under the marginal cells, however, is quite often partly and sometimes even altogether missing. In our experience, this is particularly so in the *Atomatae* and *Pronae*, in which the colour of the gill edge is a very unreliable character.

In a previous paper (Kits van Waveren, 1971) we pointed out that in *P. gracilis* and *P. microrrhiza*, both species normally having a red gill edge, it is not at all un-

common that the gill edge is seemingly white and that only on close examination (washed gill under binocular lens or microscope) small stretches of a red zone are revealed, usually only in older specimens and only near the margin of the cap or near the stem. In both species it moreover does occur, be it rarely and more often in younger specimens, that even on such a close scrutiny the entire gill edge is white in all gills.

Apparently the same goes for *P. stellata* Romagnesi, as in the description of that species (Romagnesi, 1953: 359) the reader is warned that while in search for a red gill edge, he should "examiner au microscope un fragment d'arête de spécimens bien développés" as in this species the red gill edge "peut être tout à fait insensible macroscopiquement."

In the *Pronae* this situation turned out to be even more misleading. Out of our 20 collections of *P. prona*, five were described as having macroscopically a white gill edge (in another two the colour was not mentioned). As a result these collections had been taken for either *P. atomata* or *P. albidula*. Examination of a washed gill both under the binocular lens and microscope clearly revealed in four out of these five collections distinct stretches of a red zone under the marginal cells, be it that sometimes two to four fruitbodies had to be examined.

One out of these four collections (Nuenen, 5 Oct. 1962) consisted of three fruitbodies, which were macroscopically described very carefully immediately after they had been collected and taken for *P. atomata*, because of their beautifully white gill edge, their conspicuously grey caps, habitat in grass and flexuous stems. Later, examination of the washed gills of the dry herbarium material revealed a fairly faint but quite distinct red zone under the marginal cells along the entire length of the edge. Much to our disappointment, as it was the only collection of which we ever believed that it was the true *P. atomata*.

In December 1969 we were enabled to examine ten collections labelled *P. atomata* in the Kew Herbarium. Unfortunately except for one collection (one specimen collected in 1948), none of these collections was accompanied by descriptive notes. On close examination (binocular lens, microscope) the specimens of five of these ten collections showed stretches of a red zone under the marginal cells (four could be identified as *P. prona*, one as *P. gracilis*), two others were taken to be *P. prona* because of distinctly but not strongly pigmented hymenophoral trama, one collection (leg. Broome, 1869) had very pale and small spores and therefore could not possibly belong to the *Pronae*, and only two might have been identified as *P. atomata* if a macroscopic description had been available;

The uselessness of the red gill edge as distinctive character is finally clearly demonstrated by the cases of *P. picta* and *P. infida*. Romagnesi's original description of *P. picta* (1952: 151) and the one in the 'Flore analytique' (1953: 356) mention the presence of a red gill edge in that species. But Favre (1960: 550) in giving the only other description of *P. picta* (or rather, what he believed to be *P. picta*) available in the literature, calls the edge white, saying that he does not believe this to be sufficient reason not to identify his specimens as *P. picta*!

Romagnesi (1953: 356) ranks *P. infida* Quél. with the species of the *Pronae* (edge of gills red), but Quélet himself in all his publications (1877: 329; 1886: 120; 1888: 61) calls the edge white and so do Bigeard & Guillemain (1913: 281). As for *P. prona*, Quélet (1880: 52; 1888: 57) calls the gill edge “parfois rosée” or “souvent rose”, therefore by no means always red.

Like in other species of *Psathyrella*, which normally have a red gill edge, in the *Pronae* the red zone under the marginal cells therefore can either be absent altogether or only be present along small stretches of the edge or be concealed by a thick spore deposit, which only leaves the marginal cells exposed and therefore the edge seemingly white.

In conclusion, we have very little faith in the taxonomic value of this character, which is unreliable and should therefore be used with great caution and preferably not at all in distinguishing species of the non-coprophilous group of section *Atomatae*.

B. The colour of the moist cap.

In the genus *Psathyrella* it is generally overlooked (especially in *P. gracilis*, which is always described as having a predominantly mud-grey cap) that the moist caps of primordia and early stages of many species are dark reddish brown (M. 5 YR 3/3, 3/4, 4/4). Very soon this colour changes into some shade of (dark) brown or greyish brown. For *P. prona* Fries (1836: 239; 1853: 450; 1874: 315) called it “fuliginous.” In our experience (and the same goes for the trama of the gills) the amount of pigment causing these colours varies from one collection to another, and in one collection from one specimen to another, and with both age and weather conditions. In wet weather and on ageing the caps of *P. prona* lose some of their pigment, becoming paler brown, more greyish brown and finally grey. The drying caps become very pale brown, dirty greyish brown, alutaceous or dirty pale grey and sometimes even whitish.

On several occasions and particularly in the collections (30–40 specimens) from Haarzuilens, 31 October 1969, and Denekamp, 4 August 1962, we were able to observe both the dark reddish brown colours in young specimens and the very grey colours in old specimens, with the brown and greyish brown shades in intermediate stages. Dr. Bas in his collection 5140 described the colour of moist young specimens as “rather dark brown with chocolate tinge, older more sepia, M. 7.5 YR 3/2.”

It is perhaps often overlooked that in *Psathyrella* the process of drying of the cap begins very soon (favoured by wind and drought). Often, when one collects mature specimens of *P. prona*, the caps seemingly are still moist, whereas in fact they have already begun to dry.

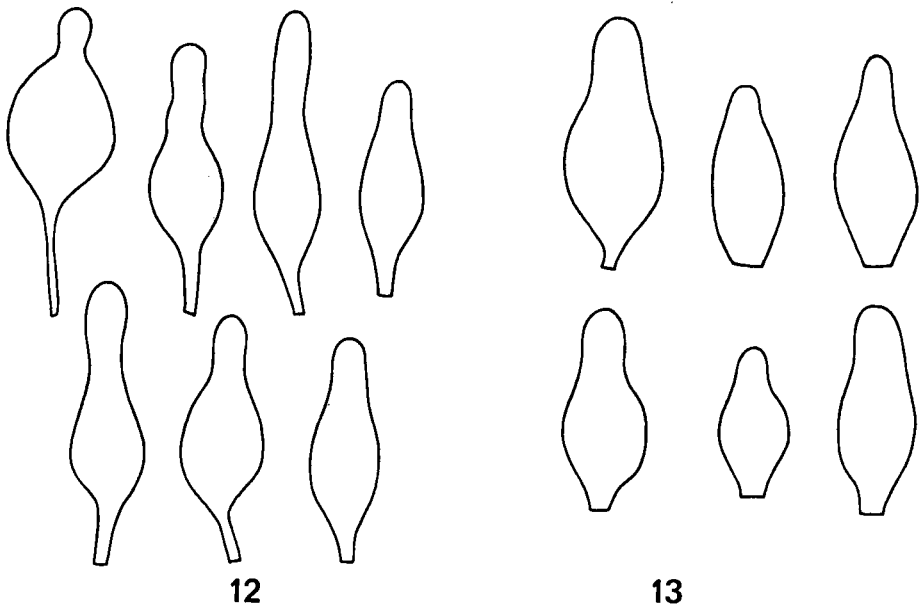
C. The appearance of pink in the colour of the drying cap.

What exactly causes the caps of *P. prona* and many other species of *Psathyrella* to acquire a—often very striking—pink colour in the process of drying, is unknown. It

must be some quality of the pigment (chiefly located in the hypodermis). The amount of pigment (largest in very young caps) present at any time must be an important factor. As a result of the following observations, we believe that the amount of moisture in the trama of the cap and above all the speed by which the caps dry, also are important factors.

Specimens from a large collection (Haarzuilens, 31 October 1969) which were made to dry quickly in the heater or on the radiator of the central heating system never showed the slightest trace of pink during their process of drying. Other specimens of the same collection, which were left lying on the table for some hours to dry very slowly, produced the most wonderful pink colours (up to M. 10 R 6/3). Again other specimens of the same collection and age were first put with the lower part of their stems in water for 24 hours, their caps resting on white paper in order to obtain a spore print. At the end the caps were very wet and the carpophores were then left to dry slowly on the table. These caps hardly showed a trace of pink during their process of drying.

On June 3rd 1972, Mr. Daams brought us a fresh collection of some 30 specimens collected only a few hours previously in a hothouse and kept by him in the moist atmosphere of a closed box. In spite of this careful precaution, the caps of most specimens already showed a beautiful pink discoloration. Only a few were still quite moist and as a result very brown (M. 7.5 YR 4/2, 3/2) without any trace of pink.



Figs. 12, 13. *Psathyrella prona* var. *utrififormis*, pleurocystidia (12: Salernes, 28 Sept. 1960; 13: Amerongen, 19 Sept. 1965). ($\times 575$.)

Others, seemingly moist also but apparently having already begun to dry, were of a peculiar dark reddish brown, vinaceous colour (M. 5 YR 4/3, 4/2). Still others, obviously involved in the process of drying, showed a variety of mainly pink colours (M. 5 YR 6/3, 6/2; 10 R 5/3, 5/2, even 6/3), usually being more brown on top and greyer near the margin. The specimens were all left to dry slowly on a table and then put in a heater. In this case the pink shade remained to a slight extent.

Ageing, drying out and remoistening of caps of carpophores of species of *Psathyrella* are bound to occur in the field also.

D. *The ultimate colours of the cap in P. prona.*

At any moment the ultimate colour of the caps of *P. prona*, as we have seen under B and C, therefore depends on the amount of pigment still present at that moment, the speed by which the process of drying took place up till that moment and the degree of dryness reached at that moment. Romagnesi made similar observations and conclusions. He states (1953: 356) that the cap in *P. prona* takes a "couleur crème-grisâtre blafarde (parfois mêlée de rose pâle au bord), ou blanchâtre-alutacé sale mais seulement si c'est un adulte qui sèche." He does not state what colour the younger stages take when they dry out. In our experience they remain browner and may develop dark vinaceous colours, which eventually may turn distinctly red.

From all this it should be clear that the caps of *P. prona* are bound to show such a multitude of colours that it seems very hazardous and therefore undesirable to attach any taxonomic importance to these colour variants, let alone to base new species on them. We thus do not believe in the taxonomic value of the differences in colour used by Romagnesi (1953: 356) in distinguishing the six non-coprophilous species of his *Atomatae* and *Pronae*. Of these six species, *P. atomata* stands more or less apart as the one and only species which has very little pigment, so that we will deal with the relation of this species to *P. prona* separately.

E. *The colour of the gills.*

Two factors are responsible for the colour of the gills, viz. the amount of pigment in the hymenophoral trama and the number and ripeness of the spores. The true colour of the trama, we feel, should therefore be examined and assessed in the absence of the spores and thus after their removal from the gill. This is done by the process of washing the gills, as fully described in a previous paper (Kits van Waveren, 1971: 249). Dry herbarium material and NH_4OH 10 % being used as medium, the pigmentation presents itself as brown under the binocular lens when viewed against a white background. Curiously enough the red zone under the marginal cells turns a distinctly olive, olive-brown to greenish colour. We always avoided as much as possible examination of either very young or very old specimens.

In very early stages of *P. prona* the fresh gills usually are distinctly brown in the

almost exclusively responsible for the colour of the gills, which is then dark grey to purplish black or black, with, however, usually still a trace of brown near the base. Not infrequently, however, mature gills are just grey or dark grey all over, having very little or hardly any pigment in the trama.

As was expected from our general experience in *Psathyrella*, the degree of pigmentation of the trama of washed gills turned out to vary rather considerably; the gills in some collections or some specimens of the same collection being distinctly but never strongly coloured (strongest at the base), in others practically colourless (M. 10 YR 7/3, 7/2; 2.5 Y 7/2). On microscopical examination the trama often appeared to be more pigmented than was expected from the preceding examination under the binocular lens. In *P. prona* all intermediate stages between distinctly pigmented and almost colourless trama were encountered.

F. *The flexuous stem.*

In 12 out of our 20 collections of *P. prona* the stem was called either slightly or usually very distinctly flexuous. In five the stem had been described as straight, suggesting that they must have been stiffer than in the specimens with flexuous stems. In four the shape was not mentioned. Fries in all his publications called the stem of *P. prona* "laxus"; in 'Monographia' (1857: 450) and 'Hymen. europ.' (1874: 315) he called it "flexuosus," but in the 'Icones' (1879: 39, pl. 139 Fig. 3) he depicted straight stems and in the accompanying description he said that the stems could either be flexuous or straight ("normaliter flexuosus sed variat strictus").

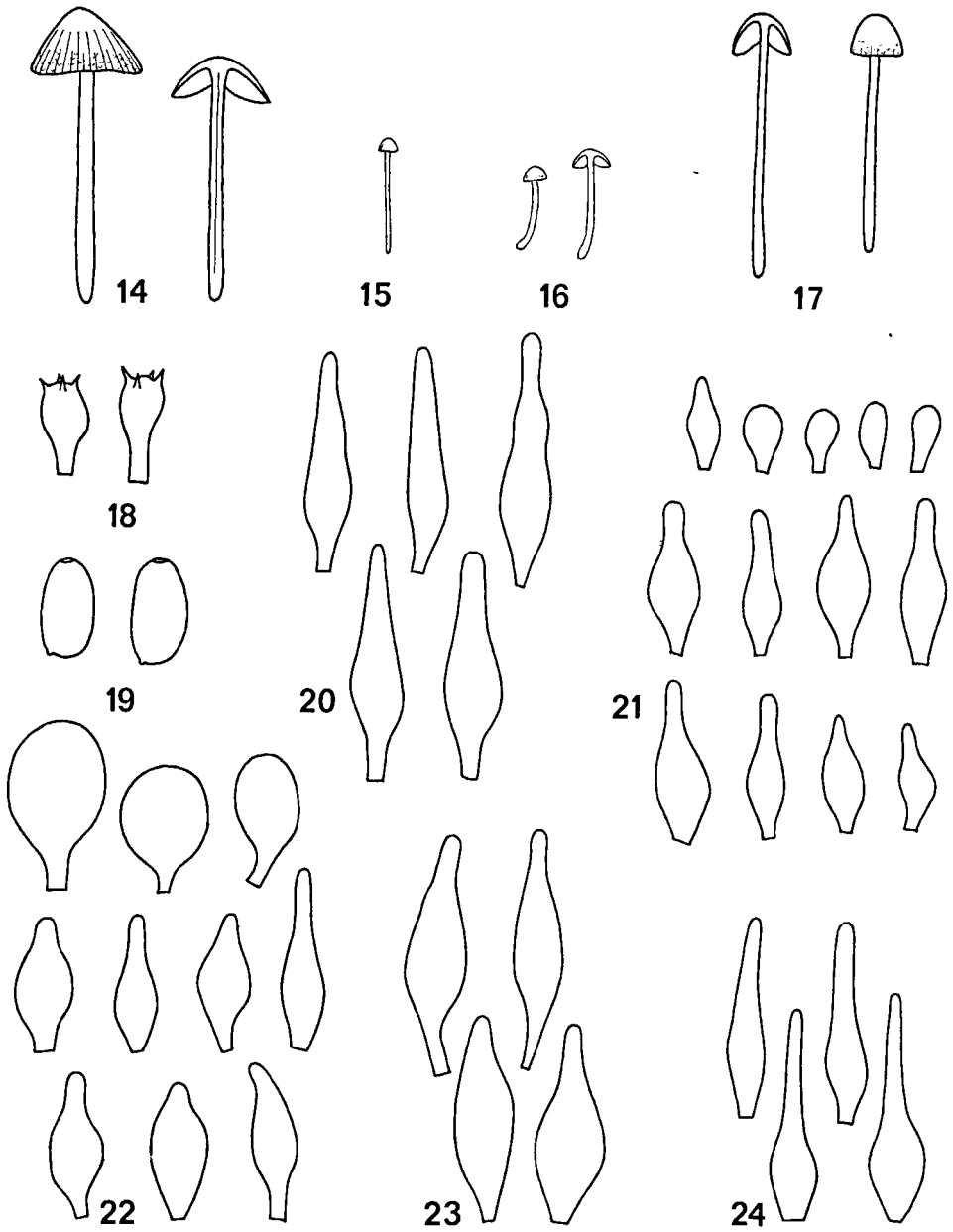
Romagnesi (1953: 356) does not mention a flexuous stem in any of the species of the *Pronae*, but the stem of *P. orbitarum* is called "recto" (1952: 152), also "raide" (1953: 356). Of *P. albidula* Romagnesi (1953: 356) states that the stem is "plus flexueux" than that of *P. atomata*.

From these data we think it sufficiently clear that the stem, being either more or less flexuous or straight, cannot play a part in the separation of species in section *Atomatae*, the variability obviously being too great.

G. *Habitat.*

It would seem from the 'Flore analytique' that the habitat of the non-coprophilous species of the *Pronae* and *Atomatae* is of some importance with regard to distinguishing the various species.

Psathyrella atomata is said to grow in "pelouses ou ornières herbeuses des chemins éclairés, en général isolé ou par deux"; *P. albidula* "sur les graminées fanées" and its var. *palustris* "dans les endroits boueux" (of both *P. atomata* and *P. albidula* it is also stated that they may occur "au plus sur paille pourrie"). *Psathyrella prona* is supposed to grow "surtout dans l'herbe des endroits \pm ensoleillés"; *P. picta* in "humus des endroits ombragés," whereas *P. orbitarum* and *P. infida* are supposed to be "espèces caractéristiques des ornières boueuses des chemins ombragés." In a recent letter to



Figs. 14—24

basal part, but the intensity of this colour gradually but rapidly decreases towards the area of the edge, in which the colour is whitish to hardly brown or already slightly grey because of the presence of some spores. In later and final stages the spores are the Dutch mycologist Mr. Daams, Prof. Romagnesi stated having found *P. albidula* also in meadows.

We feel that there is no essential difference between the various habitats listed above. The list does not mention manured meadows or dung. As for *P. prona* Fries (1838: 239; 1874: 315), however, already stated that this species grows "in graminosis fimetosis" (exactly like the habitat of the gregariously growing fruit-bodies of our Scottish find of 31 August 1965). Later (1857: 450) Fries mentioned "locis graminosis pinguibus, juxta vias passim" and still later (1879: 39, description accompanying his plate 139 fig. 3) he mentioned "locis graminosis pinguibus ad viarum margines" (exactly like our gregariously growing find in Denekamp, 4 August 1962). Mr. Daams found the species on compost in hothouses, Dr. Huijsman in a recently manured garden, and Dr. Bas found some 40 specimens on wood chips in sandy clay in a park (some subcespitose). Finally we found two beautiful specimens on a large dungheap (29 July 1967) and two specimens attached to small pieces of burnt wood at a burnt place in a meadow in Switzerland (23 September 1966).

Therefore, although *P. prona* preferably grows in grass or muddy cart-tracks, it may sometimes be found growing in heavily manured fields or gardens and sometimes actually even on dung.

2. *Psathyrella atomata* versus *P. prona*

Fries described *P. atomata* in 'Syst. mycol.' (1821: 298) and *P. prona* together with *P. atomata* in 'Epicrisis' (1838: 239). In 'Monographia' (1857: 450) and 'Hymen. europ.' (1874: 315) he gave a description of both species and in the 'Icones' (1879: 39 pl. 139 fig. 3) he described and depicted *P. prona*. From these descriptions it is clear that the differences between the two species are mainly differences of degree. In *P. atomata*: cap "striatulo," stem "leviter flexuoso"; in *P. prona*: cap "striato," stem "flexuoso." Gills are called "subdistantes" in both species, but "subtriquetrae" or "subtriangulares" in *P. prona*, whereas for *P. atomata* no particular shape is mentioned.

The only real difference seems to be a difference in colour of cap, gills and gill edge. In 1821 the cap of *P. atomata* is called "albido roseo," in 1838 and 1874 "A gracilis instar e livido in albidum et roseum mutator" and in 1857 "livescens siccus

EXPLANATION OF FIGURES 14-24

Figs. 14-24. *Psathyrella coprobia*. — 14-17. Habit sketches (14: Braemar, 25 Aug. 1961; 15: Denekamp, 15 Oct. 1962; 16: Rannoch, 24 Aug. 1965; 17: Glenisla, 28 Aug. 1966). — 18-21. Elements from the Glenisla collection (18: basidia; 19: spores; 20: pleurocystidia; 21: marginal cells). — 22, 23. Elements from the Rannoch collection (22: marginal cells; 23: pleurocystidia). — 24. Pleurocystidia from the collection Hilversum, 27 Oct. 1970. (Habit sketches, $\times 1$; spores, $\times 1212$; all other elements, $\times 575$).

alutaceo aut incarnato-pallescente,” the comparison with *P. gracilis* and the word “livescens” indicating the presence of another—no doubt somewhat browner—colour at some earlier stage of development. In all descriptions the gills are called “cinereo-nigricantibus” and in 1838 and 1874 the gill edge is called “concolore l. albicante.”

In *P. prona* the cap is called “livido-fuliginus” (1838) or “fuliginus” (1857, 1874, 1879), a pink colour never being mentioned! The gills of *P. prona* are always called “livido-fuliginus” and the gill-edge “obsolete roseolae” (1838, 1874). We therefore share Romagnesi’s view (1953: 371) about Fries in this matter: “sans doute Fries n’a-t-il pas exactement limité les deux espèces,” and think that the differences in colour of cap and gills mentioned by Fries are merely differences of degree. As we pointed out under 1A, we consider the colour of the gill edge totally unreliable.

Having reached this conclusion it would be only natural to combine the two species under the older name, *P. atomata*. However, whereas we are sufficiently informed about *P. prona*, particularly through the illustration in the ‘Icones’, we have very little definite knowledge of *P. atomata*. Indeed, the latter is mainly known in the sense as interpreted by Bresadola and Lange. This consideration has eventually led us to reject *Agaricus atomatus* of Fries as a nomen dubium and to choose *P. prona* instead as the name covering the assemblage of forms to be described presently. Romagnesi (1953: 371) had to make some decision with regard to the interpretation of *P. atomata* and adopted Bresadola’s and Lange’s interpretation of *P. atomata* and Ricken’s interpretation of *P. prona*, quoting Lange’s plate (1939: pl. 156 C) for *P. atomata* with an exclamation mark. Romagnesi (l.c.) gave the following characteristics of *P. atomata*: —

1. Cap “cendré sur le frais, puis blanc-gris-cendré ou blanc par le sec.” Above, under 1B, we stressed the point that usually mature caps of *P. prona* are predominantly grey and that the cap can also dry to practically white, like Romagnesi himself said for *P. prona* (“blanchâtre-alutacé sale”). On the other hand the caps of *P. atomata* must have a touch of brown in their earlier stages, because they dry to “d’ocre-clair ou de fauvâtre” at the centre according to Romagnesi.

2. Dry cap “dépourvu de teintes rosées ou rougeâtres.” But Fries and practically all other authors mention the appearance of pink in the drying cap. Even Bresadola (1931: pl. 889 fig. 1) and Lange (1939: 102) mention and clearly depict a pink colour in the drying cap.

3. Cap “jamais strié même lorsqu’il est humide.” But Fries and practically all other authors consider the caps of *P. atomata* to be striate to some extent (in a membranaceous, hygrophanous species like this *Psathyrella* this is to be expected). Again, both Bresadola and Lange depict distinctly striate caps, although Lange in his description curiously enough calls the caps “never pellucido-striate.”

4. Gills “gris-perle, gris-cendré, puis gris-noirâtre sans nuances brunes.” But Lange’s plate clearly depicts a brown shade in the gills, although in the text he calls them “pale to dark grey.” If there is a difference in the colour of the gills between *P. atomata* and *P. prona* it must be caused by a difference in the amount of

pigment in the hymenophoral trama. Like we pointed out under 1E the pigmentation of this trama in *P. prona* may, in our experience, vary from fairly strong to almost nil. If indeed it is almost nil or nil, the gills are bound to be grey in the earlier, and purplish black or black in the later stages, "cinereo-nigricantibus" (Fries).

5. Gills subhorizontal (1953: 356 fig. 468 and in comparison with the gills of *P. albidula*; in *P. prona* "ventrués-ascendantes"). But it was *P. prona*, of which Fries calls the gills "subtriangulares" and one of the sketches we have of cross-sections of carpophores of *P. prona* and also one of a cross-section of a specimen of *P. prona* f. *picta* shows a practically horizontal gill edge. Moreover, both Lange and Bresadola depict distinctly ascending gills for *P. atomata*.

6. "Voile nul." But the veil in *P. prona* is very poorly developed, very evanescent and usually missing in mature specimens. It is never even mentioned in any of the descriptions of *P. prona* in literature!

7. Gill edge white. Under 1A we have demonstrated the unreliability of this character.

8. *P. atomata* is supposed to grow "en général isolé ou par deux," but out of our 20 collections of *P. prona* eight consisted of either one or two specimens.

In conclusion, we feel that there is sufficient reason to assume that what hitherto has been called *P. atomata* in the sense of Bresadola and Lange merely is a pigment-poor form of *P. prona*, which happens to have a white gill edge macroscopically and rarely also microscopically. We propose to describe this form as: —

PSATHYRELLA PRONA f. **cana** Kits van Wav., f. nov.

A *Psathyrella prona* var. *prona* differt pileo griseo lamellisque acie haud rubris.

TYPUS: Bresadola, Icon. mycol. 18: pl. 889 fig. 1. 1931 ("*Psathyrella atomata* Fr.")

SELECTED DESCRIPTIONS AND ILLUSTRATIONS. — Bresadola (l.c.). — J. E. Lange, Fl. ag. dan. 4: 102, pl. 156 C. 1939.

Differing from *P. prona* var. *prona* in the grey colour of the cap and in the gill edge which is not red.

COLLECTION EXAMINED. — FRANCE: Oct. 1939 (Herb. H. Romagnesi).

**3. *Drosophila picta*, *D. infida*, *Psathyrella orbitarum*,
and *P. albidula* versus *P. prona***

Romagnesi (1953: 356) made the colour of the cap one of the chief characters in distinguishing these five non-coprophilous species from one another. In the light of the very great variability of the colours of the cap of *P. prona* as outlined above under 1D these differences cannot be of any taxonomic importance. This may be best shown by quoting these colours of the five species one by one as given by Romagnesi.

P. prona: "brun-bistre-ocracé, prenant—mais seulement si c'est un adulte qui

sèche—une couleur crème-grisâtre blafarde (parfois mêlée de rose pâle au bord) ou blanchâtre-alutacé sale.”

D. picta: “couleur particulièrement vive, d’abord d’un brun-fauvâtre obscur, mais chaud, puis brun-chocolat et conservant une nuance ocre, par le sec alutacé-ocracé terne, mais chaud, avec un léger reflet incarnat.”

P. orbitarum: “brun-chocolat ou brun-bistre foncé par l’humidité, mais laissant deviner déjà dans cet état la teinte pourpre-vineux ou incarnat-vineux qu’il prend \pm dès qu’il se met à sécher.”

D. infida: “brun-bistre-ocracé intense, sombre mais beau, un peu teinté de fauvâtre en haut (rappelant un peu *picta*, mais cependant bien moins fauve), pâissant remarquablement quand il sèche, en passant au crème-alutacé pâle et sale sur le bord, un peu jaunâtre sur le mamelon.”

P. albidula: “d’abord brun-ocre terne ou brun-fauvâtre \pm sale, mais se déshydratant vite et pâissant en crème-blanchâtre ou alutacé clair avec le sommet crème ou brun-jaunâtre pâle.”

What it comes to is that the caps of *Drosophila picta* and *D. infida* have more pigment than the cap of *P. prona* and so are very dark brown, and that in *Psathyrella orbitarum* the pink and reddish colours on drying come early and are rather intense. These differences with *P. prona* are obviously merely differences of degree. On more than one occasion we have been in great doubts whether we had found *D. picta* or *P. orbitarum*, or merely a colour variation of *P. prona*. We will now deal with each of these species separately.

A. *Drosophila picta* Romagn.

Apart from Romagnesi (1952: 151 and 1953: 356) only Favre (1960: 550) has ever given a description of this species (which he describes as having a white gill edge, a paler colour of the cap than mentioned by Romagnesi and no pink in the dry cap). It is mentioned neither by Moser, nor in the New British Check List. According to Romagnesi the stems of this species are darker than in any of the other species, but becoming paler in their upper part. In the Latin description the colour of the gills is called “brunneis” and in the ‘Flore analytique’ the hymenophoral trama is described as being “remarquablement colorée en brun-jaune vif.” (We saw this for ourselves while studying the type specimen.) Obviously, therefore, cap, stem and trama of the gills are more strongly coloured than in *P. prona*, but in all other respects (shape and size of carpophores, spore size, size and shape of cystidia, occurrence of 4- and 2-spored basidia etc.) this species is identical with *P. prona*, reason why we propose to regard *D. picta* as a strongly pigmented form of *P. prona*.

We believe having found this form on 23 April 1961 near Amsterdam (some 50 specimens in grass) and at some distance from the same locality on 16 July 1966 (two specimens). In every respect they were identical with *P. prona*, but the young caps

were very dark reddish brown (M. 5 YR 2/2, 3/2, 3/4), and the older ones still very dark brown (M. 7.5 YR 3/2, 4/2, 4/4, also M. 10 YR 3/4, 4/3). Some of these colours, however, are already lying within the range of *P. prona*. On drying, the caps became pale greyish yellow to alutaceous with a very distinct touch of pink. The stems were either whitish or very pale brown at the apex and gradually darker towards the base (up to M. 10 YR 7/3, 6/3, sometimes even 5/3), a flesh colour occasionally mixing with the brown ("fauvâtre"). The gills in the mature specimens were distinctly browner than they usually are in *P. prona* (at the base M. 10 YR 4/4, in the basal part M. 10 YR 4/3, 4/2, and greyer towards the edge, M. 10 YR 5/2; 5 YR 5/2, 5/1).

At first we found in the collection of 23 April 1961 the trama of a washed gill only pale brown (M. 10 YR 7/3) under the binocular lens, but unexpectedly it turned out to be more strongly coloured under the microscope. Examination of another gill showed it to be browner (M. 10 YR 6/3) and again another gill showed a brown narrow zone at the base, the remainder being pale brown. Finally we examined a younger specimen and here the gill showed in its basal 1/3 the very same brown colour as the gills of the type specimen (slightly paler and more ocre than M. 7.5 YR 5/4). The colour was paler towards the edge and pale brown (M. 10 YR 7/3, 7/2) close to the edge. The very same pigmentation was next encountered in the specimens of 16 July 1966.

As a result of these observations we propose the name *P. prona* f. **picta** (Romagn.) Kits van Wav., *comb. nov.*, for this colour variant (basonym: *Drosophila picta* Romagn. in Bull. mens. Soc. linn. Lyon 21: 151. 1952).

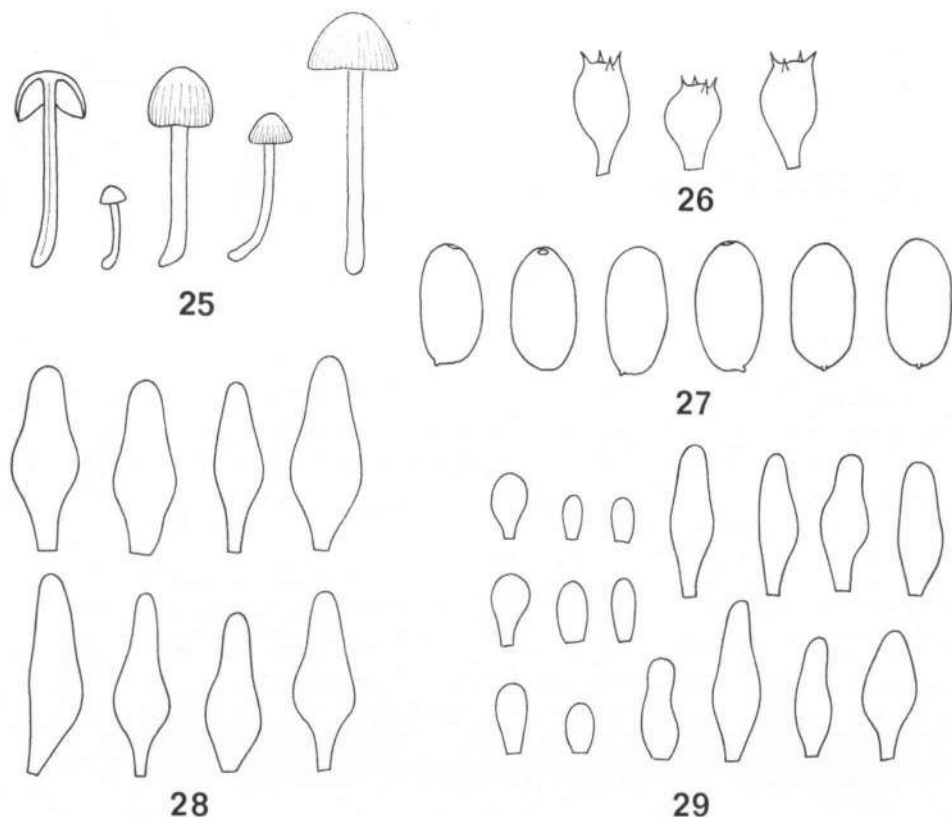
B. Drosophila infida Quél.

Apart from Konrad & Maublanc (1928: 77), who call this taxon a "forme voisine de *P. prona*" and list it with a number of "espèces peu connues, douteuses ou à exclure" and Bigeard & Guillemin (1913: 281), who call it *Hypholoma infidum* (Quél.), this species, described by Quélet (1877: 329) is only mentioned by Romagnesi (1937: 246 and 1953: 356) and Moser (1967: 215), the latter author obviously copying Romagnesi's description. The species seems most likely to represent young stages of *P. prona* as Quélet (1877: 329; 1888: 61) called the cap "villeux, floconneux" and also (1886: 120) merely "floculoso" and as Romagnesi (1937: 246) described the cap as being "revêtu de petites soies blanches qui ne paraissent pas provenir du tout de la cortine." But later (1953: 367) Romagnesi neither mentioned these "soies," nor the presence of a veil. This species is also supposed to be very small (cap 6–10 mm, but in 1953: 5, 12–18 mm) and the cap is conical (like often in younger stages of *P. prona*). The gill edge, according to Quélet in all his descriptions, is white, which also supports the view that the species represents young stages of *P. prona*. Romagnesi, however, ranks the species in the *Pronae* (red gill edge).

Both Quélet and Romagnesi call the gills "espacées" and "triangulaires," the number of large gills according to Romagnesi being "parfois frappant, 16–19

grandes lames." But Dr. Huijsman (notes in herbarium) counted in one fresh collection of *P. prona* ± 20 large gills, in another ± 18 and in a third 13-17. Dr. Bas (notes in herbarium) called the gills in one fresh collection of *P. prona* "moderately distant" and in another "rather crowded." We counted the gills in three dry collections from our herbarium and found 14-15 in one collection, 14-14-18-13 in another and 15-16-16-14 in a third. Moreover Quélet (1880: 52) also called the gills of *P. prona* "espacées." In several other species of *Psathyrella* and particularly in *P. fulvescens* we have occasionally come across specimens which had strikingly distant gills, so that this character can hardly be of any importance in distinguishing the species of this group.

As for the gills being triangular (Quélet, Romagnesi), it was Fries (1838: 239; 1857: 450; 1874: 315) who called the gills of *P. prona* "subtriquetrae" or "sub-



Figs. 25-29. *Psathyrella coprophila*, Rannoch, 25 Aug. 1965. — 25. Habit sketches. — 26. Basidia. — 27. Spores. — 28. Pleurocystidia. — 29. Marginal cells. (Habit sketches, $\times 1$; spores, $\times 1212$; all other elements, $\times 575$).

triangulares"; on rare occasions we found the gills of *P. prona* and *P. prona* f. *picta* to be subhorizontal.

All that remains as a possible difference between *Drosophila infida* and *P. prona* is the fact that according to Romagnesi the gills are "d'un brun tabac, à la fin très foncé" (according to Quélet they are "incarnat bistré, puis brun noir" or "carneo-fuscis" or "incarnat, puis baies"). The trama of a washed gill taken from a fragment of a cap of a specimen which Prof. Romagnesi sent us and which he had identified as *D. infida*, indeed was very brown (M. 7.5 YR 4/4), and towards the gill edge slightly paler. This being the one and only difference with *P. prona* to go by and for that matter only a difference of degree, we recommend to consider the name *D. infida* Quélet a synonym of *P. prona*. Quélet himself (1886: 120) once listed *D. infida* as a variety of *P. prona*.

C. Psathyrella orbitarum (Romagn.) Moser

From the original description (1952: 153) and from the description in the 'Flore analytique' (1953: 356) it is quite obvious to us that this species represents those forms of *P. prona* in which the pink discoloration of the drying cap is very strong and sets in very early, so that in combination with the brown pigment of the cap a dark wine-reddish colour originates. In the original description the gills are called "e brunneis cinereis" (the hymenophoral trama is called "subhyalina vel hyalina"), but in the 'Flore analytique' the gills of *P. prona* are said to be of practically the same colour, viz. "gris-lilacin, puis gris-brunâtre." In all other macroscopic and microscopic respects *P. orbitarum* and *P. prona* are also identical. The stem of *P. orbitarum* is called "raide" (1953: 356) and also "recto" (1952: 152), but the fact that, like we have seen, the stems in *P. prona* also often are straight, indicates that they can be "raide" too.

Romagnesi (1953: 356) refers for *P. orbitarum* only to plate 155 C of Lange (1939) and not to plate 155 C' to which Romagnesi does not refer any of the species of the *Pronae*. Lange himself considers both plates to represent *P. prona* and it is interesting to notice that the specimen depicted by him on the right of plate 155 C is absolutely identical with the specimen depicted in the middle of plate 155 C' (both specimens are conspicuously dark brown!). Also the cap of the specimen depicted on the left on plate 155 C is hardly more pink than the cap of the specimen depicted on the right of plate 155 C'. Dennis & al. (1960: 147) consider both plate 155 C and C' to represent *P. orbitarum*.

Mr. J. Daams, while collecting four specimens of a *Psathyrella* on rich soil in a hothouse at Vleuten on 31 March 1972, noted the colour of the moist caps as being a beautiful wine-red, hence the identification as *P. orbitarum*. But on 22 April 1972 he collected on the very same spot young specimens of which he described the caps as "entirely brown, rather dark coffee-brown without any trace of red." Of the latter collection older specimens were brown-grey, only some of them showing a trace of pink. (Mr. Daams also noticed that the young specimens had a conspicuous red

gill edge, while in older specimens the red gill edge was present only in a few places.) Our explanation would be that the fruit-bodies of the two collections had been drying at a different speed owing to external conditions (see above under 1C). Valuable observations like these just show how erratic the matter of the pigmentation of the cap (and gill edge) and its pink discoloration on drying can be.

The hymenophoral trama (studied on a washed gill under a binocular lens) of a gill of a type specimen, received from Prof. Romagnesi, was practically colourless and hyaline, like the trama of several of our collections of *P. prona* in which the trama was almost colourless or very pale brown (M. 10 YR 7/3, 7/2).

In conclusion we think that *P. orbitarum* has to be looked upon as being conspecific with *P. prona* and not even worth separating as a taxonomic form.

D. Psathyrella albidula (Romagn.) Moser

Psathyra subatomata J. E. Lange (1936: 16; 1939: 102, pl. 153 C; 1940: VII) is not the same species (based on a different type) as *Psathyrella subatomata* Karsten (1885: 72), the latter species having a red gill edge and a stem with "basi curvatus, in radicem deorsum attenuatum" and therefore most likely to represent *P. gracilis*. Romagnesi (1952: 151) changed Lange's name into *Drosophila albidula* and later (1953: 356) gave his own description of this species, referring to Lange's plate 153 C. Moser (1967: 215) transferred the species to the genus *Psathyrella*. The species is supposed to have a white gill edge and a non-rooting stem.

Although Lange (1939: pl. 153 C) depicts this species with very slightly rooting stems, in the text (1939: 91) he puts this species in a group of "small not rooting species." Lange calls the colours of the cap "at first ochre clay" and—in small print—"like those of *P. prona* when dry." From his plate it is obvious that he must have dealt with specimens already in the process of drying. With Romagnesi the colour is "brun ocre terne ou brun-fauvâtre." Both descriptions therefore indicate that the drying cap must have turned pinkish.

Lange depicts straight stems whereas with Romagnesi the stems are "plus flexueux" (than those of *P. atomata*). With Lange the colour of the gills is "fuscous with a slight tinge of purplish" (for *P. prona* it even is "brownish fuscous"), with Romagnesi "± brunâtre, brun-tabac, brun noirâtre." In the light of the variability of the colour of the cap (see under 1D) and of the gills (see under 1E) and the stems being either straight or flexuous in *P. prona*, it is clear that with regard to these characters there are no real differences between on the one hand *P. prona* and on the other hand *P. subatomata* and *P. albidula*.

All other characters of *P. subatomata* and *P. albidula* also are identical with, or lie within the range of the normal variability of the characters of *P. prona*, except perhaps the somewhat browner gills and the white gill edge. But with Lange the gills in *P. prona* are even browner and—as we have seen—the edge of the gills in *P. prona* occasionally is white. We indeed found the hymenophoral trama of a type specimen of *P. albidula* distinctly coloured under the binocular lens (M. 10 YR 5/4, even

slightly darker at the base). Also microscopically the trama was distinctly pigmented. This puts the species in the same boat as *Drosophila picta* and *P. infida*, both species also having rather brown gills but then combined with a red gill edge. *Drosophila picta* we regard as a rather strongly pigmented form of *P. prona* (see above). In the same way we propose to regard *P. albidula* as yet another form of *P. prona*, in which both the cap and the hymenophoral trama are less coloured than in *P. prona* f. *picta*, and in which the colour of the gill edge moreover happens to be white; *Psathyrella prona* f. **albidula** (Romagn.) Kits van Wav., *comb. nov.* (basonym: *Drosophila albidula* Romagn. in Bull. mens. Soc. linn. Lyon 21: 151. 1952).

We already argued that *P. atomata* should be regarded as a pigment-poor form of *P. prona* and it is interesting to notice that Lange considers his *P. subatomata* to stand even between *P. atomata* and *P. prona*. It just shows how very close these various forms are to one another and how justifiable it therefore is to unite them into one species, *P. prona*.

The futility of all these colour differences in species of the non-coprophilous group of the *Pronae* is once again demonstrated by our find of some 30 specimens in a heavily manured grass field in Scotland (Kinloch Rannoch, 31 August 1965), which at first we mistook for *P. albidula*. The caps were rather dark brown (M. 10 YR 5/3, 5/2), young gills were distinctly brown (M. 10 YR 5/6 near the base and M. 10 YR 6/4, 6/3 towards the edge), gills of older specimens were purplish grey with only a trace of brown near the base, and the edges of the gills looked white. Only on careful examination of a few gills of the herbarium material, distinct stretches of red gill edge were found.

Romagnesi (1952: 151) also described a *Drosophila albidula* var. *palustris*, which he called "très voisine" to *D. albidula* (1953: 356). This variety is characterized by "cystidiis primum obtuse fusiformibus, deinde saepe lageniformibus" (in the 'Flore analytique': "cystides avec le col souvent plus large et plus court" than in *P. albidula*), while it is supposed to grow in muddy places, to be darker and to have smaller spores ($12-15.5 \times 6.5-7.2 \mu$) than *P. albidula*, the latter species being supposed to grow on rotting grass and to have spores measuring $13-16 \times 7-8 \mu$. In the discussion of the habitat (see under 1G) we already pointed out the variability of habitats of the species of the *Pronae* and we discussed also (see under 1D) the negligible value of the differences in colour of the cap in these species. The difference in spore size between *P. albidula* and its var. *palustris* moreover showing considerable overlapping, we decided to consider this varietal name, which so far has only been mentioned by Romagnesi, a mere synonym of *P. prona* f. *albidula*.

4. *PSATHYRELLA PRONA* var. **utriformis** Kits van Wav., *var. nov.*—Figs. 12, 13

Psathyrella vinosofulva P. D. Orton in Trans. Br. mycol. Soc. 43: 378. 1960.

A varietate typica differt pleurocystidiis utriformibus.

TYPE: H. S. C. Huijsman, 28 Sept. 1960, France, Var, Salernes (L).

This variety differs from *P. prona* var. *prona* by the rather numerous and large

utriform pleurocystidia, $35-77.5 \times 12.5-25 \mu$, of which the apex is very obtuse and broad ($5-11 \mu$).

COLLECTIONS EXAMINED.—NETHERLANDS: Amerongen, near castle, 19 Sept. 1955, C. Bas 886 (L); Leiden, Estate "Nieuweroord", 19 Sept. 1960, R. A. Maas Geesteranus 13405 (L); Echt, 6 Oct. 1962, E. K. v. W. (L).

FRANCE: Dép. Ain, Simandre, 21 August 1957, H. S. C. Huijsman (L); Dép. Var, Salernes, 28 Sept. 1960, H. S. C. Huijsman (type, L).

OBSERVATIONS.—In four out of these five collections the hymenophoral trama was very pale brown, practically colourless, in the fifth it was slightly but distinctly brown. The specimens from the Echt collection had a white gill edge.

This variety, no doubt, is the same as *P. vinosofulva* P. D. Orton (1960: 378). For Orton the very conspicuous wine-reddish colour of the drying cap was a striking character; hence the name. This peculiar colour is the very same colour which made Romagnesi separate his *P. orbitarum* from *P. prona* and for all macroscopic characters *P. vinosofulva* seems identical with Romagnesi's *P. orbitarum*. As pointed out above, we regard *P. orbitarum* as being merely a colour variant of *P. prona*. The presence of a white gill edge and the utriform cystidia remain as the only difference between *P. vinosofulva* and this colour variant of *P. prona*. The gill edge in *P. prona*, however, is not infrequently white, as we pointed out above, and in one out of our five collections of *P. prona* var. *utriformis* it indeed was white also. The only remaining, but very striking difference therefore is the utriform shape of the cystidia. This is why we propose the name *P. prona* var. *utriformis* for this taxon.

5. *Psathyrella Romagnesii* Kits van Wav., *sp. nov.*—Figs. 34–40

Pileus 3–5 mm latus, semiglobatus vel semiglobato-paraboloideus, striatus, spadiceus dein cinereo-spadiceus, hygrophanus, siccus alutaceus haud rubescens, haud rugulosus, micaceus. Velum exiguum sed manifestum, e fibrillis parvis minutis ad pilei marginem vel paulo sursum constans. Lamellae 1 mm latae, 12–14 primariae, subdistantes, ventricosae ad pilei marginem, ascendentes, latissime adnatae in dentem brevem decurrentes, cinereo-spadiceae dein purpureo-ravidae, acie albae. Stipes 10–15 \times 0.25–1 mm, aequalis, rectus, fistulosus, haud radicans, albus, basi bulbosus atque pilis minimis albis contactus, apice pruinosis. Caro in pileo tenuissima.

Sporae (10.4–)10.8–12.6 \times 5.9–7.2 μ (11.2 \times 6.3 μ), ellipsoideo-amygdaliformes, in aqua observatae obscure rubiginosae, poro germinativo magno (1.8 μ). Basidia 4-sporigera, 16–24 \times 9.5–12 μ . Pleurocystidia dispersa ad modice numerosa, fusiformia, apices subcapitatae vel capitatae, 32.5–55 \times 10–17.5 μ , hyalina, tenui-tunicata. Cellulae marginales: cheilocystidia 25–40 \times 7.5–12 μ , pleurocystidia similia, hyalina, tenui-tunicata. Cellulae spheropedunculatae numerosae, 12.5–25 \times 7.5–15 μ . Cuticula pilei cellularis e cellulis 10–30 μ formata. Trama lamellarum in partem basalem pallide brunnea, alibi hyalina. In quisquiliis gramineae putridas.

TYPUS: The Netherlands, prov. Limburg, Bommerig, 3 Oct. 1964, E. Kits van Waveren (L).

MACROSCOPIC CHARACTERS.—*Cap* hemispherical to hemispherical-paraboloid, 3–5 mm in diam., striate, brown to greyish brown (M. 10 YR 4/3, 6/3, 6/2, not seen in probably darker and reddish brown earlier stages), hygrophanous, drying out to very pale alutaceous without pink, smooth, strongly micaceous,

Veil poorly developed but leaving distinct, scanty, very small fibres near margin of cap or even further up.

Gills 1 mm broad, subdistant, large ones numbering 12–14, rounded near margin of cap, ascending, very broadly adnate with small decurrent tooth, greyish brown to purple (M. 10 YR 5/2; 7.5 YR 5/2) with white edge.

Stem 10–15 × 0.25–1 mm, equal, straight, not rooting, at distinctly bulbous base covered with very small white hairs, pruinose at apex, hollow.

Flesh of cap very thin, colour not noted.

Spore print not obtained.

Pigmentation under binocular lens: Hymenophoral trama in basal 1/4–1/3 of gill distinctly brown (slightly paler than M. 10 YR 6/3), remainder of gill very pale brown (M. 10 YR 7/3, 7/2) and almost colourless near the edge.

MICROSCOPIC CHARACTERS.—*Spores* ellipsoid-amygdaliform, (10.4–)10.8–12.6 × 5.9–7.2 μ (11.2 × 6.3 μ), in water dark reddish brown (M. 2.5 YR 3/4, 3/6; 5 YR 3/4), opaque to subopaque with 1.8 μ wide pore and small hilar appendix.

Basidia 4-spored, 16–24 × 9.6–12 μ.

Pleurocystidia scattered to fairly numerous, fusiform, at apex subcapitate to capitate, 32.5–55 × 10–17.5 μ, with wall of normal thickness, colourless.

Marginal cells: Gill edge sterile with abundant spheropedunculate to clavate, fairly small cells, 12.5–25 × 7.5–15 μ, mixed with fairly densely packed, rather small, fusiform, subcapitate to capitate cheilocystidia, 25–40 × 7.5–12.5 μ, without crystals or mucoid deposits on marginal cells.

Pigmentation of hymenophoral trama under microscope in basal 1/3–2/3 part pale but distinctly brown with many yellow hyphal septa and few encrustations.

HABITAT.—On rotting grass or hay. Very rare.

COLLECTIONS EXAMINED.—NETHERLANDS: Heumen, farm “Boonenkamp”, 12 Oct. 1964, E. K. v. W. (L); Bommerig, “Elzeter Bos”, 3 Oct. 1964, E. K. v. W. (type: L).

OBSERVATIONS.—This species differs from *P. prona* and is characterized by its very small size, its small spores and its subcapitate to capitate cystidia. In the collections examined, the gill edge was white.

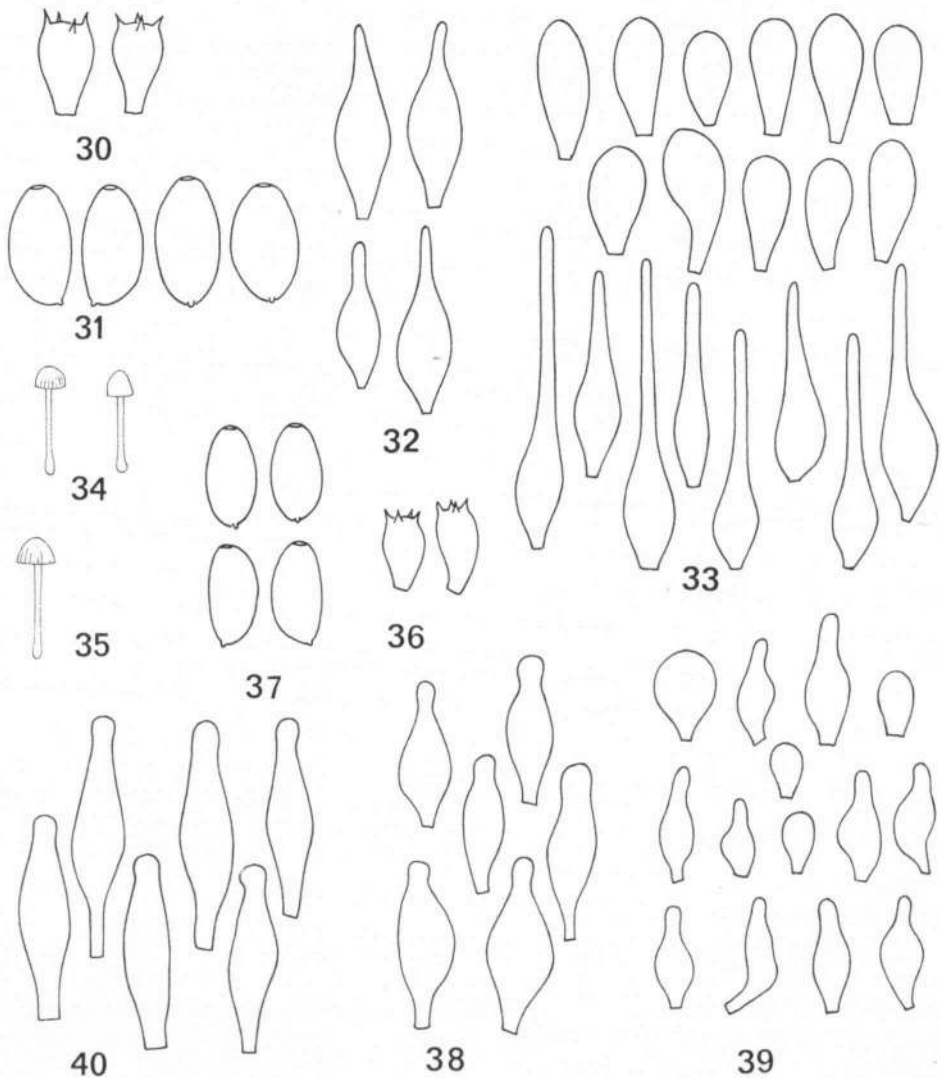
This is one of these remarkable instances in which a rare species is found twice within a very short time on two places lying many miles apart (in this particular case some 60 miles).

One might think that this is Romagnesi's *Drosophila albidula* var. *palustris* (see under 3D), but according to Romagnesi's Latin description that variety is a good deal larger (cap 5–10 mm, stem 18–35 mm long), it has larger spores (10–15 × 5.5–7.7 μ), and its cystidia are not capitate.

6. PSATHYRELLA COPROBIA (J. E. Lange) A. H. Smith—Figs. 14–24

Psathyra semivestita B. & Br. var. *coprobia* J. E. Lange in Dansk bot. Ark. 9 (1): 7. 1936. — *Psathyra coprobia* (J. E. Lange) J. E. Lange, Fl. ag. dan. 4: 93. 1939. — *Psathyrella coprobia* (J. E. Lange) A. H. Smith in Contrib. Univ. Mich. Herb. 5: 44. 1941. — *Drosophila coprobia* (J. E. Lange) Kühn. & Romagn., Fl. anal. 355. 1953.

MISAPPLIED: *Psathyra semivestita* (Berk. & Br.) Quél. sensu Kauffman, Agaric. Mich. 271. 1918.



Figs. 30-33. *Psathyrella stercoraria*, 's-Graveland, 8 April 1971. — 30. Basidia. — 31. Spores. — 32. Pleurocystidia. — 33. Marginal cells. (Spores, $\times 1212$; all other elements, $\times 575$).
 Figs. 34-40. *Psathyrella Romagnesii*. — 34, 35. Habit sketches (34: Bommerig, 3 Oct. 1964; 35: Mook, 12 Oct. 1964). — 36-39. Elements from the Bommerig collection (36: basidia; 37: spores; 38: pleurocystidia; 39: marginal cells). — 40. Pleurocystidia from the Mook collection. (Habit sketches, $\times 1$; spores, $\times 1212$; all other elements, $\times 575$.)

SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—J. E. Lange, Fl. ag. dan. 4: 93, pl. 152 F. 1939. — Kühn. & Romagn., Fl. anal. 355. 1953.

MACROSCOPIC CHARACTERS.—*Cap* hemispherical, paraboloid to slightly conico-paraboloid, 3–25 mm in diam., in early stages dark red-brown (M. 5 YR 3/4; 7.5 YR 3/2), very soon various shades of dark brown (M. 7.5 YR 4/2; 10 YR 3/3, 3/4) or just brown (M. 10 YR 5/3, 5/4), striate up to 1/2–3/4 from margin inwards; hygrophanous, drying out via yellowish brown (M. 10 YR 6/8, 6/6, 6/4) to pale brown, greyish brown or alutaceous (M. 10 YR 6/3, 6/2, 7/3), without pink, rarely slightly rugulose, sometimes micaceous.

Veil beginning as a thick woolly-fibrous coating, forming adpressed but sometimes also slightly reflexed bundles of fibres, sometimes even forming coarse fibrillose scales; its density increasing towards the margin of the cap; in older specimens still present as fibrous flocci and networks up to 1/3–2/3 from margin inwards.

Gills (1–)2–4 mm broad, ascending but sometimes subhorizontal, broadly adnate with or without a small decurrent tooth, distinctly brown (M. 10 YR 4/3, 5/4) at and near the base, greyish brown (M. 10 YR 4/2, 5/2) towards the edge and grey (M. 10 YR 6/1, 5/1, 4/1, 5 YR 4/1) at margin, with white edge.

Stem (15–)25–50 × (0.5–)1–2 mm, equal, straight, normally distinctly bulbous or with a gradually swelling extreme base, not rooting, whitish to very pale brown, hollow, pruinose at apex, covered with a fairly dense woolly-fibrous coating of veil.

Flesh of cap relatively thick, 0.75–1.5 mm, dark grey-brown (M. 10 YR 3/2, 3/3, 4/3), flesh of stem whitish but very pale brown alongside the cavity.

Spore print purplish black to black.

MICROSCOPIC CHARACTERS.—*Spores* ellipsoid-amygdaliform, 9.9–13.5 × (4.5–)5.9–7.2 μ (11.1 × 6 μ), in water very dark to dark reddish brown (M. 2.5 YR 3/4, 3/6, 2/4; 5 YR 3/3), subopaque, with 1.5–1.8 μ wide pore and small hilar appendix.

Basidia 4-spored, 16–27.5 × 9.6–12.5 μ.

Pleurocystidia fairly numerous, lageniform, with neck usually rather long and sub-cylindrical or tapering towards the subacute apex, sometimes either more or less sharply delimited from, but usually gradually broadening towards ventricose cell body, (20–)30–55(–60) × 10–17.5 μ.

Marginal cells: Gill edge sterile and normally densely packed with either fairly large or rather small spheropedunculate and clavate cells, 12.5–30(–40) × 7.5–25 μ, mixed with varying numbers (sometimes locally closely packed) of cheilocystidia of same shape as pleurocystidia, 25–45 × 7.5–15 μ.

Hymenophoral trama distinctly brown, increasingly so towards base of gill.

Cuticle of cap cellular; cells 25–50 μ.

HABITAT.—On (cow and) horse dung.

COLLECTIONS EXAMINED.—NETHERLANDS: Denekamp, Estate “Singraven”, 15 Oct. 1962, E. K. v. W. (L); Hilversum, 27 Oct. 1970, J. Daams (L); Etten & Leur, “Haagsche Beemden”, 6 June 1965, P. B. Jansen (Herb. Jansen); Nederweert-Asten, Groote Peel, 7 Nov. 1963 and 19 Oct. 1965, P. B. Jansen (Herb. Jansen).

SCOTLAND: Braemar, “Invercauld” Estate, 25 Aug. 1961, E. K. v. W. (L); Kinloch Rannoch, Perthshire, “Carmichael” Estate, 24 Aug. 1965 and “Dunalastair” Estate, 14 Sept. 1966, E. K. v. W. (L); Glenisla, “Brewlands” Estate, 28 Aug. 1966, B. Ivory (L); Edinburgh, 1967, culture received from M. Jurand; Glen Affric, Invernesshire, 17 Sept. 1968, E. K. v. W. (L); Tomich, Invernesshire, 17 Sept. 1968, E. K. v. W. (L).

7. *PSATHYRELLA STERCORARIA* (Kühn. & Joss.) Moser—Figs. 30—33

Drosophila stercoraria Kühn. & Joss. *apud* Kühn. & Romagn. in Bull. Soc. Nat. Oyonnax (Mém. hors sér. 2): 4, 57, 59. 1957. — *Psathyrella stercoraria* (Kühn. & Joss.) Moser in Gams, Kleine KryptogFl. 3. Aufl., 2 (b2): 215. 1967.

SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—Kühn. & Joss. in Bull. Soc. Nat. Oyonnax (Mém. hors sér. 2): 4, 57, 59. 1957. — Kühn. & Romagn., Fl. anal. 356. 1953.

MACROSCOPIC CHARACTERS.—From field notes provided by Mr. Daams: Moist *cap* paraboloid, 8 mm in diam., dark brown, striate, hygrophanous, drying out to greyish pink (this colour is not mentioned by Kühn. & Joss.); *gills* grey with a red edge; *stem* 27 × 1 mm; whitish to yellowish white, hyaline, not rooting.

Abbreviated and compiled from descriptions published by Kühner and by Josserand: *Cap* campanulate, hemispherical or conical, 4–8 mm in diam., striate, dark reddish brown to dirty brown, hygrophanous, drying out to pale brown, alutaceous or coffee-colour, no pink appearing.

Veil arachnoid, evanescent, soon leaving only a few fibres and minute flocci near margin of cap and some fibres on stem.

Gills ascending, broadly adnate, dingy brown (Josserand: coffee-colour, then dirty grey), edge red.

Stem 15–25 × 1 mm (Josserand: 20–40 × 0.6 mm), equal, flexuous, pale brown, with base slightly bulbous, covered with small white hairs and not rooting.

Spore print blackish.

MICROSCOPIC CHARACTERS (examination of dried specimen, received from Mr. Daams).—*Spores* ellipsoid-amygdaliform, 11.7–12.6 × 6.3–7.2 μ (12.4 × 6.9 μ), in water dark reddish brown (M. 2.5 YR 3/4, 3/6), not opaque, with 1.8 μ wide pore and small hilar appendix.

Basidia 4-spored, 20–22.5 × 12–13 μ.

Pleurocystidia very scarce indeed, fusiform with neck thin, long, and either cylindrical, passing abruptly into ventricose cell body or gradually widening towards cell body, 32.5–45 × 10–14 μ, colourless.

Marginal cells: Gill edge sterile with a vast majority of spheropedunculate and clavate cells, 22.5–32.5 × 10–13 μ, mixed with a fair number, either scattered or in small or somewhat larger groups, of cheilocystidia, most of them with remarkably long, thin (2.5–4 μ), cylindrical necks, 45–75 × 10–12.5 μ, colourless.

Hymenophoral trama under binocular lens and microscope distinctly brown in basal 1/4, paler towards edge.

Cuticle of cap cellular; cells 15–45 μ.

HABITAT.—On dung.

COLLECTION EXAMINED.—NETHERLANDS: 's-Graveland (hothouse), 8 April 1971, J. Daams (L).

OBSERVATIONS.—According to Romagnesi (1953: 356) this is a rare fungus. We know of only two full descriptions of it, viz. those by Kühner and by Josserand (1957: 57, 59). Short descriptions were given by Moser (1967: 215), who transferred the species to *Psathyrella*, and by Romagnesi in the 'Flore analytique'. We have only seen dry specimens, found and dried by Mr. Daams.

This species is characterized by its exclusive occurrence on dung, by its small size, red gill edge, great scarcity of pleurocystidia, and the long thin necks of its cheilocystidia. The veil is far less developed than in *P. coprobia*, which species moreover has never been found with red gill edges.

Kühner in his description does not mention the pleurocystidia at all, while Josserand calls them "rares." Mr. Daams had been unable to find any and we only found four on an entire gill. Characteristic are also the very thin necks of the cheilocystidia (Kühner: "bec saillant plus grêle, 2.5–3.5 μ ", and Josserand: "bec assez grêle, 2.5 μ "), which we found to be much longer than in any of the species of the *Atomatae*. Curiously enough here the cheilocystidia are much longer than the pleurocystidia, whereas normally it is the other way round.

8. PSATHYRELLA COPROPHILA Watling—Figs. 25—29

Psathyrella coprophila Watling *apud* Watling & Jurand in *Notes R. bot. Gdn Edinb.* **31**: 146. 1971.

Psathyrella fimetaria Watling *apud* Watling & Jurand in *Notes R. bot. Gdn Edinb.* **31**: 143. 1971.

MACROSCOPIC CHARACTERS (description based on our find of 25 August 1965).—*Cap* both in early and later stages predominantly hemispherical to paraboloid, sometimes slightly conical-paraboloid, 4–11 mm in diam., 2–8 mm high, in later stages striate up to 2/3 from margin inward, shining when moist, not viscid, in the early stages strikingly dark red-brown (M. 5 YR 3/4; 7.5 YR 3/2) and dark brown (M. 7.5 YR 4/2, 4/6) only near margin; later dark reddish brown only at centre (M. 7.5 YR 4/2), the remainder brown (M. 10 YR 3/3, 4/3); hygrophanous, drying out to pale brown (M. 10 YR 7/4, 6/4) without pink, smooth, not micaceous.

Veil on cap rather poorly developed but distinctly present, in very early stages reaching up to half-way from margin inward as isolated minute fibres or bundles of fibres and fairly copious at margin itself, soon disappearing and in mature specimens leaving only isolated fibres at margin.

Gills 2 mm broad, large ones numbering 16–20, rounded near margin of cap, further distinctly ascending, broadly adnate, in early stages distinctly brown (M. 10 YR 5/4) in very narrow zone at base, towards edge first greyish brown (M. 10 YR 5/2, 6/2) and near edge pale grey (M. 10 YR 6/1), later dark grey (M. 10 YR 5/1, 4/1) with narrow zone of brown (M. 10 YR 5/4, 5/3) at base; edge white, minutely flocculose.

Stem 15–25 \times 1–2 mm, equal but at base gradually swelling up to 3–4 mm, not bulbous, not rooting, straight, white but extreme base isabelline or pale greyish brown, at surface covered with sparse and scattered small velar fibres, pruinose at apex, hollow.

Flesh of cap in centre 1 mm thick, dark red-brown (M. 5 YR 3/3; 7.5 YR 3/2) but in slightly less moist condition very soon dark brown, M. 10 YR 3/3, 4/3) also in apex of stem alongside its cavity; flesh of stem white but pale brown in very narrow zone alongside cavity. Smell and taste indistinctive.

Spore print purplish black.

Pigmentation of gills under binocular lens very pale brown (M. 10 YR 7/2, 7/3) but in very narrow zone along base more or less suddenly becoming distinctly ocre-brown (\pm M. 7.5 YR 5/4 but paler).

MICROSCOPIC CHARACTERS (description based on our find of 25 August 1965 and on three collections, one of them being the type material, received from Miss M. Jurand). — *Spores* ellipsoid-amygdaliform, in face-view often very slightly (hardly noticeable) elongate-hexagonal (best seen in the upper 1/3), $11.7-13.5 \times (6.3-6.8-7.2(-8.1) \mu$ ($11.9 \times 6.7 \mu$), in water very dark reddish brown (M. 2.5 YR 2/4, 3/4), opaque to subopaque, germ-pore distinctly eccentric on the abaxial face and rather small ($1-1.5 \mu$).

Basidia 4-spored, $22.5-27.5 \times 12-13 \mu$.

Pleurocystidia scattered to fairly numerous, sublageniform, subfusiform or subutriform, $30-47.5 \times 10-17.5 \mu$, with wall of normal thickness, colourless.

Marginal cells: Gill edge sterile, usually densely packed (90-95 % of total number of cells, but locally sometimes very much less, and there crowded cheilocystidia dominating the picture) with small spheropedunculate cells, $12.5-22.5 \times 6-10 \mu$, mixed with scattered, but sometimes locally rather densely packed, fairly small, sublageniform, subfusiform or subutriform cheilocystidia, $25-45 \times 7.5-17.5 \mu$, without crystals or mucoid deposits.

Pigmentation of hymenophoral trama under microscope almost colourless to very pale brown in peripheral half, pale brown by membranous pigment in basal half, and distinctly brown with many yellow hyphal septa and small encrustations at base.

Cuticle of cap cellular; cells $25-50 \mu$.

HABITAT.—On horse dung.

COLLECTIONS EXAMINED.—SCOTLAND: Kinloch Rannoch, Estate "Carmichael", 25 August 1965, E. K. v. W. (L); specimens from cultures No. 1 (obtained from collection Blackford Glen near Edinburgh, 1966), and No. 51 (Perthshire, 1968) received from Miss Jurand.

SWEDEN: Specimens from culture No. 128 (collection of 1971) received from Miss M. Jurand.

9. *Psathyrella coprophila* versus *P. fimetaria*

Simultaneously with *P. coprophila* Watling (1971: 143) has described yet another coprophilous *Psathyrella*, also with subutriform cystidia, viz. *P. fimetaria*. Dr. Watling and we had a very lively correspondence about this species after we had carefully studied his descriptions of both species, our own find of *P. coprophila* of 25 August 1965, and the type material of both *P. coprophila* and *P. fimetaria*, which was kindly sent on loan. This because we came to the conclusion that, judging by purely morphological criteria, *P. coprophila* and *P. fimetaria* are to be considered conspecific.

According to Watling (1971: 149) *P. coprophila* "is separable morphologically from *P. fimetaria* in size, spore-shape and sparsity of pleurocystidia."

As for the size, Watling (1971: 149) states that "*P. fimetaria* is normally more of a robust species." In the actual descriptions of both species, however, it is just the other way round—*P. fimetaria*: cap 5-12 mm (up to 14 mm high), stem $40-50 \times 2-3$ mm versus *P. coprophila*: cap 5-18 mm (18 mm high) and stem $50-60 \times 2-3.5$ mm—and it is stated that in culture "the fruit-bodies of *P. coprophila* are more variable than those found in nature, the largest sized fruit-bodies resemble the size of *P. fimetaria*."

Like in all species of *Psathyrella* the size of the carpophores varies considerably, and Watling agreed that "fruitbody size probably is less significant" (in litt.).

As for the spore-shape, we very carefully compared the various characters of the spores of the type material of *P. coprophila* and *P. fimetaria* and we found them identical in every way. At our request Dr. Bas compared the spores of both type collections and observed that in both many spores are very slightly hexagonal in face view (hardly visible, best seen in the upper part of the spore). This must be what Watling means when he calls the spores of *P. coprophila* "slightly angled about apiculus and germ-pore." The very slight difference in colour of the spores between the two species was found to lie within the normal range of variability in spores of the species of section *Atomatae*.

The number of pleurocystidia is described as being smaller in *P. coprophila* (in the actual description they are even called "absent or very rare"; unfortunately there is an error in Watling's key, in which it is stated that in *P. fimetaria* pleurocystidia are scarce and in *P. coprophila* present). In our collection of 25 August 1965 we found these cells to be fairly numerous and it was quite easy to produce a full pleurocystidiogram. In the three collections received from Miss Jurand they were less numerous (we were able to draw 16, 13 and 7 pleurocystidia respectively). From the type specimen of *P. fimetaria* a full pleurocystidiogram was easily obtained and it did look as if here these cells were somewhat more numerous than in *P. coprophila*, but the number of these observations is far too small to be reliable, especially so as the difference is merely a matter of degree while there is also considerable overlapping. Consequently, we consider this character unsuitable for distinguishing the two species.

In Watling's key to the coprophilous species, *P. coprophila* and *P. fimetaria* are said to differ in spore size, the spores of the former measuring $12-13(-14) \times 5.5-6.5 \times 6-7 \mu$ and of the latter $13.5-14.5(-15) \times 6.5-7.5(-8) \mu$. The number of observations again is very small and besides we found for *P. coprophila* the mean value to be $11.9 \times 6.7 \mu$ and for *P. fimetaria* $12.5 \times 7 \mu$. Again we consider this difference to be too slight for differentiating the two species.

Later Watling (in litt.) mentioned some other possible differences between the two species, two of which, we felt, perhaps being of greater importance than those mentioned in his key and text, because they were not differences of degree. In *P. fimetaria* the germ-pore was suggested not to be eccentric and the hymenophoral trama was suggested to be brownish as opposed to eccentric germ-pore and colourless hyaline trama in *P. coprophila*. However, we found the germ-pore in the type material of *P. fimetaria* also to be eccentric (confirmed by Dr. Bas). We also compared the pigmentation of the trama in both species by putting on one slide a gill from each species, by washing these gills, and subsequently comparing their colour under binocular lens and microscope. We found the pigmentation for both species to be exactly the same.

All other morphological differences mentioned by Watling turned out to be differences of degree.

In the key the colour of the cap is supposed to be chestnut honey or tawny in *P. coprophila*, bay brown or chestnut brown in *P. fimetaria*, but in the text the description of the colours in *P. coprophila* reads "commencing bay, chestnut honey or tawny flushed" and in *P. fimetaria* "very rich chestnut-brown or bay-brown at first, becoming flushed sepia."

The veil is supposed to be more developed in *P. fimetaria*. But the description for *P. coprophila* reads "margin with numerous small indistinct fibrils of veil extending as faint groups of hyphae to 1/2 way, but remnants soon disappearing" (this means the presence of a distinct veil) and for *P. fimetaria* "veil copious at margin of pileus when very young and on stipe, soon becoming lost or adpressed when on stipe." Again, this is a difference of degree if a difference at all.

The white edge of the gills is supposed to be more distinct in *P. coprophila* and Watling (in litt.) asked us whether this might be due to a different development of the vesiculose marginal cells (in the species of section *Atomatae* these cells far outnumber the cheilocystidia and can be either large or small). We found the spheropedunculate cells to be small in both species.

Clamp connections are called "present, numerous on cortical cells of stipe" in *P. coprophila*, and "infrequent, only seen in cells of stipe" in *P. fimetaria*; this again is a difference of degree, difficult to evaluate.

Pileocystidia are called "few" in *P. coprophila*, and "absent" in *P. fimetaria*, but this is hardly a character to go by, particularly since we know that both in *Conocybe* and *Galerina* some species occasionally have a few pileocystidia, although normally they do not possess them.

It is interesting to notice that for both species shape and size of the pleuro- and cheilocystidia were found to be the same.

As for the cultural differences noticed by Miss Jurand, we feel that these observations are still in an experimental stage (Miss Jurand was unable to obtain carpophores of *P. fimetaria* in culture) and that at the present moment we shall just have to go by morphological criteria only in distinguishing the species of section *Atomatae*.

In conclusion we believe *P. coprophila* and *P. fimetaria* to be conspecific, and have chosen the first name for this species, as *P. fimetaria* has been described with a central germ-pore.

KEY TO THE SPECIES OF PSATHYRELLA SECT. ATOMATAE

1. Non-coprophilous species.

2. Cap 6–20 mm in diam., stem 18–65 mm long, spores 12.6–17.1 × 6.3–8.1 μ, pleurocystidia lageniform or utriform.
3. Pleurocystidia lageniform *P. prona* var. *prona*
4. Gill edge white.
5. Cap and gills grey f. *cana*
5. Cap and gills brownish f. *albidula*
4. Gill edge red.
6. Mature cap brown to greyish brown, gills grey to purplish grey f. *prona*

6. Mature cap dark brown, gills brown *f. picta*
 3. Pleurocystidia utriform var. *utriformis*
 2. Cap 3–5 mm in diam., stem 10–15 mm long, spores 10.8–12.6 × 5.9–7.2 μ, pleurocystidia capitate *P. Romagnesii*
1. Coprophilous species.
7. Germ-pore central, cystidia lageniform.
 8. Veil strongly developed, gill edge white *P. coprobia*
 8. Veil poorly developed, gill edge red *P. stercoraria*
 7. Germ-pore eccentric, cystidia subutriform to utriform. *P. coprophila*

REFERENCES

- BIGEARD, R. & H. GUILLEMIN (1913). Flore des champignons supérieurs de France. Complément ou tome II. Chalon-sur-Saône.
- BRESADOLA, G. (1931). Iconographia mycologica 18: pl. 88g fig. 1 and pl. 89o. Mediolani.
- DENNIS, R. W. G., P. D. ORTON & F. B. HORA (1960). New check list of British agarics and boleti. In Trans. Br. mycol. Soc., Suppl.
- FAVRE, J. (1960). Catalogue descriptif des champignons supérieurs de la zone subalpine de Parc national suisse. In Ergebn. wiss. Unters. schweiz. NatParks 6 (Neue Folge): 42.
- FRIES, E. (1821). Systema mycologicum 1. Lundae.
 — (1838). Epicrisis Systematis mycologici. Upsaliae.
 — (1857). Monographia Hymenomycetum Sueciae 1. Upsaliae.
 — (1874). Hymenomycetes europaei. Upsaliae.
 — (1879). Icones selectae Hymenomycetum nondum delineatorum 2 (3). Holmiae et Upsaliae.
- KARSTEN, P. A. (1885). Fragmenta mycologica XX. In Hedwigia 24: 72–74.
- KITS VAN WAVEREN, E. (1968). The 'stercorarius group' of the genus *Coprinus*. In Persoonia 5: 131–176.
 — (1971). Notes on the genus *Psathyrella*-I. *Psathyrella gracilis* and *P. microrrhiza*. In Persoonia 6: 249–280.
- KONRAD, P. & A. MAUBLANC (1928). Icones selectae Fungorum 6 (Fasc. 4): 73–112. Paris.
- KÜHNER, R. & M. JOSSELAND (1957) apud R. Kühner & H. Romagnesi. Compléments à la Flore analytique 7. Espèces nouvelles, critiques ou rares de Naucoriacées, Coprinacées et Lépiotacées. In Bull. Soc. Nat. Yonnax (Mém. hors sér. 2): 4, 57, 59.
- KÜHNER, R. & H. Romagnesi (1953). Flore analytique des champignons supérieurs. Paris.
- LANGE, J. E. (1936). Studies in the agarics of Denmark. Part XI. *Psathyra*, *Panaeolus*, *Psilocybe*, *Gomphidius*, *Phylloporus*, *Cantharellus*, *Schizophyllum*. In Dansk bot. Ark. 9 (1): 1–32.
 — (1939). Flora agaricina danica 4. Copenhagen.
 — (1940). Idem 5.
- MOSEER, M. (1967). Die Röhrlinge und Blätterpilze. 3. Aufl. In H. Gams, Kl. KryptogFl. 2 (b2). Stuttgart.
- Munsell Color Company (1954). Munsell soil color charts. Baltimore.
- ORTON, P. D. (1960). New check list of British agarics and boleti. Part III. Notes on genera and species in the list. In Trans. Br. mycol. Soc. 43: 159–439.
- QUÉLET, L. (1877). De quelques nouvelles espèces de champignons du Jura et des Vosges. In Bull. Soc. bot. France 23: 324–332. "1876".
 — (1880). Diagnoses nouvelles de quelques espèces critiques de champignons. Première Partie. In Bull. Soc. bot. France 26: 45–54. "1879".
 — (1886). Enchiridion Fungorum. Lutetiae.
 — (1888). Flore mycologique de la France. Paris.

- ROMAGNESI, H. (1937). Florule mycologique des Bois de la Grange et de l'Etoile (Seine-et-Oise). Basidiomycètes (Suite). *In* Revue mycol. **2**: 243-256.
- (1944). Classification du genre *Drosophila* Quélet. *In* Bull. mens. Soc. linn. Lyon **13** 15-54.
- (1952). Species et formae novae ex genere *Drosophila* Quélet. *In* Bull. mens. Soc. linn. Lyon **21**: 151-156.
- (1953). See Kühner & Romagnesi (1953).
- SINGER, R. (1962). The Agaricales in modern taxonomy, 2nd Ed. Weinheim.
- WATLING, R. (1971). See Watling & Jurand (1971).
- WATLING, R. & M. JURAND (1971). Two new coprophilous species of *Psathyrella*. *In* Notes R bot. Gdn Edinb. **31** (1): 143-153.

Corrigenda

1. The reader should continue the bottom line of p. 32 on the top line of p. 35 for only three lines, following which he is referred back to the top line on p. 33.
2. The reader should continue the bottom line of p. 33 on the fourth line from the top of p. 35.