

TYPE STUDIES IN CREPIDOTUS—I

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All types of Pilát's *Crepidotus* species available at PRM, W, and K have been studied. In addition *Crepidotus harperi* Sing. has been examined. For each taxon studied microscopical characters and SEM pictures of the spores are given, followed by a concise discussion of its status. In this first set of studies Pilát's taxa *C. carpatorossicus*, *C. carpaticus*, *C. cesatii* var. *gothoburgensis*, *C. kubickae*, *C. lundellii*, *C. macedonicus*, and *C. mollis* var. *pseudo-applanatus* are being considered.

Because of a great interest in all pleurotoid fungi, A. Pilát (1903–1974) treated the genus *Crepidotus* in several papers. In 1948 his monographic study of European species was published. The many new species in that publication were without a Latin diagnosis. Pilát made up for that in a following paper in 1949. His monograph is still the fundament for all regional floras. Few species have been described since.

In an attempt to re-examine Pilát's species concept in *Crepidotus* it became essential to study type material, as several of his species have apparently never been found again after their original description. New techniques, such as scanning electron microscope (SEM) observations, offer a new approach to taxonomical problems within *Crepidotus*, where spore ornamentation is often too slight to be clearly observed with light microscopy.

METHODS AND PRESENTATION

The microscopical structures of the exsiccata were observed, measured, and drawn in ammonia with 1% Congo red or in 5% KOH. The spore sizes are given with an approximation of 0.5 μm ; Q is the length-width ratio with the average added. Out of 10 measurements of basidia and cystidia the sizes of the smallest and the largest elements are given. Strongly aberrant sizes are indicated in parentheses.

The SEM investigations were carried out with a JEOL JSM-T 300 using accelerating voltages between 10 and 15 kV. The terminology of spore ornamentation is mainly in accordance with that used in pollen morphology (Faegri & Iversen, 1989).

The scale markers in Figs. 1–6 equal 10 μm , in Plate 1 approximately 1 μm .

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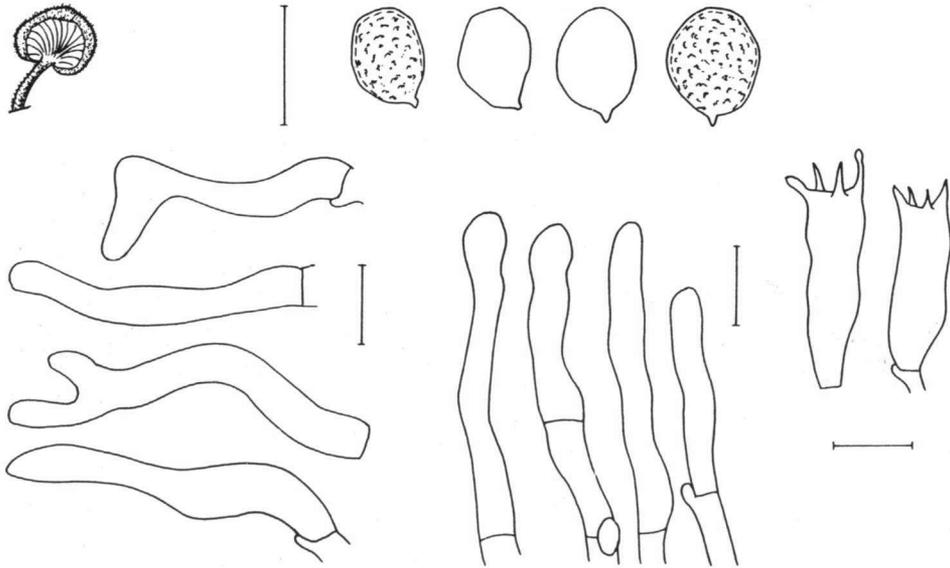
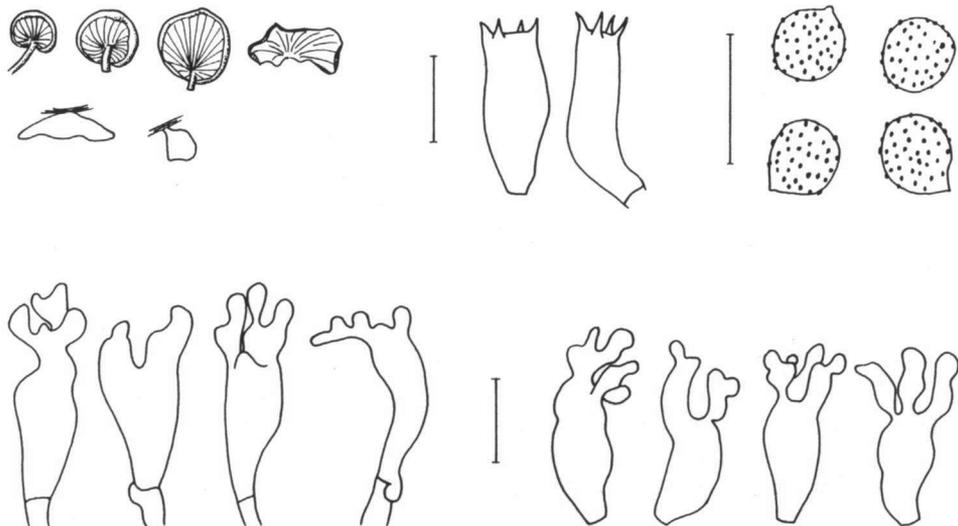


Fig. 1. *Crepidotus carpatorossicus*. — Fruit-body, spores, basidia, pileipellis with cystidioid, and caulocystioid elements.



Figs. 2. *Crepidotus carpaticus*. — Fruit-bodies, basidia, spores, and cheilocystidia.

SPECIES OF CREPIDOTUS DESCRIBED BY PILÁT-I

Crepidotus carpatorossicus Pilát—Pl. 1A, B; Fig. 1

Crepidotus carpatorossicus Pilát in *Studia bot. čech.* 10: 153. 1949. — Type: USSR, Ucraina, Transcarpathes, between the rivers Kuzy and Bredecel near Velky Bockov, 800–1200 m, in virgin forest of *Abies* and *Fagus*, on living mosses (*Hypnum cupressiforme*), Aug. 1934 (PRM 23474).

Spores $7.5\text{--}10 \times 6\text{--}8 \mu\text{m}$, $Q = 1.1\text{--}1.4$, av. $Q = 1.27$, subglobose, ellipsoid or broadly ovoid in outline, sometimes slightly angular; ornamentation very vaguely spotted-subverruculose to verruculose, with a small rather indistinct plage (Pl. 1A, B); walls deeply rusty-tawny in KOH; apiculus clearly visible, pale, dextrinoid. Basidia $21\text{--}33 \times 6\text{--}8 \mu\text{m}$, clavate, four-spored, clamped. Cystidia absent. Pileipellis a transition between a cutis and a trichoderm with loosely intermixed, $6\text{--}10 \mu\text{m}$ wide, hyaline hyphae, giving rise to numerous cystidioid terminal elements, $27\text{--}45 \times 4.5\text{--}6 \mu\text{m}$, slightly capitate, sometimes flexuose, near margin more cystidium-like. Stipe densely covered with erect cystidioid elements shaped like those on pileipellis, $31\text{--}49 \times 4.5\text{--}6 \mu\text{m}$. Pigment pale brownish, faint but clearly incrusting in stipitipellis. Clamp connections abundant.

On account of the dextrinoid, sometimes slightly angular spores with a small plage, this type does not represent a species of the genus *Crepidotus*. Except for the pronounced radial ridges on the hymenophore, which even may be called lamellae, this collection fits fairly well *Chromocyphella muscicola* (Fr.) Donk. Yet, there exists no close relationship with *Crepidotus*; on the contrary I am convinced that *Chromocyphella muscicola* is closely related to *Galerina* because of the spore features.

Crepidotus carpaticus Pilát—Pl. 1C; Fig. 2

Crepidotus carpaticus Pilát in *Hedwigia* 69: 140. 1929. — Type: (as *Claudopus carpaticus*, in Pilát's handwriting referred to *C. cesatii* Rab., under this name also listed in *Atl. Champ. Eur.*: 62. 1948) USSR, Ucraina, Corá Hora Mountains, Bogdan¹, on cortex of dead *Alnus incana* twig, Aug. 1929, leg. & det. A. Pilát (PRM 23470).

Spores $5.0\text{--}6.5 \times 5.0\text{--}6.5 \mu\text{m}$, $Q = 1.0\text{--}1.2$, av. $Q = 1.06$, globose to broadly lacrymoid, distinctly punctate, outline of the ornamentation visible in optical section, ultrastructurally microbaculate with some small outgrowths on the warts; walls medium coloured, yellow-brownish in KOH. Basidia $17\text{--}23 \times 6\text{--}8 \mu\text{m}$, four-spored, clamped. Cheilocystidia $20\text{--}26 \times 6\text{--}8 \mu\text{m}$, broadly clavate, narrowly utriform with several short finger-like to coralloid, hyaline, up to $3 \mu\text{m}$ wide protuberances. Pileipellis a loosely interwoven cutis or trichoderm with straight or slightly crooked to coiled, $4\text{--}6 \mu\text{m}$ wide hyaline hyphae; terminal cells ascending, cylindrical, often angled, near cap margin sometimes shaped like cheilocystidia. Clamps present.

This collection is identical with the type of *Crepidotus wakefieldiae* Pilát (1949), the species best documented in literature (Pearson, 1952; Reid, 1965; Jossierand, 1965). Singer (1973) has already published the results of a re-examination of the type collection of *C. carpa-*

¹ For the names of the localities see Pilát (1940).

ticus and stresses the striking shape of the cheilocystidia. This feature, however, is not unique in the genus *Crepidotus* (see *C. roseornatus* Ferrari & Pöder, 1984). I agree with Singer, that Pilát (1929) was wrong in mentioning the presence of conidia on the cap surface; these are obviously basidiospores.

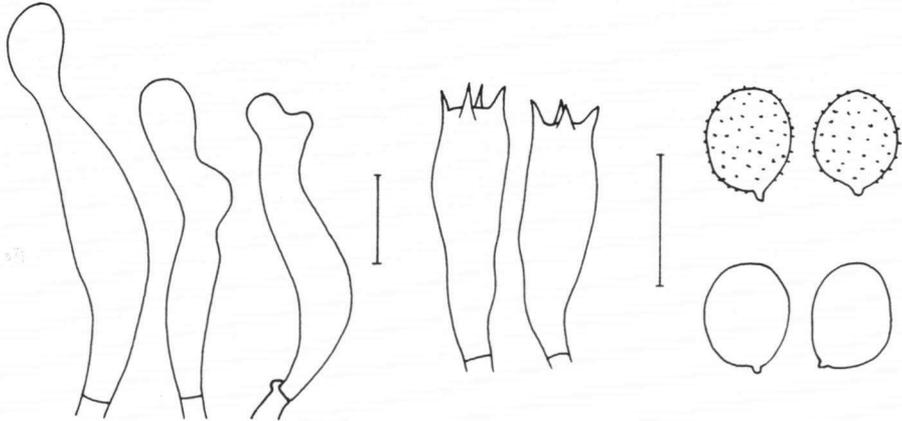


Fig. 3. *Crepidotus cesatii* var. *gothoburgensis*. — Cheilocystidia, basidia, and spores.

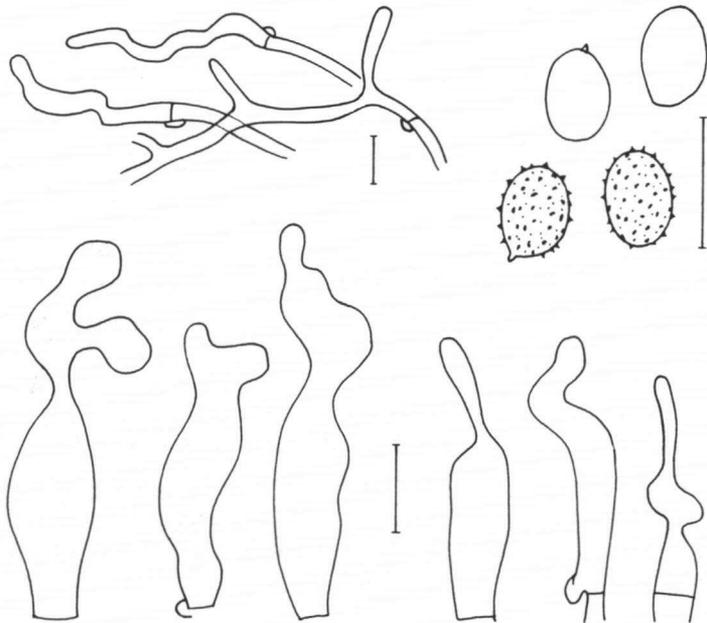


Fig. 4. *Crepidotus kubickae*. — Cheilocystidia, cystidioles, spores, and pileipellis.

Crepidotus cesatii (Rab.) Sacc. var. *gothoburgensis* Pilát—Fig. 3

Crepidotus cesatii var. *gothoburgensis* Pilát in Atl. Champ. Eur. 6: 63. 1948. — Type: Fungi exs. succ. no. 908. Sweden, Göteborg, on *Lonicera tatarica*, Aug. 1937, T. Nathorst-Windahl (PRM 149095).

Spores 6.5–9.0 × 6.0–8.0 μm, Q = 1.0–1.3, av. Q = 1.14, globose, subglobose, finely punctate, distinctly spiny in optical section, echinulate in SEM; walls weakly coloured. Basidia 26–30 × 7.5–10 μm, 4-spored, clamped. Cheilocystidia 33–47 × 6–8 μm, narrowly utriform, clavate or cylindrical, in the upper part mostly branched or slightly capitate. Pileipellis a transition between a cutis and a trichoderm of 3–5 μm wide, straight or moderately coiled, cylindric hyphae with tufts of ± erect undifferentiated terminal cells. Clamp connections abundant.

The type collection fits perfectly into the range of variation of *Crepidotus cesatii* var. *cesatii*.

An examination of 60 collections from all over Europe and the results from a similar study of mainly Norwegian material (Norstein, 1990) shows, that there exist two varieties in *Crepidotus cesatii* (Rab.) Sacc. The distinguishing characters are not the subglabrous or tomentose cap (Singer, 1947) nor the presence of mainly coiled or straight epicuticular hyphae (Hesler & Smith, 1965) but the shape of the spore: globose to subglobose in *C. cesatii* var. *cesatii* and subglobose to broadly ellipsoid in *C. cesatii* var. *subphaerosporus*. The first mainly occurs on hardwood, while the latter variety shows a preference for coniferous wood. As will be expounded in a forthcoming paper, the correct name for Pilát's collection is *Crepidotus cesatii* var. *cesatii*.

Crepidotus kubickae Pilát—Pl. 1D; Fig. 4

Crepidotus kubickae Pilát in Studia bot. čech. 10: 150. 1949. — Type: Czechoslovakia, Bohemia, Poricko nad Sazavou, in *Picea* forest, on soil among mosses, 19 May 1949, *Kubicka* (det. A. Pilát; PRM 665290).

The type collection contains five small fruit-bodies with saffron cap colours. Spores 6–8 × 4.5–6 μm, Q = 1.3–1.5, av. Q = 1.37, broadly ellipsoid to ellipsoid finely punctate, distinctly spiny in optical section, echinulate with scanning electron microscopy (Pl. 1D); walls moderately coloured. Basidia present, but sterigmata collapsed. Cheilocystidia 43–46 × 8–10 μm, narrowly lageniform, cylindrical, branched, angled and knobbed in upper part, hyaline; lamella-edge largely destroyed. Pileipellis a transition between a cutis and a trichoderm; terminal cells erect, often slightly flexuose, 3–4.5 μm wide.

The few cheilocystidia indicate a close relationship with *Crepidotus cesatii* (Rab.) Sacc. The type of ornamentation as seen in the SEM supports this idea. With light microscopy, however, the spores are darker and the ornamentation seems more pronounced than usual; the spores are often ellipsoid. *Crepidotus kubickae* is best interpreted as a variant of *C. cesatii* based on old fruit-bodies.

Crepidotus lundellii Pilát—Pl. 1E; Fig. 5

Crepidotus lundellii Pilát in Lundell & Nannfeldt, Fungi exs. succ.: 10 ('1935') 1936. — Type: Sweden, Upland, Almunge parish, close to 'Harparbol lund', on decaying fallen branches of *Ulmus*, 15 Sept. 1935, S. Lundell & E. Åberg (det. A. Pilát; lectotype, K).

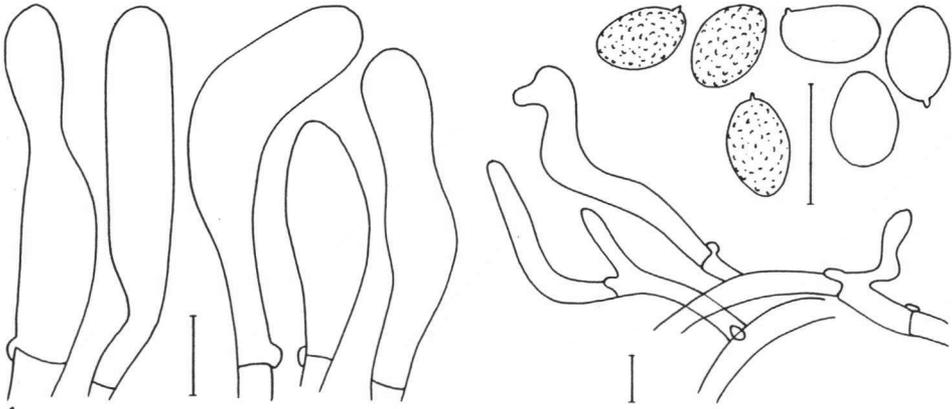


Fig. 5. *Crepidotus lundellii*. — Cheilocystidia, spores, and pileipellis.

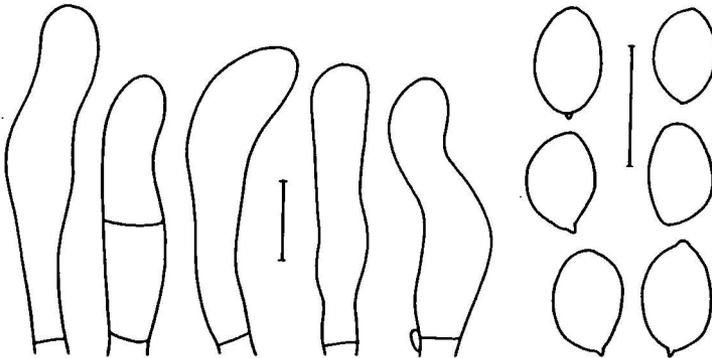


Fig. 6. *Crepidotus mollis* var. *pseudoapplanatus*. — Cheilocystidia and spores.

Spores $7.5\text{--}9.0 \times 4.5\text{--}6.5 \mu\text{m}$, $Q = 1.3\text{--}1.7$, av. $Q = 1.50$, ellipsoid, oblong, obovoid, rarely slightly amygdaliform in side view, faintly ornamented, with SEM rugulose-vermiculose; walls pale brown in microscope. Basidia $20\text{--}25 \times 6\text{--}8 \mu\text{m}$, 4-spored, clamped. Cheilocystidia $31\text{--}60 \times 8\text{--}13(\text{--}16) \mu\text{m}$, narrowly utriform, clavate, cylindrical, hyaline. Hymenophoral trama made up of subparallel, $5\text{--}8 \mu\text{m}$ wide hyphae. Pileipellis a relatively narrow trichal cutis of repent, cylindrical and straight hyphae giving rise to tufts of erect, $5\text{--}6.5 \mu\text{m}$ wide, terminal cells, at cap margin with some pileocystidia shaped like cheilocystidia; some segments yellowish. Clamp connections present.

The ornamentation of the spores consists of small warts which may grow together and form more or less a net. The same type of ornamentation was also found by Pegler & Young (1972) in British collections named *C. subtilis* P. D. Orton, *C. dishonestus* P. A. Karsten, and *C. sambuci* Velen.

Crepidotus macedonicus Pilát—Pl. 1F

Crepidotus macedonicus Pilát in *Studia bot. čech.* 10: 150. 1949. — Type: Yugoslavia, Macedonia, Sar Planina-Crni Kamen, beech forest, on *Fagus sylvatica*, Aug. 1937, V. Lindner (det. A. Pilát; PRM 489031).

The following description is based on unpublished notes of L.R. Hesler and own observations. The type collection contains two poorly dried fruit-bodies.

Spores $5-7.5 \times 4-6 \mu\text{m}$, $Q = 1.1-1.5$, av. $Q = 1.33$, ellipsoid, ovoid, sometimes subglobose, punctate in frontal view, distinctly warty in optical section; walls pale brownish. Basidia $18-25 \times 4-6 \mu\text{m}$, 4-spored. Cheilocystidia $32-50 \times 5-15 \mu\text{m}$, conspicuous, variable, lecythiform, cylindrical, clavate or ventricose, capitate or not, often irregularly forked and knobbed. Hymenophoral trama made up of subparallel to somewhat interwoven, $6-10 \mu\text{m}$ wide hyphae. Pileipellis a cutis of repent hyphae, bearing tufts of more or less erect colourless to pale fuscous, narrow, $3-5 \mu\text{m}$ wide hyphae. Clamp connections present.

Pilát (1948) placed this species in his subgenus *Paxillina* and noted a macroscopic resemblance to *Panus panuoides*, although he admitted that the macroscopic description was based on dried material. Except for the type material no other record of this species is known. The re-examination of the type revealed a rather typical species of *Crepidotus*. With SEM the ornamentation of the collapsed spores revealed a verruculose type (Pl. 1F). No spines, as typical for *C. cesatii*, could be found. Only the shape of the cheilocystidia indicates such a relationship.

Horak (1964) published a description of a collection from Yugoslavia based on fresh material. Even if no cystidia could be observed, it seems that *Crepidotus macedonicus* is a good but very rare species. It is characterized by broadly ellipsoid, warty spores, ochre lamellae (Horak, 1964), and a fleshy pileus.

Crepidotus mollis var. *pseudoapplanatus* Pilát—Fig. 6

Crepidotus mollis var. *pseudoapplanatus* Pilát in *Studia bot. čech.* 10: 151. 1949. — Type: Germany, Leipzig, Rosenthale, Sept. 1861, Auerswald (Acquisition 1889 No. 370793; W).

Large, flabelliform fruit-body with short pseudostipe (rudiment of stipe, not visible from above, secondarily grown together with part of cap). Spores $7.5-10 \times 4.5-6 \mu\text{m}$, $Q = 1.4-1.7$, av. $Q = 1.57$, ellipsoid to ovoid, with shallow suprahilar depression, apex sometimes weakly mucronate; apiculus small; walls smooth, strongly coloured. Basidia $24-26 \times 6.5-8 \mu\text{m}$, 4-spored. Cheilocystidia $26-42(-62) \times 6-12 \mu\text{m}$, clavate, narrowly utriform or cylindrical, sometimes septate, hyaline, thin-walled. Pleurocystidia absent. Hymenophoral trama of the characteristic *Crepidotus*-type, subparallel to somewhat interwoven; hyphae hyaline, $5-10 \mu\text{m}$ wide. Pileipellis a cutis of repent, $5-10 \mu\text{m}$ wide, cylindrical hyphae, with adpressed to erect, undifferentiated terminal cells. Oleiferous hyphae present. Clamp connections abundant.

This collection undoubtedly represents *Crepidotus autochthonus* J. Lange; the shape of the fruit-body is indicative, and all microscopical characters support this conclusion. In the original description Pilát mentions an indistinct gelatinous layer, but stresses the fact, that no epicuticular hyphae typical for *Crepidotus mollis* could be observed. I could not find any gelatinous layer nor other characters typical of the *C. mollis*-group.

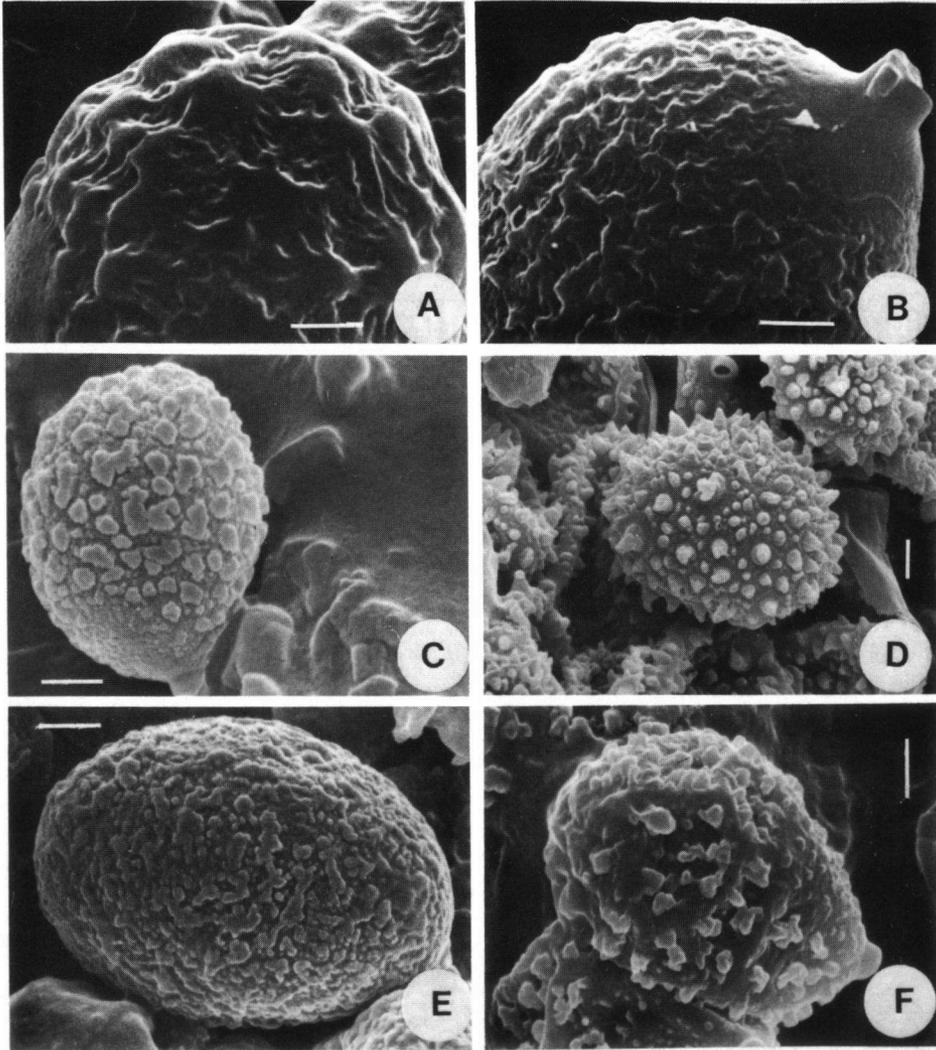


Plate 1. Scanning electron micrographs. — Figs. A, B. *Crepidotus carpatorossicus*: Fig. A. spore from the type collection; Fig. B. detail of spore with plage. — Fig. C. *Crepidotus carpaticus*, spore from the type collection. — Fig. D. *Crepidotus kubickae*, spore from the type collections. — Fig. E. *Crepidotus lundellii*, spore from the type collection. — Fig. F. *Crepidotus macedonicus*, spore from the type collection. — The scale markers in Figs. A–F represent 1 μ m.

ACKNOWLEDGEMENTS

I wish to thank the curators of W, PRM, K for their prompt loans and specially Egon Horak and Kees Bas for useful discussions. Thomas Kuyper critically read through the manuscript. I am very grateful to Lucia Wick for preparing the SEM pictures and to Cathy Dohrn for linguistic help.

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