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Crepidotus episphaeria and Related Species from the Southern Hemisphere

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The most striking microscopical character of *Crepidotus episphaeria* (Berkeley) Saccardo are thick-walled and crystal bearing cheilocystidia. About 90 years after this South African fungus has been described Reid (1975) observed for the first time these metuloids which form a sterile seam on the gill edges. Due to these unique cheilocystidia *Cr. episphaeria* holds a rather isolated and therefore well defined taxonomic position among the so far known species of *Crepidotus* (or better *Phialocybe,* see Horak 1968).

In Agaricales thick-walled metuloids encrusted with crystals are distinctive characters in the majority of species in several genera as *Inocybe, Astrosporina, Hohenbuehelia* or *Psathyrella* (sect. *Homophron*) to mention the most important ones. The anatomy of these cheilocystidia ranges from thin-walled and hyaline cells topped with few small crystals or a resinous cap to thick-walled and yellow-brown metuloids crowned with conspicuous crystals.

An analogous observation can be made in *Crepidotus* where, however, most of the described species carry only thin-walled cheilocystidia without crystals. Studying the five species described below it can be demonstrated that the occurrence of crystals indicates the tendency to thicken („metuloidisation") the membranes of the cheilocystidia and cuticular hyphae as well. *Cr. parietalis* is characterized by few scattered crystals on the cheilocystidia which can be overlooked on badly preserved material. In a second step the apex of the cheilocystidia are up to 1,5 mμ thick *(Cr. nanicus)* and the first traces of thick-walled cuticular hyphae are observed in *Cr. aureus.* Finally *Cr. hirsutellus* and *Cr. episphaeria* do have typical metuloids in combination with thick-walled septate hair-like hyphae on the surface of the pileus.

The author thanks the curators of the herbarium in Kew (K) and Bogor (BO) respectively for the loan of material. Thanks are also due to the authorities of the New Zealand Forest Research Institute and the Swiss Society of Natural Sciences who supported collecting trips in South East Asia.

If not otherwise stated the magnification of the illustrations is as follows: fruiting bodies (natural size), spores (x 2000), basidia and cystidia (x 1000) and vertical section of cuticle (x 500).

Type material of the new species is kept in ZT, BO, PDD and PC.

1. *Crepidotus episphaeria* (Berkeley) Saccardo 1887: Syll. Fung. 5: 885

Bas. *Agaricus episphaeria* Berkeley 1846: Hooker's Lond. J. Bot. 5:1.
Syn. *Agaricus pogonatus* Kalchbrenner 1881: Grevillea 9:131.
Crepidotus pogonatus (Kalchbrenner) Saccardo 1887: Syll. Fung. 5:884.
Crepidotus eumyceliatus Kalchbrenner ined.

Illustrations: Pilat (1950), Reid (1975); Fig. 1 A–E.

Nothing can be added to the macroscopic and microscopic description in the original diagnosis and the data published by Pilat (1950: 220) and Reid (1975: 115).

Habitat: On decayed *Sphaeria.* South Africa (Cape Province).

Material: South Africa: „Cap de Bonne Espérance; leg. Drège, 9413a" (holotype of *Cr. episphaeria,* PC). – „Mount Boschberg; leg. McOwan, 1075" (holotype of *Ag. pogonatus* Kalchbrenner, K). – „Cape of Good Hope; leg. McOwan" (holotype of *Ag. (Crep.) eumyceliatus* Kalchbrenner ined., UPS).

2. *Crepidotus hirsutellus* Horak sp. n.

Illustrations: Fig. 2 A–E.

Pileo –10 mm lato, dimidiato vel conchiformi, pallide argillaceo, strigoso. Lamellis excentrice vel lateraliter concurrentibus, ex luteo-griseis vel argillaceis. Stipite nullo vel rudimento-laterali. Sporis 5–7,5 mμ, subglobosis, grosse verrucosis, brunneolis. Cheilocystidiis 25–55/10–16 mμ, lageniformibus, metuloideis (membrana usque ad 5 mμ crassa), luteis, crystalliferis. Ad ramos putridos. Nova Caledonia. Holotypus 77/153 (ZT).

Pileus –10 mm, dimidiate, conchiform or reniform, attached laterally to the substratum (rarely with lateral rudimentary stipe), margin incurved, whitish to pale brown, densely covered with strigose erect hairs (especially towards the point of attachment), hairs up to 3 mm long, estriate, dry. Lamellae eccentrically or laterally concurrent, ventricose, crowded, whitish or pale yellow-grey when young turning pale brown, edge fimbriate to serrate, concolorous or paler than face of lamellae. Stipe absent, if present lateral but rudimentary, cylindrical, up to 1 mm

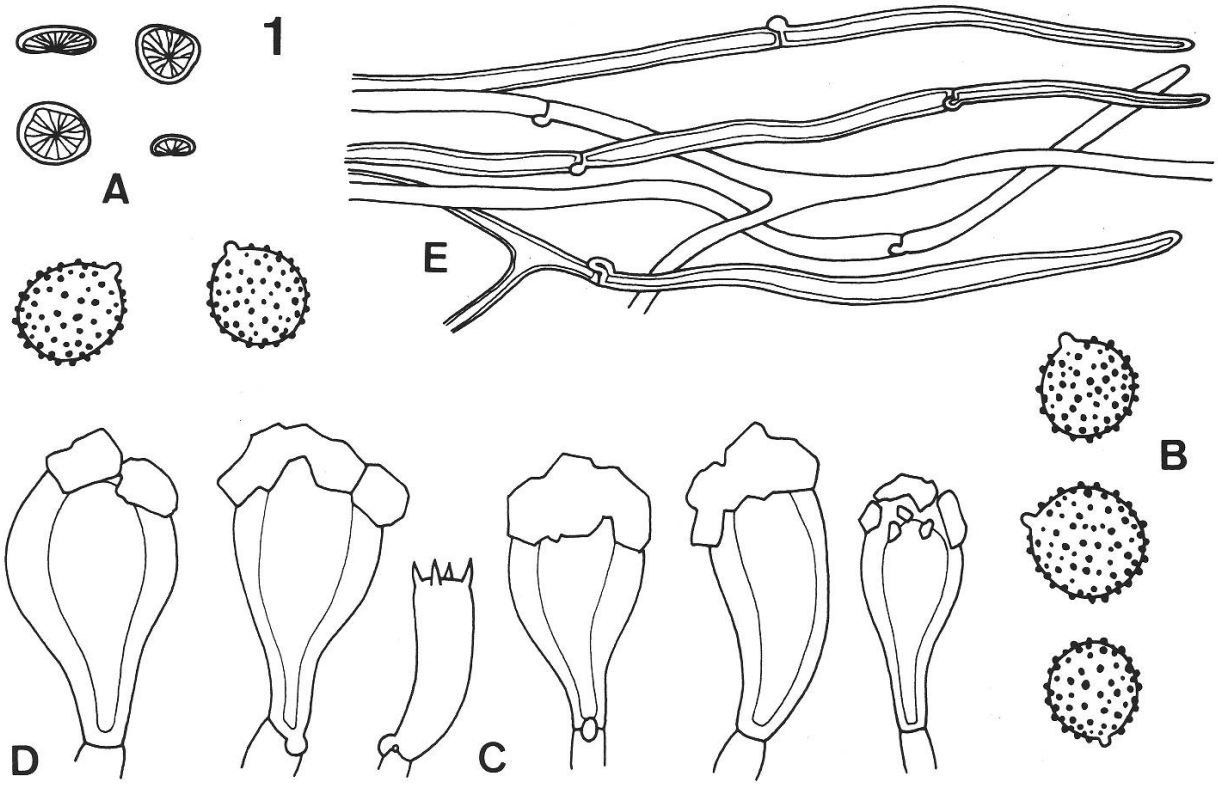

Fig. 1:
Crepidotus episphaeria (Berkeley) Saccardo (type):
A. carpophores. – B. spores. – C. basidia. – D. cheilocystidia. – E. cuticle.

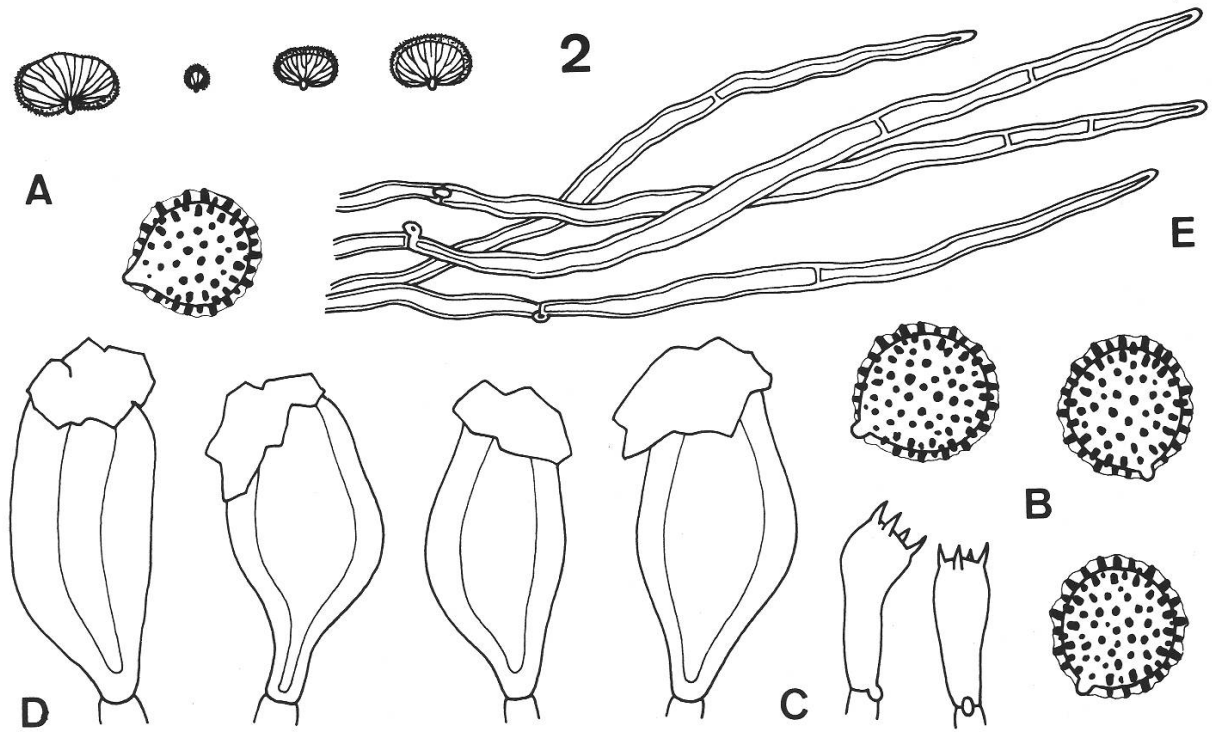

Fig. 2:
Crepidotus hirsutellus Horak (type):
A. carpophores. – B. spores. – C. basidia. – D. cheilocystidia. – E. cuticle.

long, concolorous with pileus; single, in dense groups. Odour and taste not distinctive. Context pale brown, gelatinous stratum absent. Spore print deep (chocolate) brown.

Spores 5–7,5 mμ, subglobose, hyaline to yellow-brown (KOH), apiculus distinct, covered with coarse cylindrical or hemispherical warts embedded in obvious perispor. Basidia 12–25/5–7 mμ, 4-spored. Cheilocystidia 25–55/10–16 mμ, thick-walled (up to 5 mμ diam.), hyaline to yellowish (KOH), fusoid to lageniform, encrusted with resinous amorphous material, distinct crystals absent. Pleurocystidia rare, if present similar to cheilocystidia. Cuticle a trichoderm of ± erect cylindrical or subfusoid hyphae (3–8 mμ diam.) tapering towards rounded apex, membrane – 1,5 mμ thick, hyaline, often septate, clamp connections present.

Habitat: On rotten bark of branches and logs. New Caledonia (type), Java.

Material: New Caledonia: „Summit of Mt. Mou about 1100 m; NE of Paita, 20.II.1977, leg. Horak" (77/153, ZT, holotype). – Java: „Bogor, Tjibodas, about 1500 m; 14.III.1977, leg. Horak" (77/182, ZT and BO).

The type collection from New Caledonia agrees well in all microscopic and macroscopic details with the fungi gathered in Java. *Crepidotus hirsutellus* shares with *Cr. episphaeria* (from South Africa) the conspicuous and thick-walled metuloids on the gill edges. The latter taxon, however, is well seperated due to its smaller spores and the lack of distinct septate hair-like cuticular hyphae.

3. *Crepidotus aureus* Horak sp. n.

Illustrations: Fig. 3 A–E.

Pileo –8 mm lato, reniformi vel conchiformi, ex aureo luteo, perstrigoso. Lamellis excentrice concurrentibus, luteis dein brunneis. Stipite iuventute praesenti, cylindrico, sublaterali, pileo concolori. Sporis 6–7 mμ, subglobosis, verrucosis, brunneis. Cheilocystidiis 15–30/8–12 mμ, lageniformibus, submetuloideis, hyalinis, cristalliferis. Ad corticem arborum. Nova Caledonia. Holotypus 77/154 (ZT).

Pileus –8 mm, dimidiate, conchiform or reniform, margin incurved when young, densely covered with strigose concolorous hairs, especially near the point of attachment, smooth along the estriate margin, golden yellow to deep yellow later changing to pale yellow-brown, dry. Lamellae eccentrically or laterally concurrent, ventricose, crowded, deep yellow in young carpophores turning to pale yellow or pale tobacco brown, edge concolorous or paler, subfimbriate. Stipe –2/–1 mm, present but rudimentary in young specimens, often absent in aged carpophores, cylindrical, concolorous with lamellae, eccentric or lateral, smooth; single, in dense groups. Odour and taste not distinctive. Context yellow, gelatinous stratum absent. Spore print deep brown.

Spores 6–7 mμ diam., subglobose, apiculus distinct, covered with coarse hemispherical warts embedded in inconspicuous or distinct perispor, yellow-brown. Basidia 18–25/7–9 mμ, 4-spored. Cheilocystidia 15–30/8–12 mμ, fusoid to

lageniform, thin-walled near base, membrane up to 1,5 mμ thick near apex, hyaline, encrusted with resinous material, rarely distinct crystals present. Pleurocystidia absent. Cuticle a cutis or trichoderm of cylindrical hyphae (4–6 mμ diam.), membrane up to 0,5 mμ thick, aseptate, hyaline, apex rounded, clamp connections numerous. Yellow pigment dissolves well in KOH.

Habitat: On rotten bark of branches and logs. New Caledonia.

Material: New Caledonia: „Summit of Mt. Mou, NE of Paita, about 1100 m; 20.II.1977, leg. Horak" (77/154, ZT and PC, holotype). – „Col d'Amieu; 3.III. 1977, leg. Horak" (77/65, ZT).

In the New Caledonian forests old and faded carpophores of *Crepidotus aureus* can be taken as *Cr. hirsutellus* since the two species have not only similar carpophores but grow also in the same ecological habitat. The two taxa, however, are definitely distinguished by their microscopical data. *Cr. aureus* is closely related with *Cr. parietalis* (see below) from New Zealand. The latter taxon is characterized by larger carpophores and both thin-walled cystidia and hyphae of the cuticle.

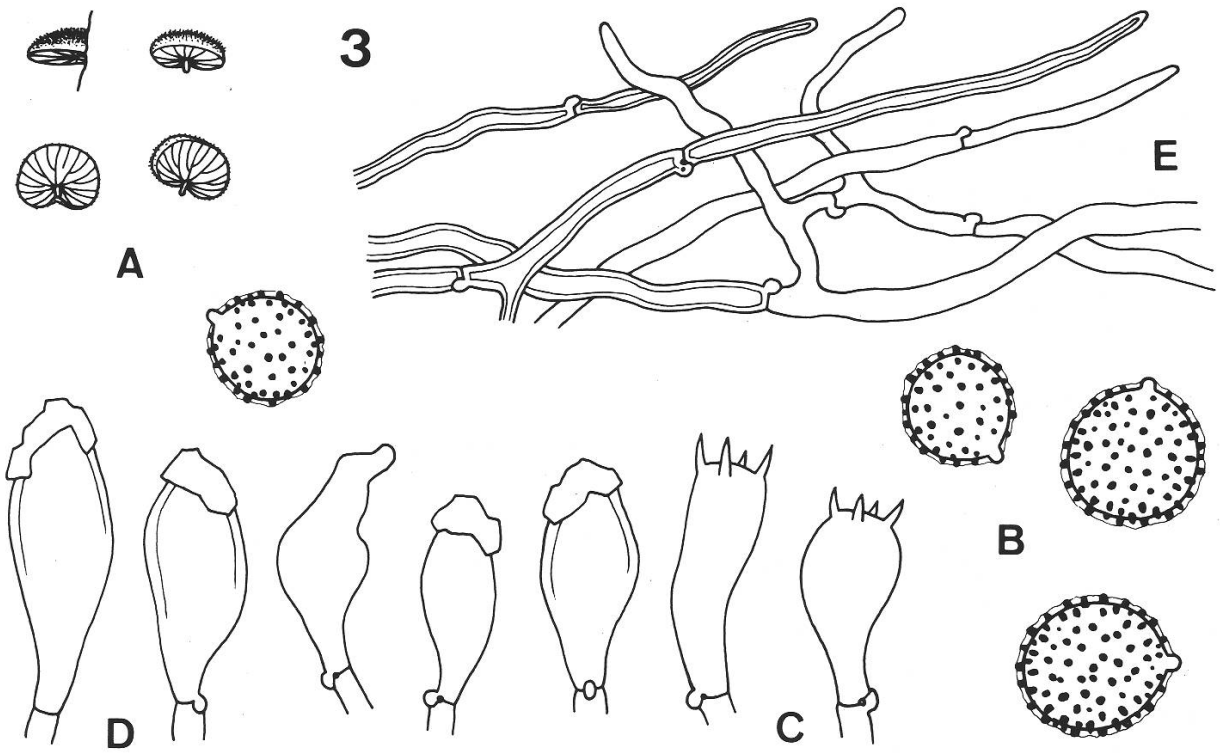

Fig. 3:
Crepidotus aureus Horak (type):
A. carpophores. – B. spores. – C. basidia. – D. cheilocystidia. – E. cuticle.

4. *Crepidotus nanicus* Horak sp. n.

Illustrations: Fig. 4 A–E.

Pileo –7 mm lato, rotundato-reniformi, ex argillaceo pallide castaneo, estipitato, tomentoso. Lamellis excentrice concurrentibus, argillaceis vel incarnatis. Stipite nullo. Sporis 5–6 mμ, subglobosis, verrucosis, brunneis. Cheilocystidiis 20–35/8–15 mμ, lageniformibus, hyalinis, membrana crassa apicaliter instructis, cristalliferis. Ad lignum putridum Nothofagi. Nova Zelandia. Holotypus PDD 27136.

Pileus –7 mm, dimidiate, conchate or reniform, margin incurved and inconspicuously striate, pale brown to argillaceous when young becoming reddish brown in aged carpophores, near point of attachment covered with white velutinous mycelium or white substrigose hairs, smooth towards margin, dry. Lamellae laterally concurrent, ventricose, crowded, pale argillaceous turning pale red-brown, edge concolorous, smooth. Stipe absent, carpophores laterally attached to substratum, single, in dense groups. Odour and taste not distinctive. Context pale brown, gelatinous stratum absent. Spore print pale red-brown.

Spores 5–6 mμ, subglobose, covered with hemispherical warts, perispor indistinct, brown. Basidia 20–25/6–7 mμ, 4-spored. Cheilocystidia 20–35/8–15 mμ, lageniform to subfusoid, hyaline, membrane up to 1 mμ thick near apex, thinning towards base, encrusted with scatterd crystals. Pleurocystidia absent. Cuticle a cutis or trichoderm of cylindrical hyaline thin-walled hyphae (2–4 mμ diam.), occasionally with clusters of dermatocystidia (shape like cheilocystidia), membranes of hyphae not gelatinized. Clamp connections present.

Habitat: On rotten wood of *Nothofagus menziesii* (Fagaceae). New Zealand.

Material: New Zealand: „Fjordland, Lake Te Anau, track to Mt. Luxmore; 9.IV.1969, leg. Horak“ (PDD 27136, holotype; ZT 69/328, isotype).

This little and inconspicuously coloured fungus reminds of *Cr. episphaeria* and *Cr. hirsutellus* whose microscopic data (spores, membranes of cheilocystidia and cuticular hyphae), however, indicate that these taxa are not conspecific.

5. *Crepidotus parietalis* Horak sp. n.

Illustrations: Fig. 5 A–E.

Pileo –18 mm lato, dimidiato, conchato vel flabelliformi, sordide flavo vel aureo-brunneo, velutino-strigoso. Lamellis excentrice vel lateraliter concurrentibus, laete aureo-brunneis vel cinnamomeis. Stipite sive nullo sive rudimento. Sporis 5–6,5 mμ, subglobosis, verrucosis, aureobrunneis. Cheilocystidiis 20–40/5–8 mμ, subfusoideis vel cylindraceis, hyalinis, tenuitunicatis, cristalliferis. Ad ramos putridos Freycinetiae. Nova Zelandia. Holotypus PDD 27137.

Pileus – 18 mm, dimidiate conchiform or reniform, margin incurved and irregularely waved in aged carpophores, pale yellow, golden yellow or pale yellow-brown, paler towards the margin, velutinous to substrigose near point of attachment,

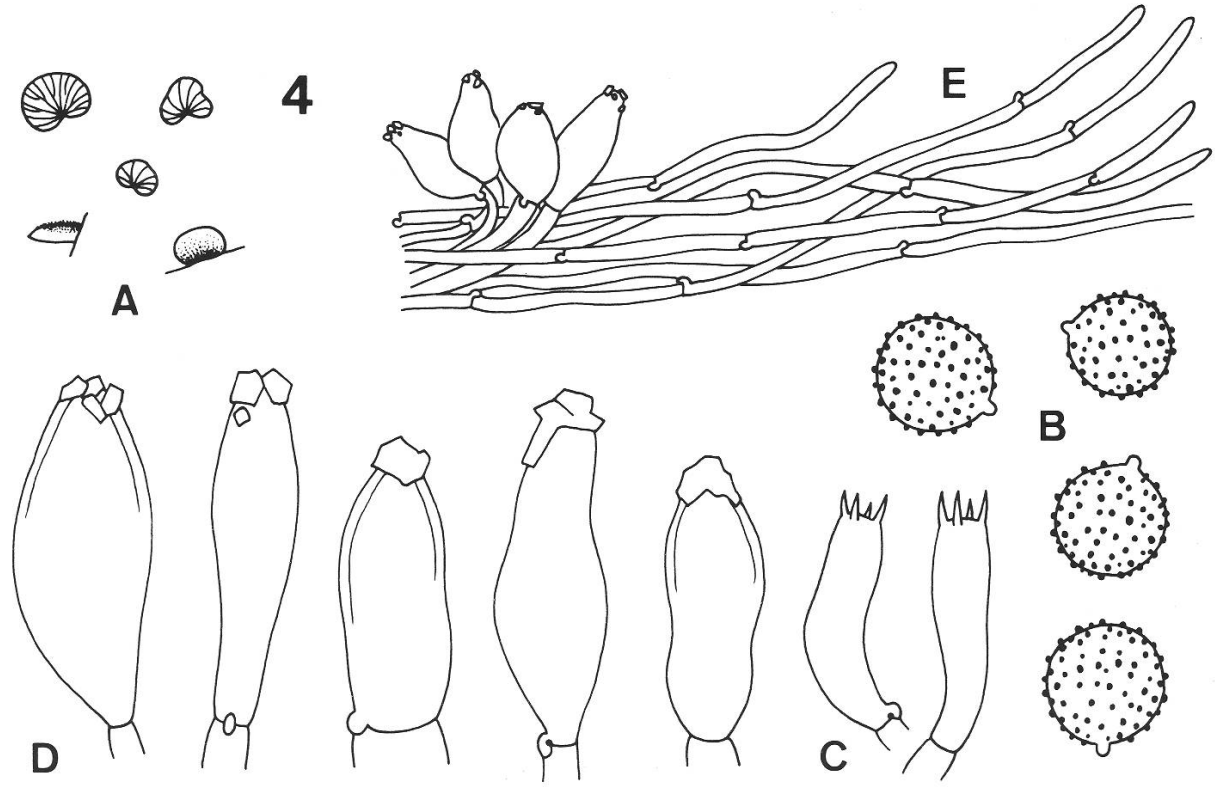

Fig. 4:
Crepidotus nanicus Horak (type):
A. carpophores. – B. spores. – C. basidia. – D. cheilocystidia. – E. cuticle.

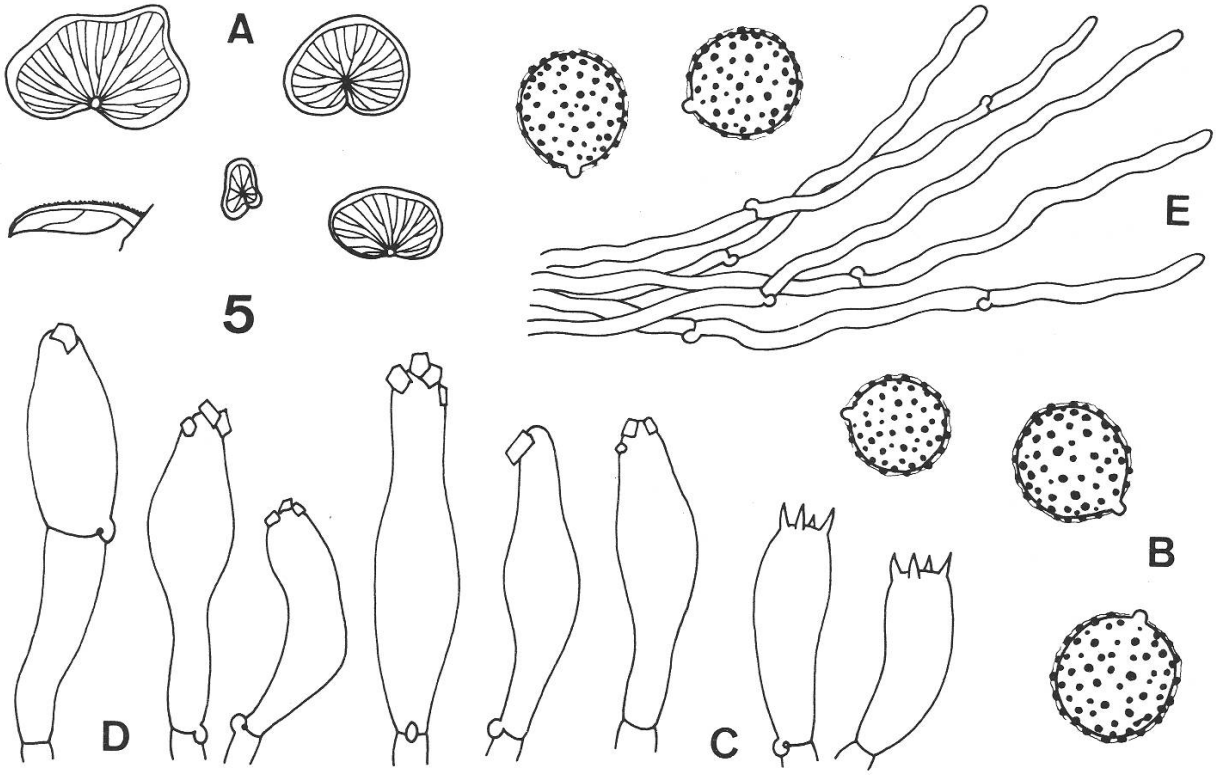

Fig. 5:
Crepidotus parietalis Horak (type):
A. carpophores. – B. spores. – C. basidia. – D. cheilocystidia. – E. cuticle.

smooth along estriate margin, dry. Lamellae eccentrically or laterally concurrent, ventricose, crowded, yellow-brown (like *Cortinarius cinnamomeus*), edge albo-fimbriate. Stipe lacking or present, rudimentary, usually absent in aged specimens, laterally attached to substratum, single, in dense groups. Odour and taste not distinctive. Context yellow, gelatinous stratum absent. Chemical reactions on pileus: KOH and NH_3-negative. Spore print: deep (chocolate) brown.

Spores 5–6,5 mμ, subglobose, apiculus distinct, covered with coarse hemispherical warts embedded in perispor, yellow-brown (KOH). Basidia 17–20/ 6–8 mμ, 4-spored. Cheilocystidia 20–40/5–8 mμ, subfusoid to cylindrical, thin-walled, hyaline, here and there covered with hyaline crystals or amorphous incrustations. Pleurocystidia absent. Cuticle a cutis or trichoderm of cylindrical, hayline, thin-walled hyphae (2–4 mμ diam.), membranes not gelatinized. Clamp connections present. Yellow pigment dissolves well in KOH.

Habitat: On rotting leaves of *Freycinetia* (Pandanaceae). New Zealand.

Material: New Zealand: „Westland, Hari Hari, Big Wanganui; 18.II.1969, leg. Horak" (PDD 27137, holotype; ZT 69/94, isotype).

According to present knowledge in New Zealand there are two species of *Crepidotus* with crystal-bearing cheilocystidia. The first, *Cr. parietalis,* is well defined due to its relatively large-sized carpophores, yellow colour and thin-walled cheilocystidia. The second species, *Cr. nanicus,* is described above.

For further discussion see *Cr. aureus.*

Summary

Five species of *Crepidotus* (Fries) Kummer with thickwalled and crystal bearing cheilocystidia are described from South Africa, Java, New Caledonia, and New Zealand.

Zusammenfassung

Crepidotus episphaeria und verwandte Arten aus der Südhemisphäre.

Aus Südafrika, Java, Neukaledonien und Neuseeland werden 5 Arten von *Crepidotus* (Fr.) Kummer mit kristalltragenden Cystiden beschrieben: *Cr. episphaeria, Cr. hirsutellus* sp. n., *Cr. aureus* sp. n., *Cr. nanicus* sp. n. und *Cr. parietalis* sp. n.

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