***Coprotus disculus* Kimbr., Luck-Allen & Cain – PDD 126084 (= AEB 1399) See p. 3 of this pdf for a morphological description and variations of AEB 1399 from the original description of *C. disculus*.**

Substrate: feral pig (*Sus scrofa*) dung
Collection date: 17 November 2024; **Collection site:** Moonshine Hill Rd., Upper Hutt, NZTM E1769796 N5447118 alt. 240m
Collector: Ian Flux; **Identifier:** Dan Mahoney
Moist chamber incubation date: 18 November 2024

Voucher materials: No dried herbarium specimen but 3 Shear's mounting fluid (SMF) semi-permanent microscope slides; Zeiss SV 11 Stereo-zoom dissecting microscope in-situ photos of the fruiting bodies using a MC80 camera and Olympus BX51 microscopic slide photos of apothecia, asci, paraphyses and ascospore details using a DP28 camera; some of the references consulted and Dan's comments concerning AEB 1399 (the latter on page 3 of this pdf).

Some of the References consulted with comments on them in red:

1. Kimbrough J.W., Luck-Allen E.R. & Cain R.F. 1972. North American species of *Coprotus* (Thelebolaceae, Pezizales). Canadian Journal of Botany 50: 957–971. Keys, descriptions & illustrations are provided for 18 N. American species. See their key & description of *Coprotus disculus* on the following page.

2. De Sloover J.R. 2002. *Coprotus arduennensis*, a new species of coprophilous discomycetes (Pezizales, Ascomycota). Persoonia 17(4): 649–656. In addition to his new species, he discusses the variable aspects of other *Coprotus* spp.; e.g. coloration affected by lighting and variability in ascospore dimensions.

3. Doveri F. 2004. Fungi Fimicoli Italici. Vicenza, A.M.B.-Fondazione Centro Studi Micologici, 1104 p., 158 pl. Includes an updated key to *Coprotus* (after Kimbrough, Luck-Allen & Cain, 1972) and a description and illustrations of *Coprotus disculus* on pp 524 & 525.

4. Bell A. publications – 1983 (New Zealand coprophiles) and 2005 (Australian coprophiles). See her keys to *Coprotus* spp. and illustrations of *C. disculus*. All 4 PDD records (accessed 1 March 2025) have been identified by her.

5. Kušan I., Matočec N., Jadan M., Tkalčec Z. & Mešić A. 2017. An overview of the genus *Coprotus* with notes on the type species and description of *C. epithecioides* sp. nov. MycoKeys 29: 15–47. This is the most recent comprehensive reference. It provides a historical summary, a worldwide key to accepted putative species of *Coprotus*, tables comparing their various morphological features and a phylogram with those species sequenced.

Kimbrough J.W., Luck-Allen E.R. & Cain R.F. 1972. North American species of *Coprotus* (Thelebolaceae, Pezizales). Canadian Journal of Botany 50: 957–971. Portions of pages 960, 961 & 963 are reproduced below.

A KEY TO NORTH AMERICAN SPECIES OF *Coprotus*

A. Apothecia yellow to orange, paraphyses with orange granules or guttules, excipulum weakly cyanophilous ..... B

A. Apothecia translucent to white, drying faintly yellowish, paraphyses without pigmented guttules, excipulum sometimes strongly cyanophilous and dextrinoid ..... F

B. Ascospores less than 10 µ long ..... *C. luteus*
B. Ascospores more than 10 µ long C

C. Ascospores less than 15 µ long ..... D
C. Ascospores more than 15 µ long ..... E

D. Apothecia bright yellow or orange, asci 65–90 × 10–15 µ, ascospores 12–14 × 6.0–8.5 µ ..... *C. aurora*
D. Apothecia yellow, asci 45–55 × 15–18 µ, ascospores 10–13 × 6.5–8.5 µ ..... *C. breviascus*

E. Ascospores 15–18 × 9.0–10.5 µ, asci 110–150 × 12–18 µ, paraphyses slightly inflated ..... *C. ochraceus*
E. Ascospores 17–25 × 11–14 µ, asci 65–100 × 20–28 µ, paraphyses slightly uncinate above ..... *C. vicinus*

F. Asci eight-spored ..... G
F. Asci with more than eight spores ..... M

G. Asci broadly clavate, paraphyses strongly inflated at their apices ..... *C. granuliformis*
G. Asci cylindric, paraphyses not strongly inflated ..... H

H. Ascospores less than 10 µ long I
H. Ascospores more than 10 µ ..... K

I. Asci less than 55 µ long, paraphyses filiform and strongly uncinate at their apices ..... *C. glaucellus*
I. Asci longer, paraphyses slightly inflated above ..... J

J. Asci 65–85 × 15–20 µ, marginal cells of excipulum not extremely elongate ..... *C. lacteus*
J. Asci 80–100 × 8–12 µ, marginal cells of excipulum long, flexuous, and capitate ..... *C. marginatus*

K. Spores mostly 14 µ or longer ..... *C. leucopocillum*
K. Spores less than 14 µ long L

L. Spores narrowly ellipsoid, 12–13.5 × 5–8 µ, asci 75–90 × 10–15 µ, apothecia white ..... *C. disculus*
L. Spores broader, 11–13 × 7.5–10 µ, asci 80–125 × 18–24 µ, apothecia with yellowish border ..... *C. dextrinoideus*

M. Asci 16-spored ..... N
M. Asci with more than 16 spores ..... O

N. Ascospores 11–16 × 8–10 µ, asci 85–140 µ long ..... *C. sexdecimsporus*
N. Ascospores 7.5–10 × 4.0–6.5 µ, asci 70–90 µ long ..... *C. duplus*

O. Asci with 32 spores ..... P
O. Asci with more than 32 spores ..... Q

P. Spores less than 13 µ long, asci 50–110 µ long ..... *C. albidus*
P. Spores more than 13 µ long, asci larger ..... *C. rhyparobioides*

Q. Asci approximately 64-spored ..... *C. niveus*
Q. Asci approximately 256-spored ..... *C. winteri*

Apothecia translucent to white, becoming yellowish discoid to lenticular, 0.5–1.0 mm in diam; *excipulum* of a textura angularis to globulosa; cells thin-walled, essentially hyaline, basal cells almost globose, up to 20 µ diam, marginal cells 8.0–12 × 6–10 µ; *asci* eight-spored, rarely four-spored; cylindric, 75–90 × 10–15 µ, rounded above, attenuated below; *ascospores* uniseriate, sometimes biseriate, narrowly ellipsoid, 12.0–13.5 × 5.0–8.0 µ, faintly yellowish, with one de Bary bubble; *paraphyses* filiform, septate below, hyaline, without oil guttules, with apices inflated 3.0–4.0 µ and slightly uncinate.

HABITAT: On dung of deer, horse, cow, and small rodents.

TYPE: On deer dung, New York: Bergen Swamp, near Rochester, 5 Oct. 1947, *Rogerson* (CUP 37168).

COMMENTS: *Coprotus disculus* is close to *C. lacteus*. In fact, specimens of the former have been accessioned in some herbaria under the latter name. *Coprotus lacteus* differs in having shorter asci and ascospores and narrower paraphyses.

Morphological description and variations of *Coprotus disculus* AEB 1399 from its original description

Apothecial color: Among the apothecia seen, all exhibited some yellow in portions exposed to daylight while incubating – none were wholly white. Those less developed and smaller were white in basal less-light exposed areas (see the 3rd photo page). Pigmentation was centered in the numerous crowded paraphyses but some very faint pigmentation even appeared in the ascospores and in peripheral gel-like areas among the asci & paraphyses. As mentioned earlier, De Sloover J.R. 2002. in his publication of *Coprotus arduennensis,* discusses coloration affected by lighting in *Coprotus* species. For a better view of faint ascospore yellowing see iNaturalist water mt. photos below of *C. disculus* identified by Igor Khomenko, Ontario, Canada in 2020 on deer dung. Although most asci are 8-spored, some are only 4-spored.

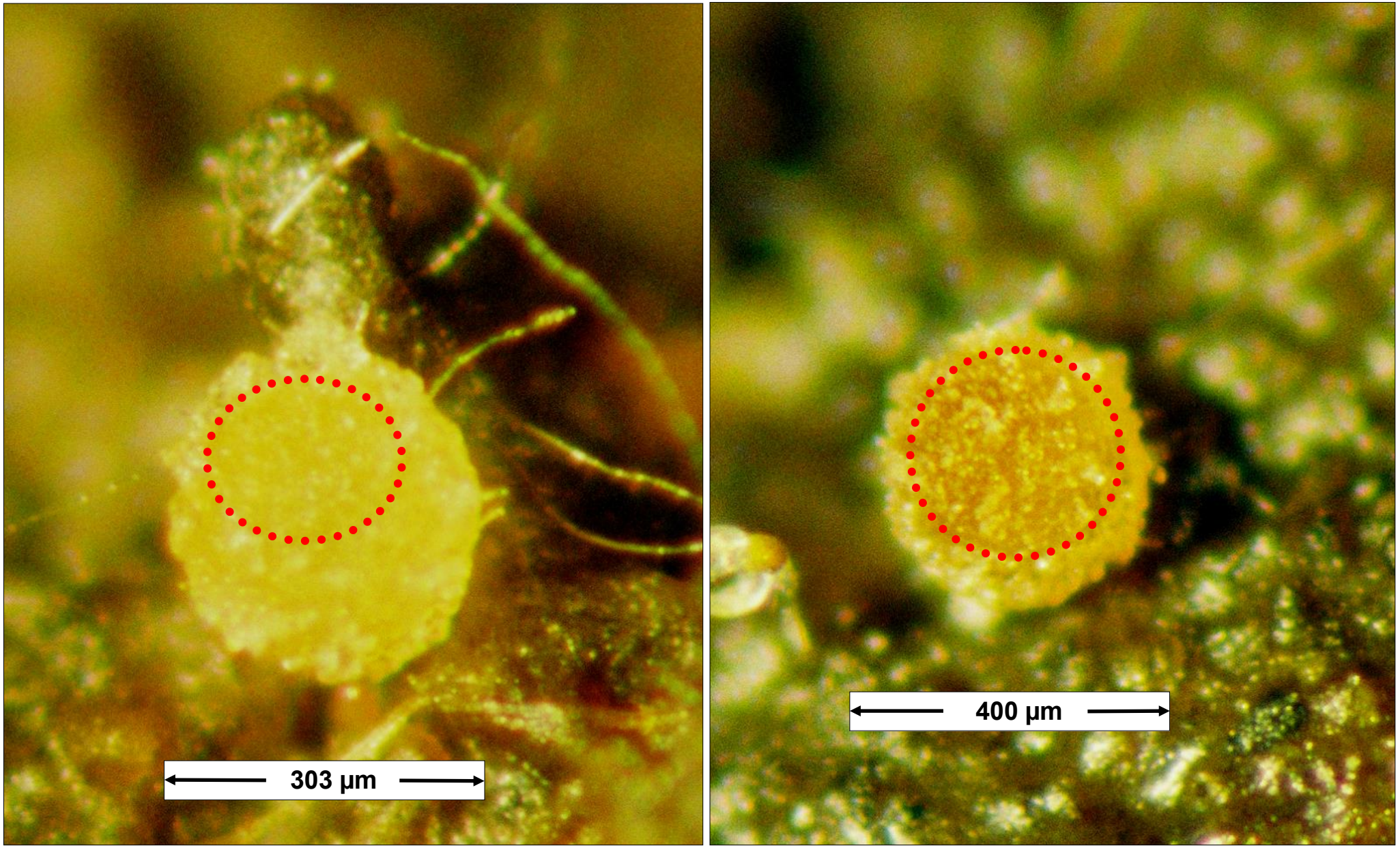
Excipulum: As described by Kimbrough et al. 1972 – “textura angularis to globulosa; cells thin-walled, essentially hyaline, basal cells almost globose, up to 20 µm diam, marginal cells 8.0-12 X 6-10 µm”.

Paraphyses: Extending beyond the asci, numerous, filiform, septate throughout, finely granular (no oil guttules), inflated and curving apically (see photo page 5). Kimbrough instead says “filiform, septate below, hyaline, without oil guttules, with apices inflated 3.0-4.0 µm and slightly uncinate”.

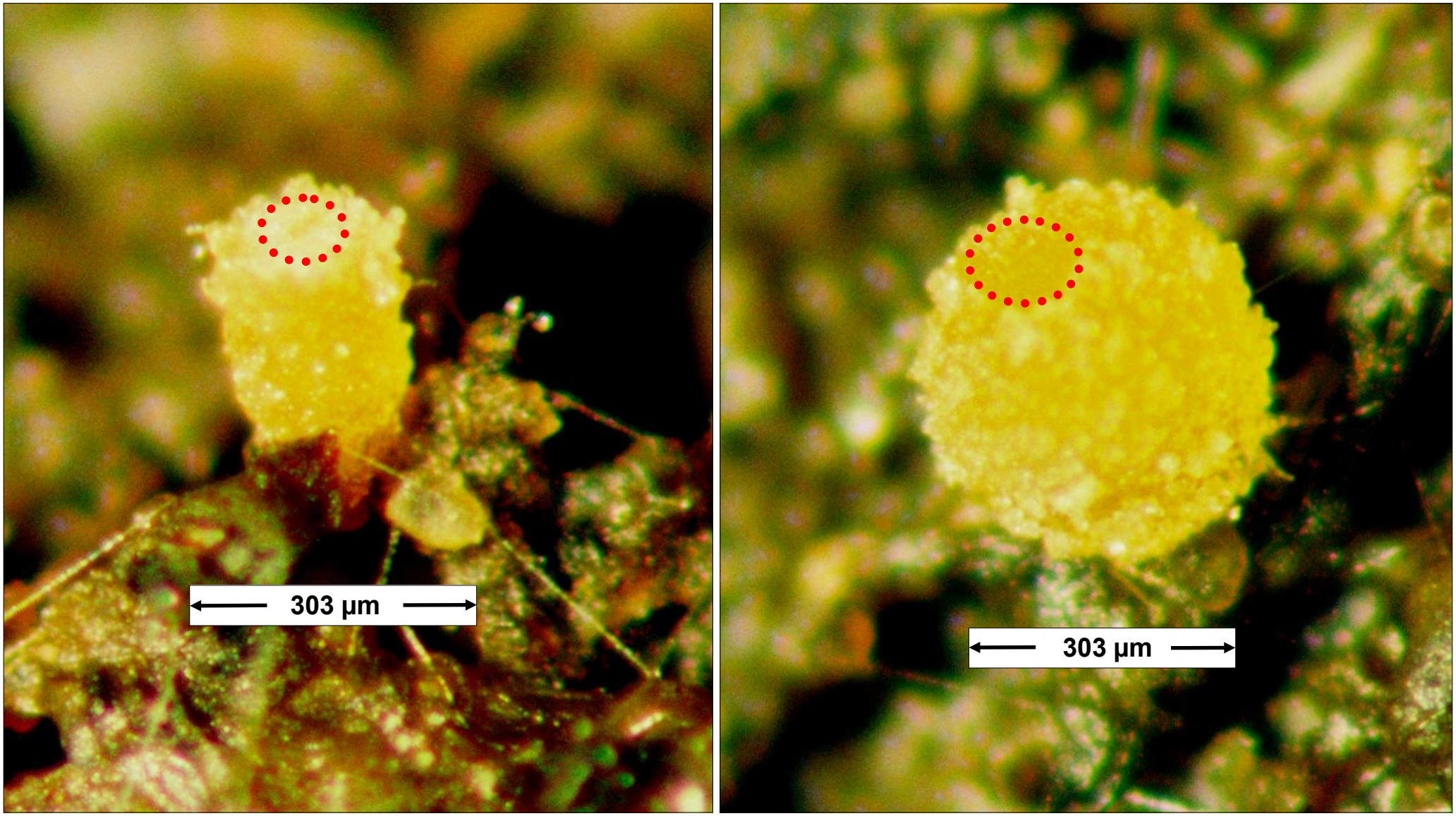
Asci: Kimbrough says “eight-spored, rarely four-spored; cylindric, 75-90 X 10-15 µm, rounded above, attenuated below”. AEB 1399 differs in having longer asci – free-floating mature asci in water mounts measured 92-125 X 10-15 µm. Publications by others vary: ‘*Coprotus disculus* Fungi of Great Britain and Ireland’ online (Paul Cannon, key by Yi-Jan Yao) agrees with Kimbrough’s measurements while Spooner and Butterfill (in Coprophilous Discomycetes from the Azores. Kew Bulletin 54(3), p. 553) record asci “up to c. 110 x 12 µm” and Doveri 2004, likewise, describes longer asci “94-126 X 11-18 µm”.

Ascospores: Kimbrough says “ascospores uniseriate, sometimes biseriate, narrowly ellipsoid, 12.0-13.5 X 5.0-8.0 µm, faintly yellowish, with one de Bary bubble”. AEB 1399 is very similar with ascospores 12.5-13 X 7-8 µm, but lack a de Bary bubble in all mounting media tried & ascospores are faintly warty & sheathed. Except for Doveri, 2004, most other publications I consulted illustrated ascospores lacking de Bary bubbles. However, Kušan et al., 2017 notes (p. 21), that *Coprotus* spp. have strong affinities to form de Bary bubbles in any anhydrous conditions (especially in media such as Cotton Blue).

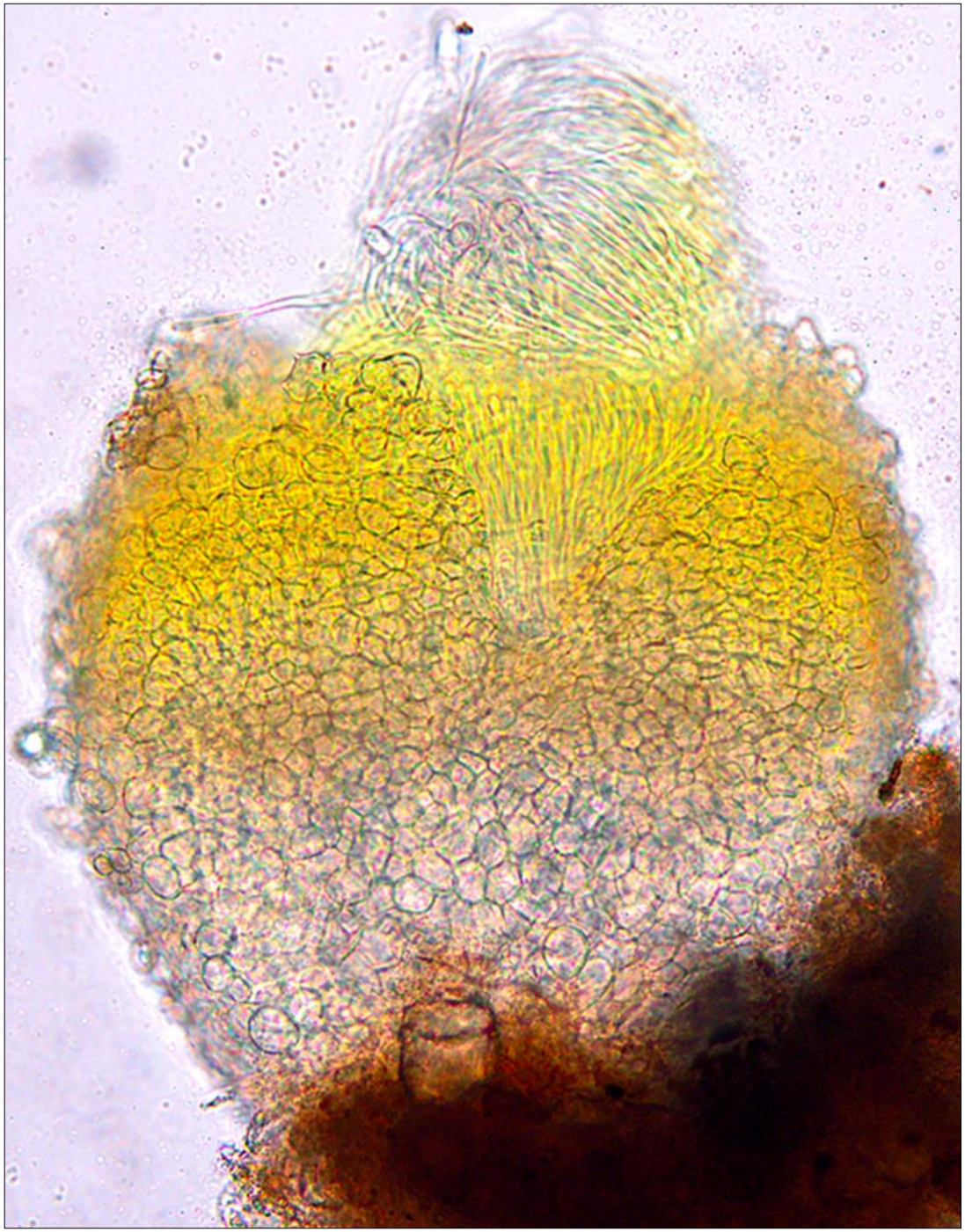
Comments: Aside from differences with the original Kimbrough description, AEB 1399 fits *Coprotus disculus* better than other species he treated. Kušan et al. 2017, while presenting invaluable morphological data, emphasize (pp. 41-42) that the present study implies the need for using living material in water mts. & phylogenetic studies in future *Coprotus* collections.



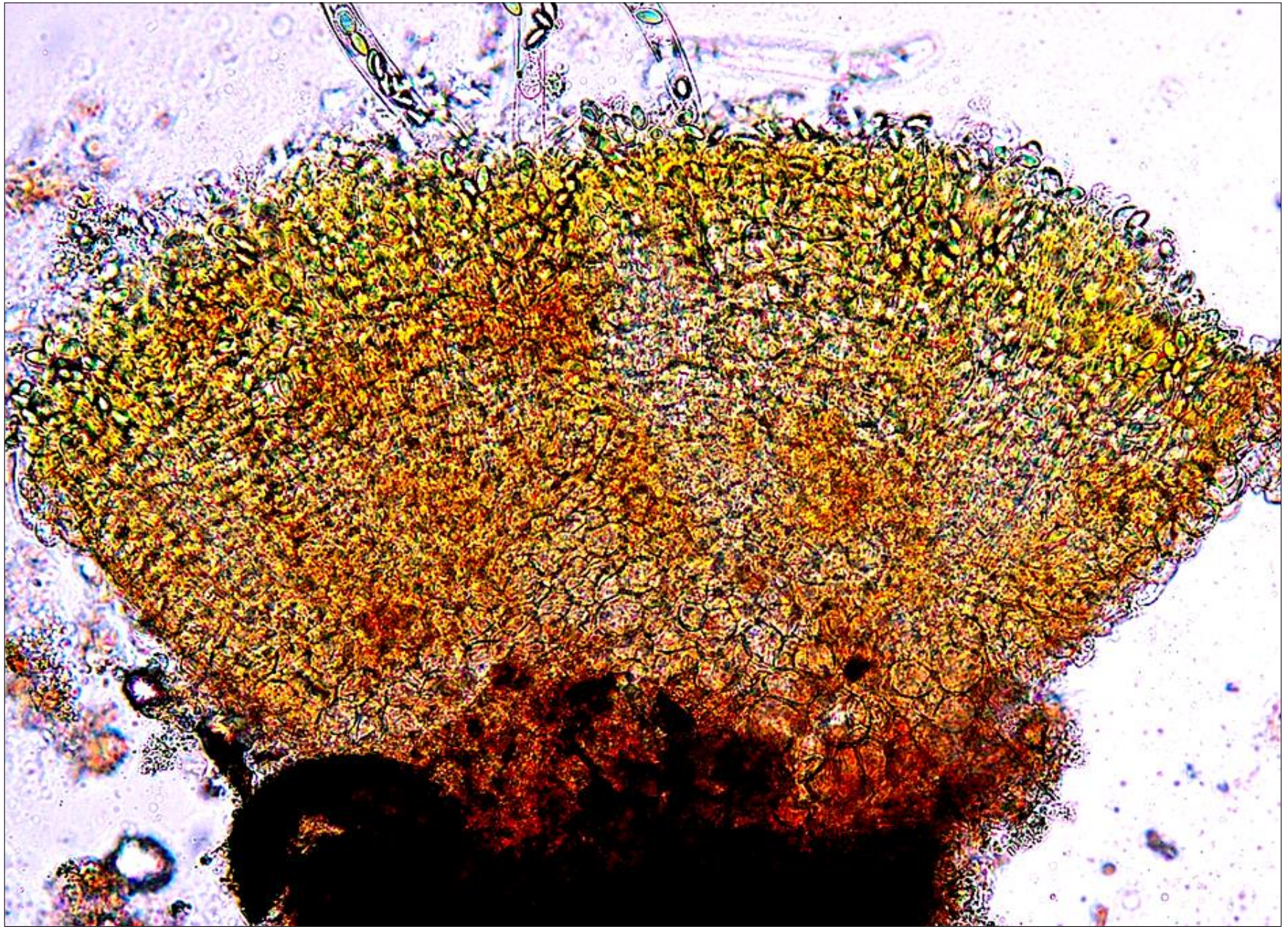
AEB 1399. In-situ overhead photos taken 2 December 2024 of fresh mature apothecia on moist-incubated pig dung. The red-dotted circles represent the edge of the hymenium with the excipular rim just outside the circles.



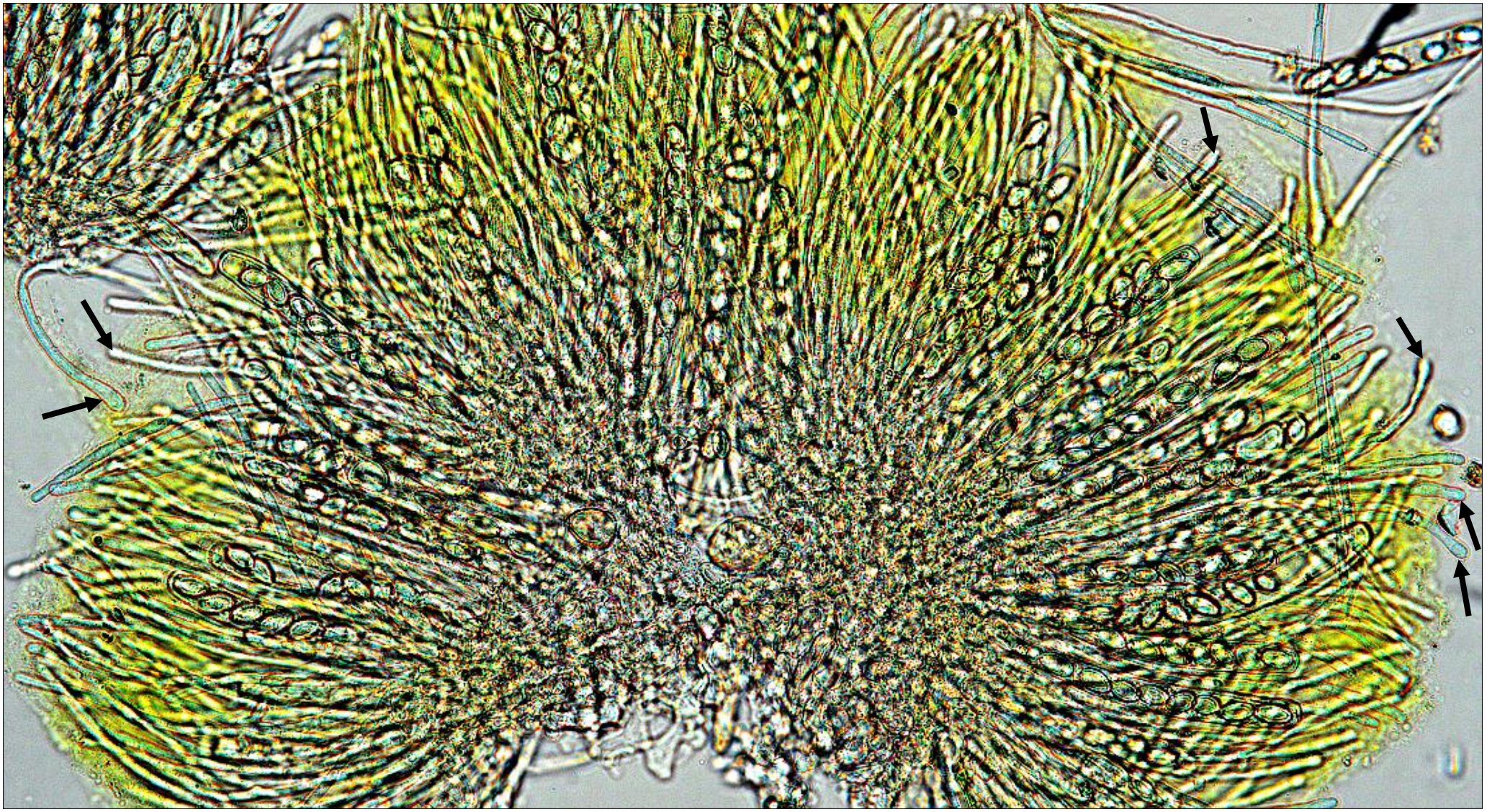
AEB 1399. In-situ side-view photos taken 2 December 2024 of fresh mature apothecia on moist-incubated pig dung. The red-dotted circles represent the edge of the hymenium with the excipular rim just outside the circles.



AEB 1399. Young fresh apothecium side view on incubating pig dung seen in a water mount 28 Nov. 2024. Emphasized is the partial yellow pigmentation and the ectal excipulum. Note the shape, size and location of the excipular cells.

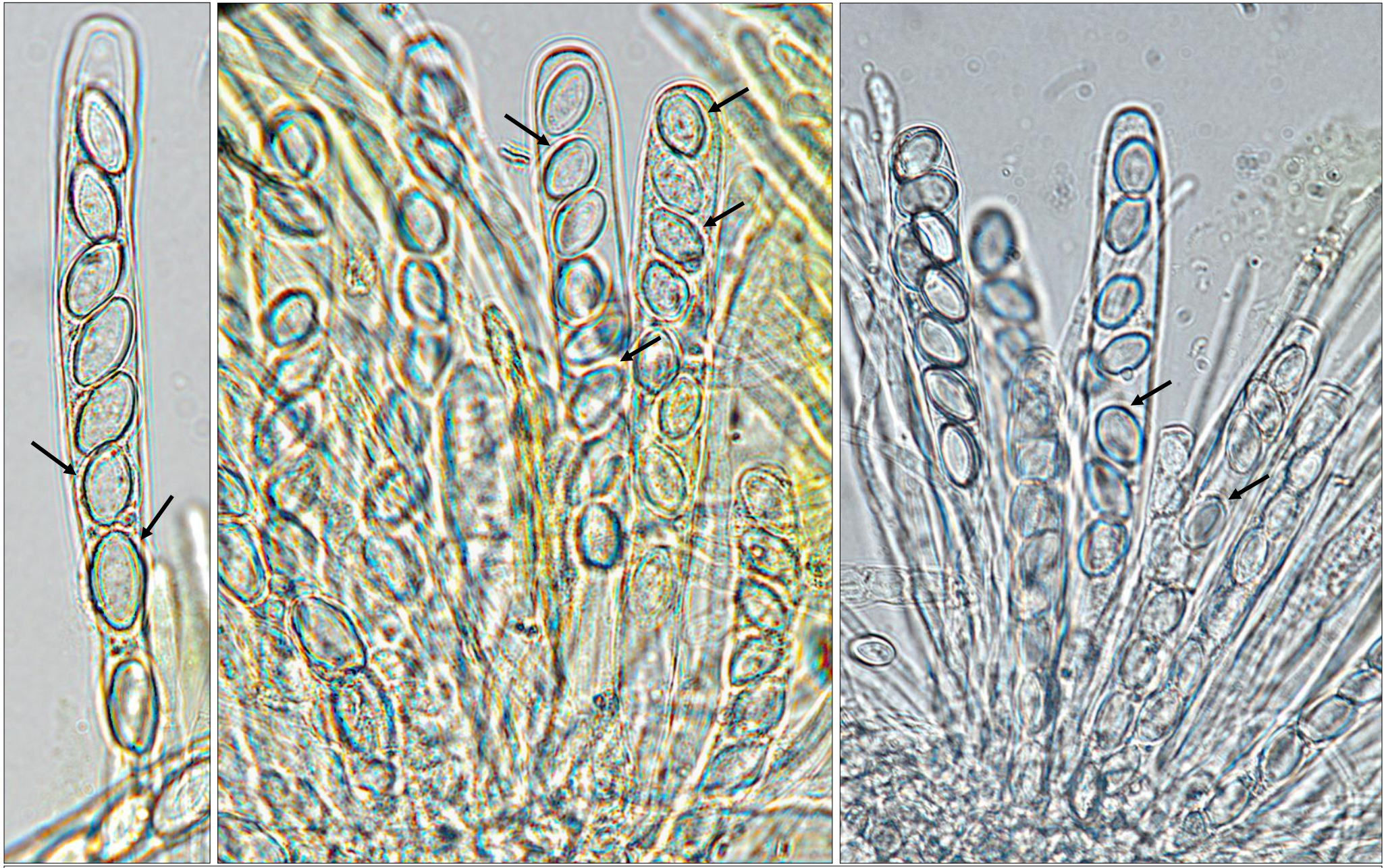


AEB 1399. Mature fresh apothecium side view (largest seen) on incubating pig dung in a water mount 30 Nov. 2024. 630 × 450 µm (others 415 × 375 & 475 × 465 µm). Apothecial size was variable as seen on the previous pages.



AEB 1399. Fresh hymenium squash in a water mount on 2 December 2024 using the X40 objective. Note the yellow pigment location, the cylindrical asci with uniseriately arranged ascospores and the numerous paraphyses. As the latter emerge at the edges, they are curving (not particularly uncinate) and their apices are enlarged somewhat (note the arrows). Enlargement of this field of view reveals tiny granules in the paraphyses & faintly verruculose ascospores.

AEB 1399. Fresh hymenium squash in a water mount on 30 November 2024 using the X40 objective. Note the yellow pigment location, the cylindrical asci with overlapping uniseriate (sometimes biseriate) ascospores and the numerous paraphyses. Enlargement of this field of view reveals tiny granules in the paraphyses & faintly verruculose ascospores.



AEB 1399. Fresh hymenium squash in water mounts on 2 December 2024 using the X100 objective. See comments provided on the previous 2 pages. Ascospores here exhibit (seen with difficulty) the gelatinous sheaths (arrowed) that Kušan et al. 2017 emphasized.

AEB 1399. Fresh hymenium squash in Shear's mounting fluid (SMF) showing 3 different free-floating asci under the same magnification, each using brightfield and phase microscopy. Asci left to right measure 120 × 15, 95 × 12.5 and 125 × 13.5 µm respectively.