

***Coprotus sexdecimsporus* (P. Crouan & H. Crouan) Kimbr. & Korf – PDD 125952 (= AEB 1408)**

Substrate: red deer (*Cervus elaphus*) dung

Collection date: 9 June 2025; **Moist chamber incubation date:** 17 June 2025

Collection site: Pureora Forest, Mangatutu, E1817980 N5756515; forest vegetation: tawa

Collectors: Ian Flux & Merryl Park; **Identifier:** Dan Mahoney

Voucher materials: Good dried herbarium specimens of *Coprotus sexdecimsporus* and scant dried material of *C. winteri* on the same dung pellet; both species accompanied by Shear's mounting fluid (SMF) semi-permanent microscope slides; Zeiss SV 11 Stereo-zoom dissecting microscope in-situ photos of *C. sexdecimsporus* apothecia among which are a few indistinguishable *C. winteri* & Olympus BX51 microscopic slide photos of asci, ascospores & paraphyses using a DP28 camera; references consulted & Dan's comments.

Primary references consulted:

1. Kimbrough J.W., Luck-Allen E.R. & Cain R.F. 1972. North American species of *Coprotus* (Thelebolaceae: Pezizales). Can. J. Bot. 50: 957–971. **Species descriptions, illustrations and a key are found here. Their descriptions of *Coprotus sexdecimsporus* & *C. winteri* are reproduced on the next page.**
2. Bell A. 2005. An illustrated guide to the coprophilous Ascomycetes of Australia. CBS Biodiversity series no. 3. Centraalbureau voor Schimmelcultures, 173 pp. **See Ann's illustrations of both species on the page after next.**
3. Kušan I. et al. 2017. An overview of the genus *Coprotus* with notes on the type species and description of *C. epithecioides* sp. nov. MycoKeys 29, 15–47. **See comments and their illustrations of *C. sexdecimsporus* on the page after Ann's illustrations.**

Comments: *Coprotus sexdecimsporus* is widely distributed on dung worldwide with 108 records in Mycoportal, 3 presently in New Zealand PDD and, although not officially recorded with 9 records from Australia as part of Ann's work with the Australian Biological Resources Study (ABRS in 1997-1998). *Coprotus winteri*, however, is less common with only 2 records in Mycoportal, 2 unofficially in Ann's Australian ABRS work (in 2000) but none in New Zealand PDD.

Kimbrough J.W., Luck-Allen E.R. & Cain R.F. 1972. North American species of *Coprotus* (Thelebolaceae: Pezizales). Can. J. Bot. 50: 957–971.

Descriptions of *Coprotus sexdecimsporus* and *Coprotus winteri* are reproduced below.

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Coprotus sexdecimsporus (Cr. & Cr.) Kimbr.

Apothecia smooth, sessile, globose to cupulate, eventually discoid, translucent to white, drying yellowish, 0.5-1.0 mm diam; ***excipulum*** of a textura angularis to globulosa, basal cells up to 12 µm in length, marginal cells of five or six layers, slightly elongated, 10-12 X 5-6 µm; ***asci*** 16-spored, broadly clavate, 85-140 X 20-30 µm, rounded above, with a broad operculum, attenuated below; ***ascospores*** smooth, hyaline to slightly yellowish, broadly ellipsoid, 11.0-16.0 X 8.0-10.0 µm, each with one de Bary bubble; ***paraphyses*** filiform, septate, 1.5 µm below, inflated to 2.0-2.2 µm and strongly uncinatate at apices, provided with a variable number of oil guttules.

HABITAT: On dung of animals.

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Coprotus winteri (Marchal) Kimbr.

Apothecia scattered to gregarious, globose to cupulate, translucent to white, glabrous, 0.4-0.5 mm diam, hymenium roughened by protruding asci; ***excipulum*** of three or four layers, of a textura angularis to globulosa, marginal cells hyaline, thin-walled, elongated, 10-12 X 4.0-5.0 µm; ***asci*** approximately 256-spored, broadly cylindric, 160-210 X 45-55 µm, rounded above, attenuated below; ***ascospores*** irregularly crowded, ellipsoid, 10.0-11.0 X 5.0-6.0 µm each with a de Bary bubble; paraphyses hyaline, filiform, septate, branched above, 1.0-2.0 µm in width below, slightly larger at apices, uncinatate.

HABITAT: On dung of horse.

Bell A. 2005. An illustrated guide to the coprophilous Ascomycetes of Australia. CBS Biodiversity series no. 3. Centraalbureau voor Schimmelcultures, 173 pp.

Illustrations of *Coprotus sexdecimsporus* and *Coprotus winteri* on p. 94 are reproduced below.

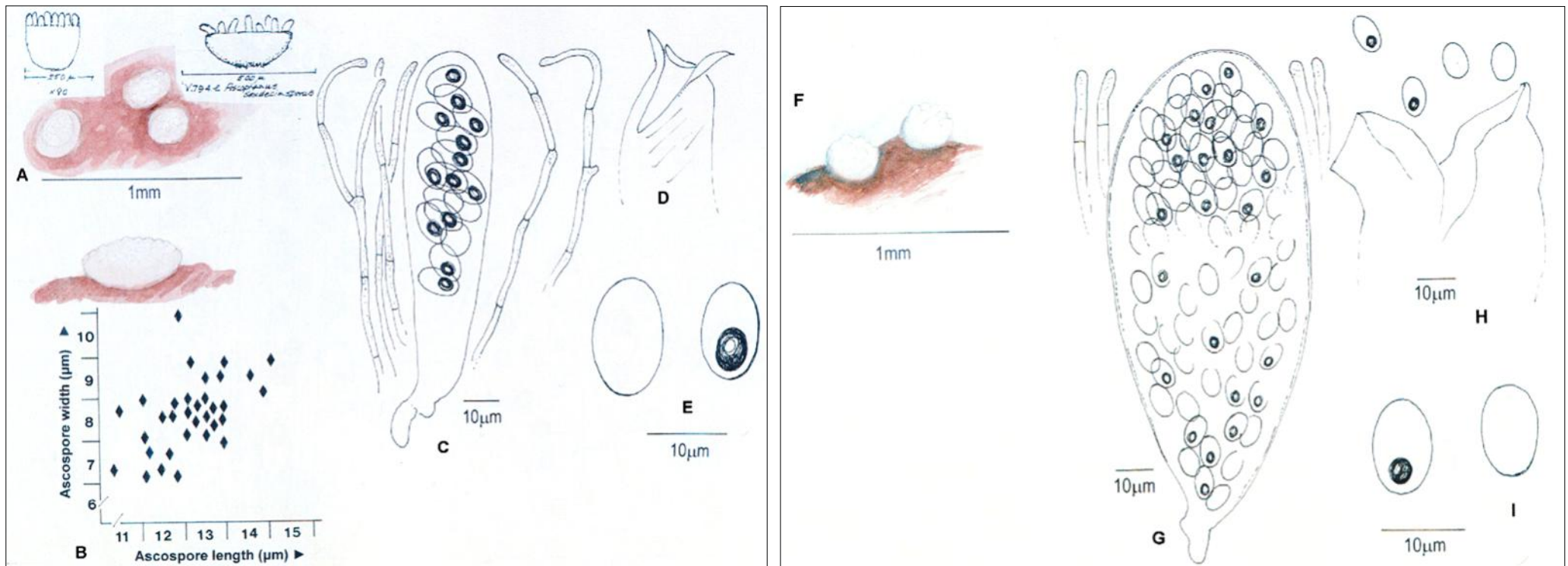


Fig. 40. *Coprotus sexdecimsporus*. A–E. A. Mature apothecia (inset drawings from Dade). B. Scatter diagram showing distribution of ascospores sizes. C. Mature ascus, ascospores & paraphyses. D. Operculum of discharged ascus. E. Two Mature ascospores one with de Bary bubble. *Coprotus winteri*. F–I. F. Mature apothecia. G. Mature ascus & paraphyses. H. Operculum of discharged ascus. I. Mature ascospores one with de Bary bubble.

Kušan I. et al. 2017. An overview of the genus *Coprotus* with notes on the type species and description of *C. epithecioides* sp. nov. MycoKeys 29, 15–47. The illustrations and legends below are from their Croatian material, p. 24 in the publication. The article includes a key to world species of *Coprotus* and a thorough description of *C. sexdecimsporus*. They also discuss *Coprobia* phylogenetics and the taxonomic relationships of *C. sexdecimsporus*, which they sequenced for the first time.

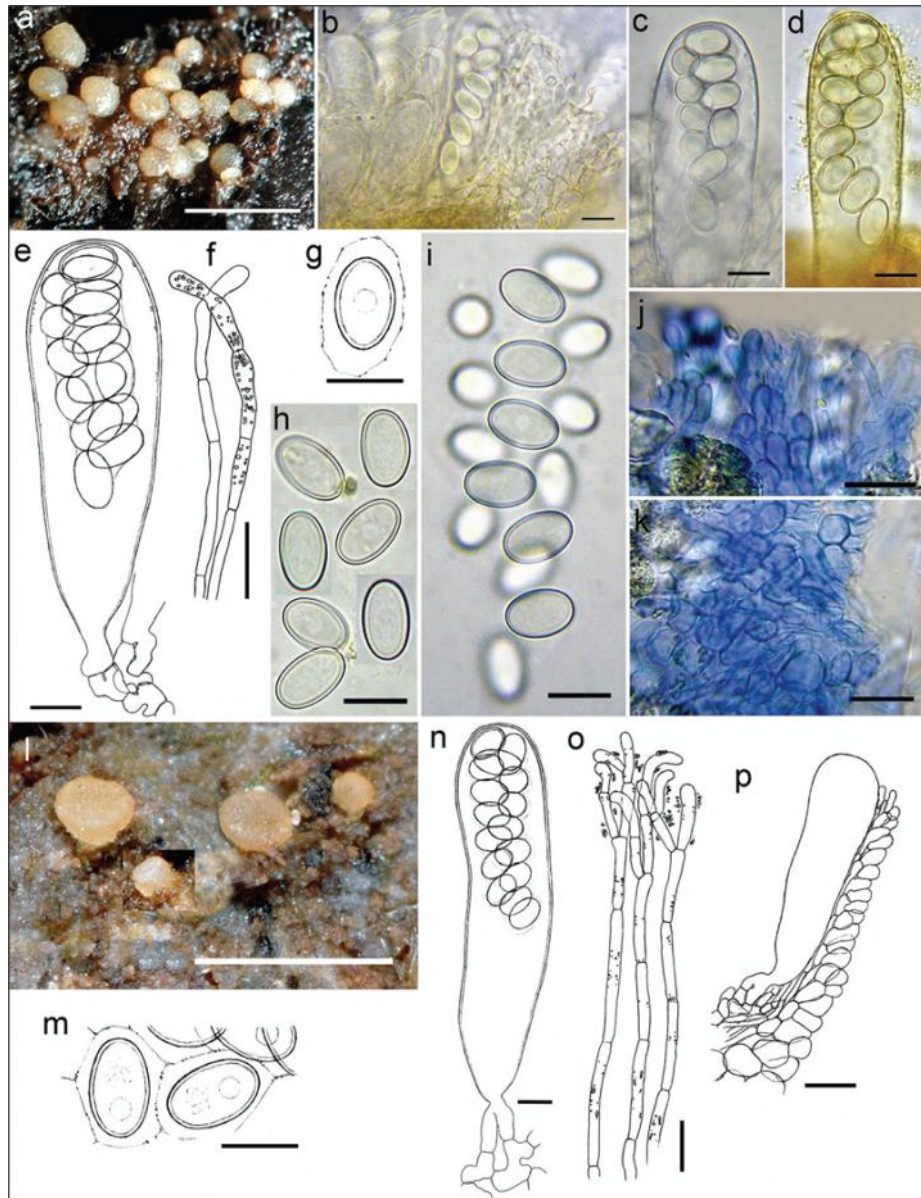
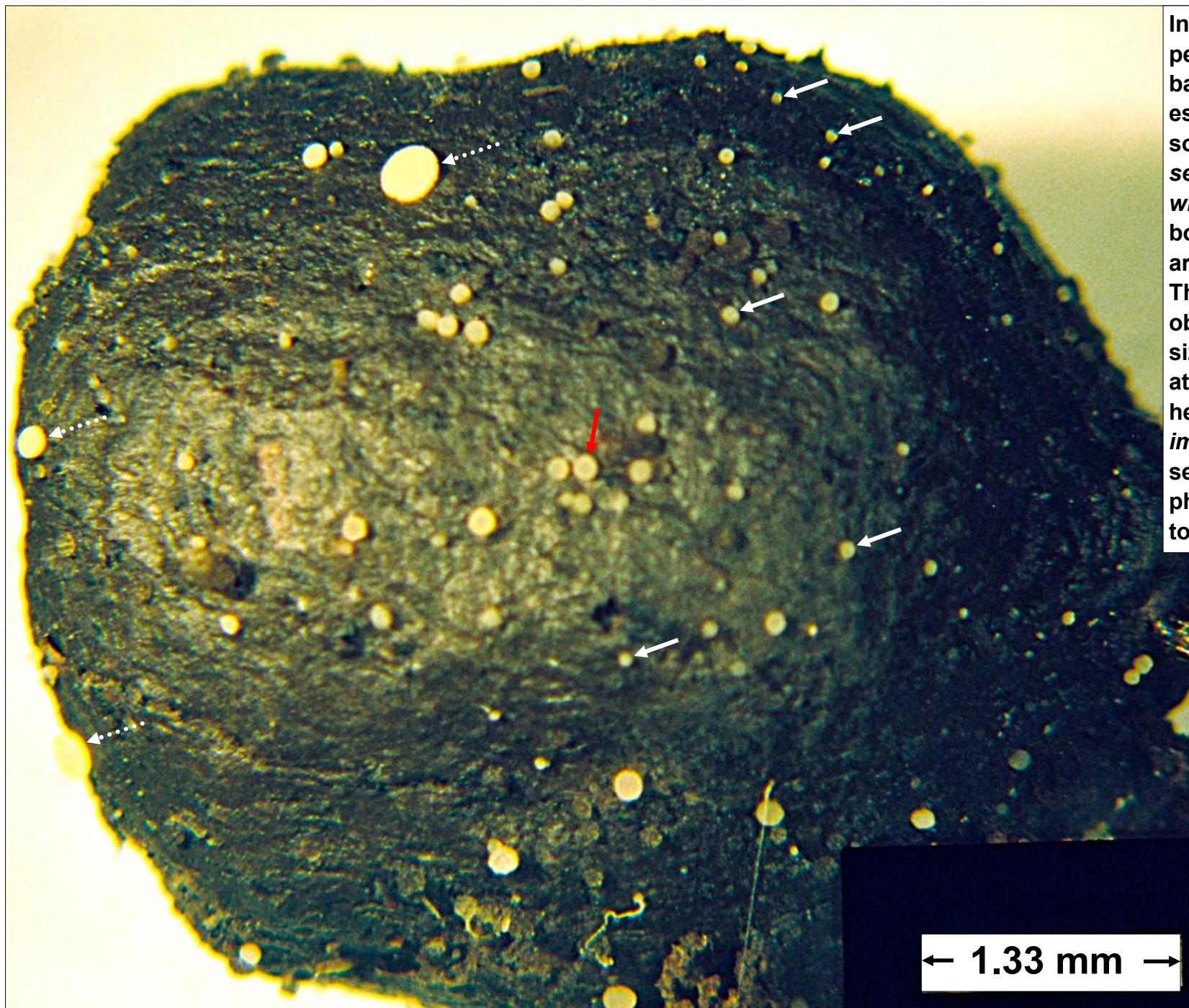
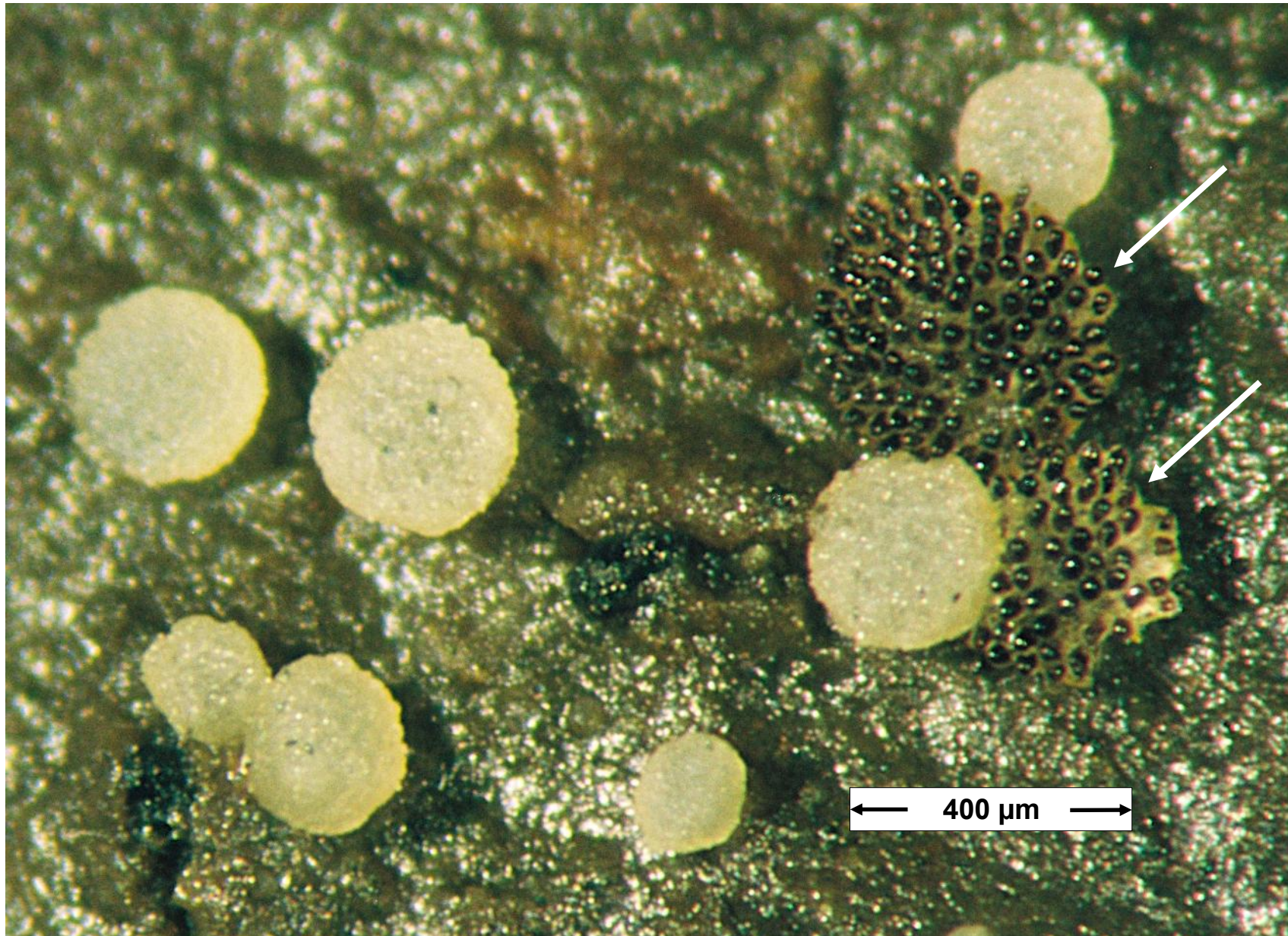


Figure 3. *Coprotus sexdecimsporus*. **a** Fresh apothecia on *Equus asinus* dung **b** Cross section with immature asci, paraphyses and marginal cells **c**, **d** Asci protruding above hymenium **e** Ascus with ascogenous cells **f** Paraphyses **g** Freshly ejected ascospore with a sheath **h** Mature ascospores **i** 16-spored freshly ejected packet of ascospores **j** Marginal cells from side view **k** Ectal excipulum cells in top view **l** Fresh apothecia on *Lepus europaeus* dung **m** Freshly ejected ascospores held together with a sheath **n** Ascus with ascogenous cells **o** Paraphyses with granular pigment and copious exudate **p** Excipular and marginal tissue. **b**, **c**, **e–g**, **i**, **m–p** *tap water **d**, **h** *IKI **j**, **k** †CB **a–i** from CNF 2/8394 **j–p** from CNF 2/8942. Scale bars: **a**, **l** 1 mm, **b–k**, **m–o** 10 µm, **p** 20 µm; del. N. Matočec, phot. N. Matočec & I. Kušan.

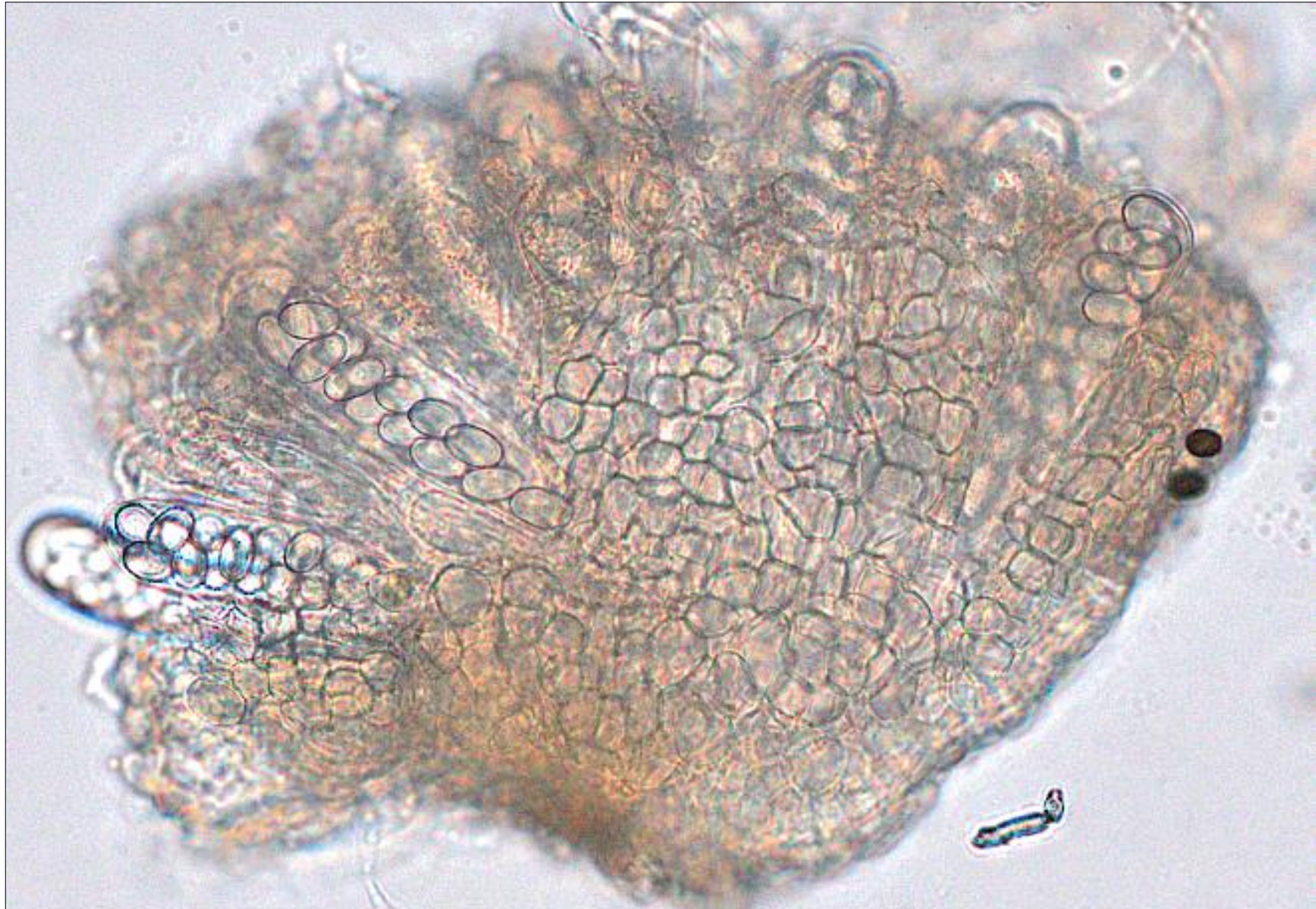


In-situ fresh, red deer dung pellet seen in a moist incubation chamber. The smallest fruiting bodies (arrows solid white) are *Coprotus sexdecimsporus* – rarely *C. winteri*. The larger fruiting bodies (arrows dotted white) are *Coprotus baeosporus*. The largest of the latter are obvious while intermediate-sized ones are faintly yellow at the apothecium rim & here usually *C. sexdecimsporus* (red arrow – view seen on next page.) Post-photo slide views were used to verify the identifications.

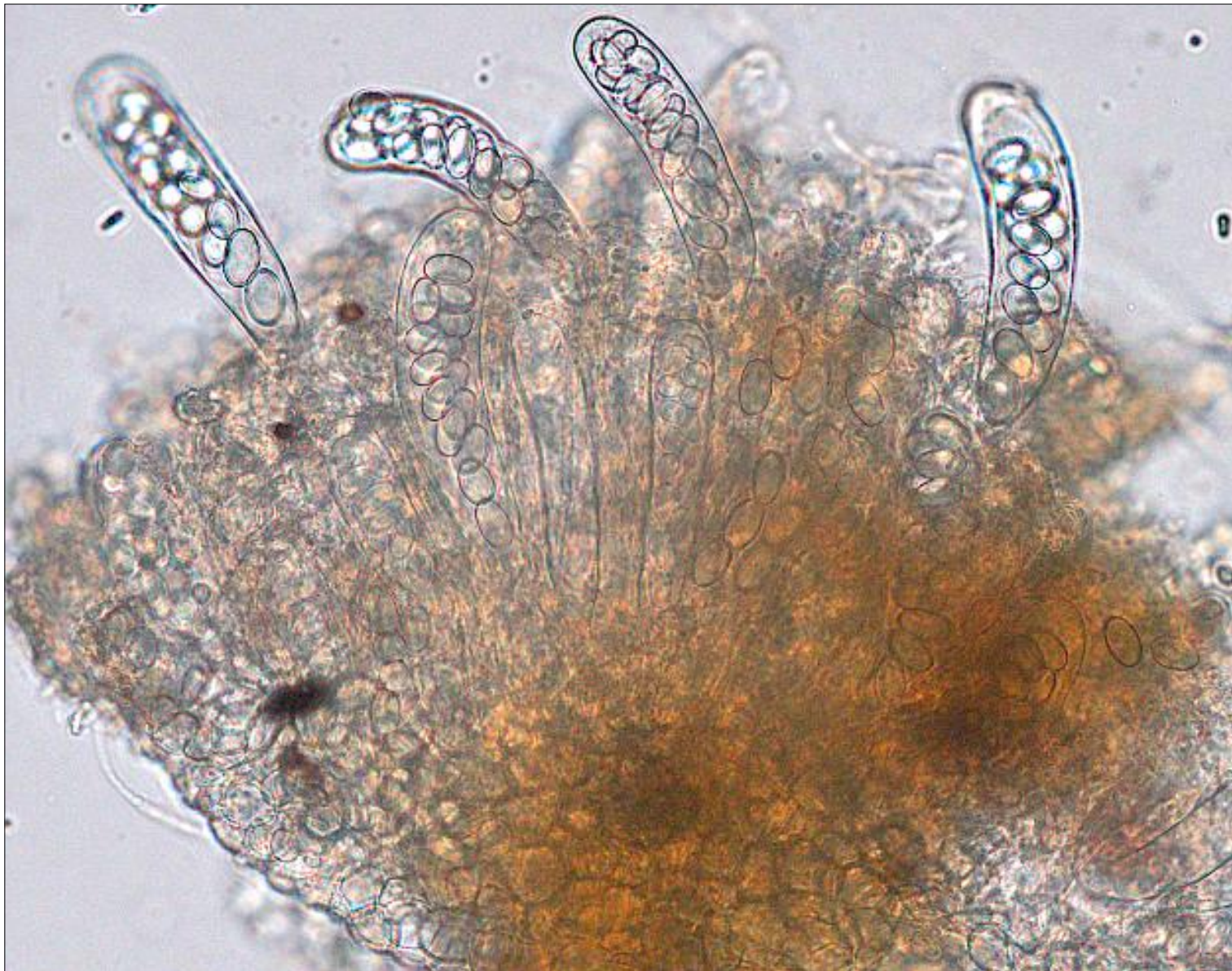
← 1.33 mm →



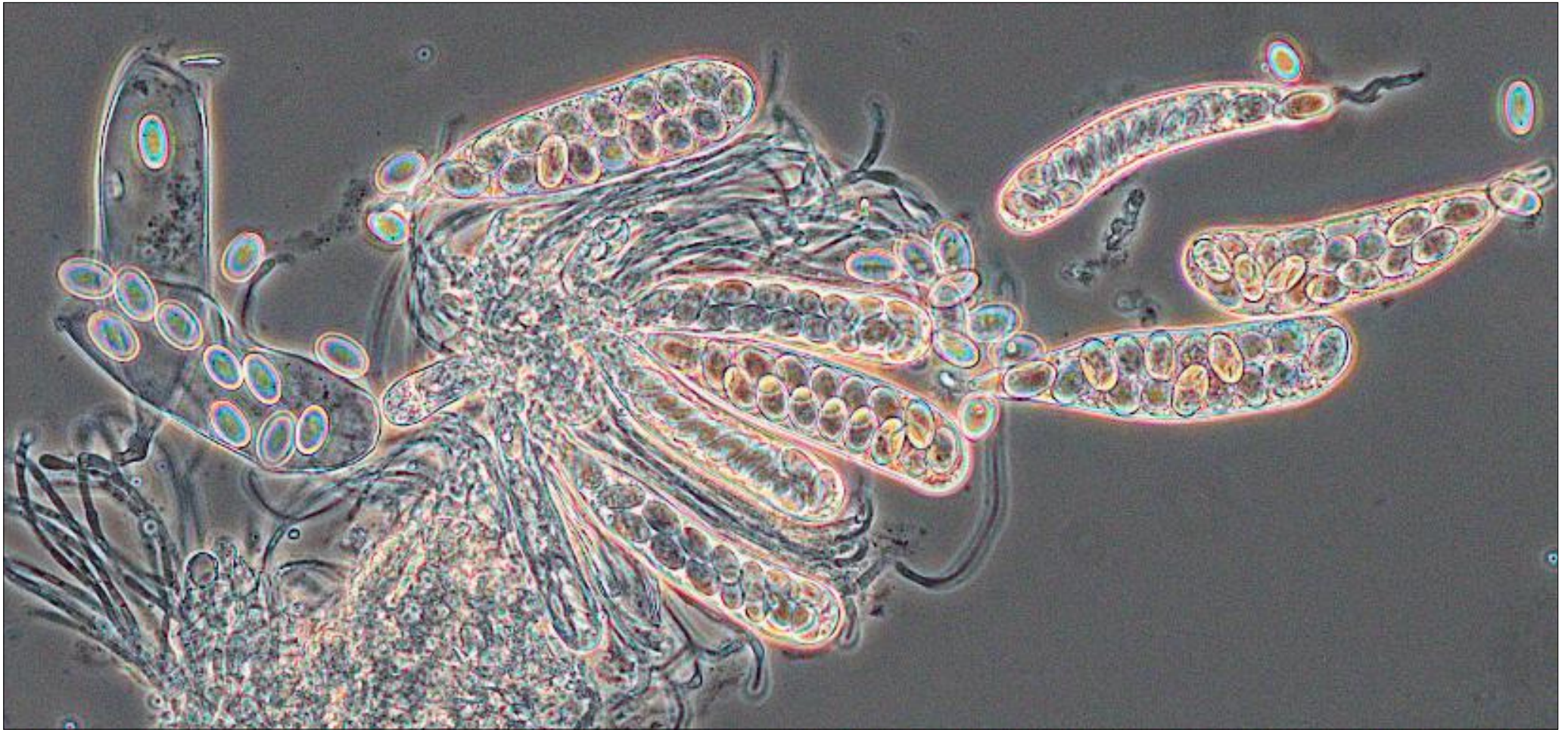
In-situ closeup view from the red-arrowed area on the previous page dung pellet. The pale whitish apothecia are *Coprotus sexdecimsporus* while the yellowish apothecia with protruding black asci are *Saccobolus citrinus* (2 white arrows). Post-photo slide mounts verified the identifications.



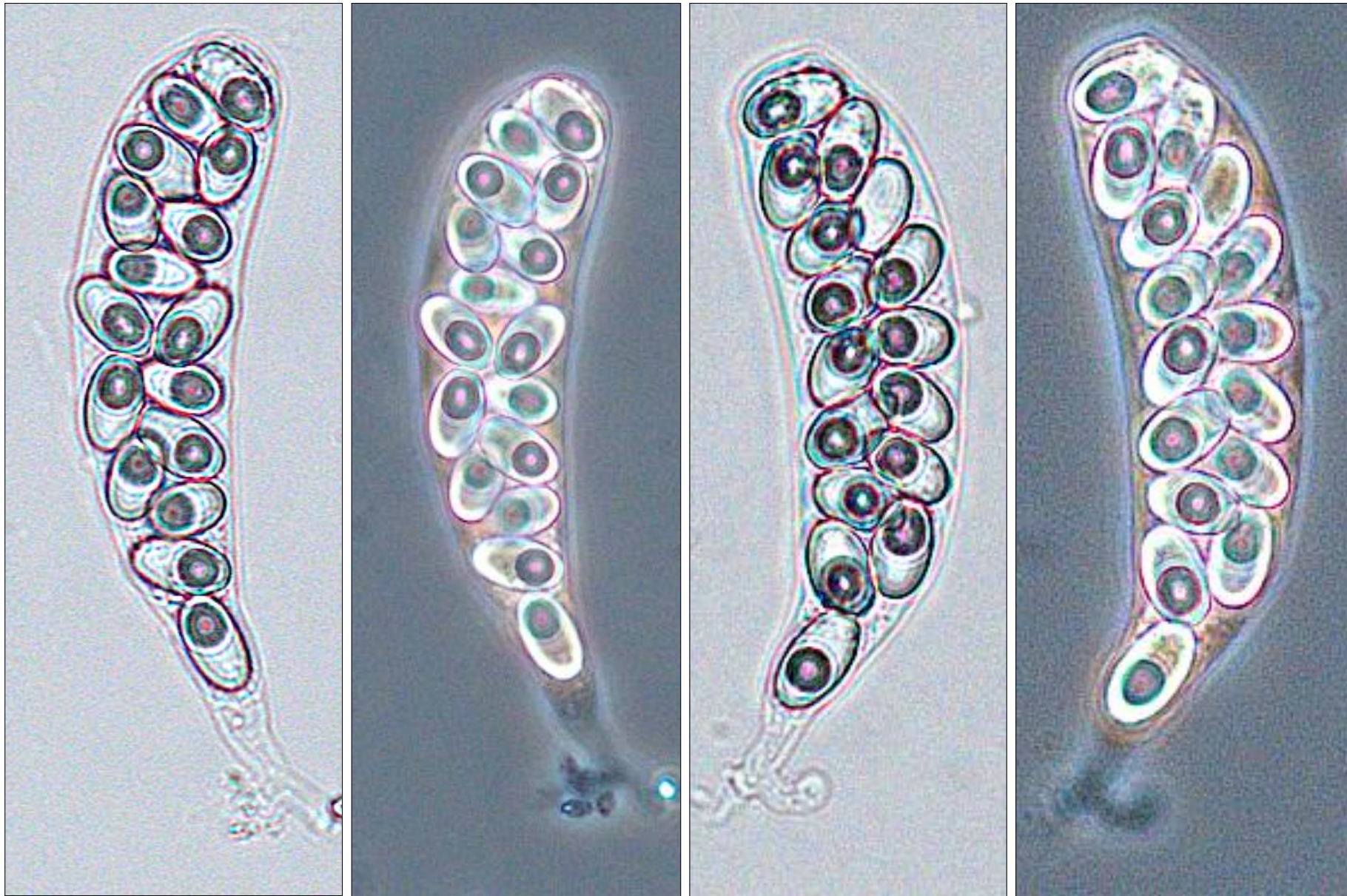
***Coprotus sexdecimsporus*. Apothecium ($225 \times 150 \mu\text{m}$) in water slide mount using the X40 objective & brightfield microscopy. Photo taken 12 July 2025. Note the textura angularis excipulum and a few of the 16-spored asci.**



***Coprotus sexdecimsporus*. Another apothecium (300 × 225 µm) slightly squashed in a water slide mount using the X40 objective & brightfield microscopy. Note the protruding 16-spored asci. Photo taken 12 July 2025.**



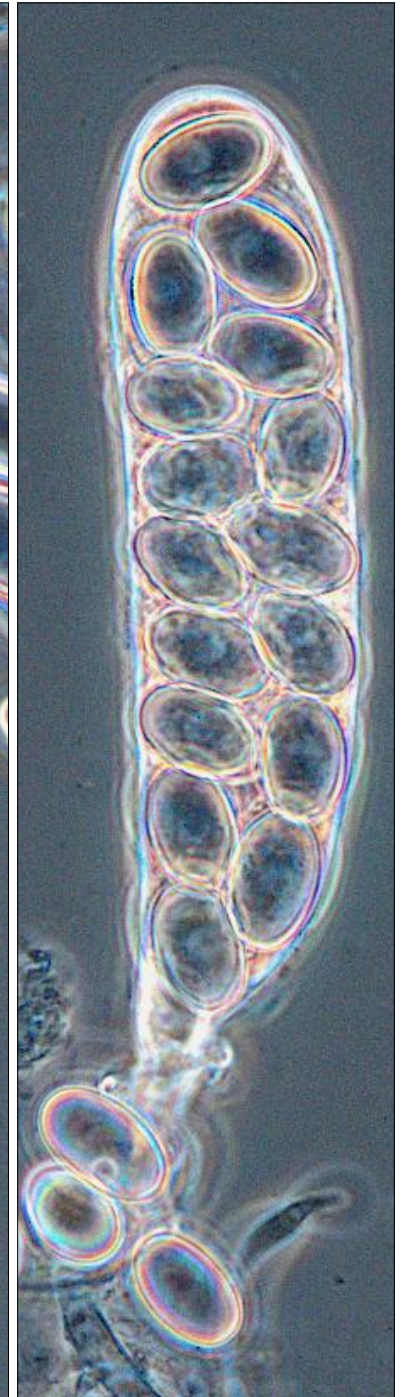
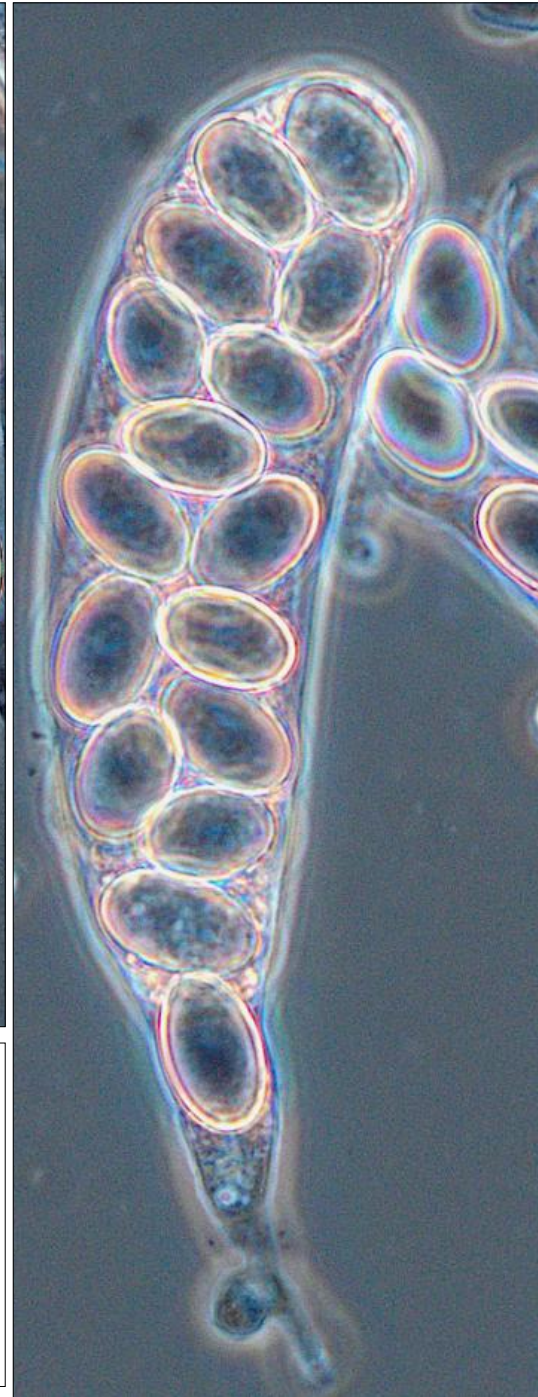
***Coprotus sexdecimsporus*. 16-spored asci in a water slide mount using the X40 objective & phase microscopy. Note also the curving uncinat, apically inflated paraphyses. Photo taken 12 July 2025.**



***Coprotus sexdecimsporus*. 16-spored asci in SMF slide mounts using the X40 objective. Left 2 photos same ascus: brightfield & phase (ascus $95 \times 21 \mu\text{m}$, spores $12.5 \times 7.5 \mu\text{m}$). Right 2 photos same ascus: brightfield & phase (ascus $87.5 \times 22.5 \mu\text{m}$, spores $12.5 \times 7.5 \mu\text{m}$).**



***Coprotus sexdecimsporus*. 16-spored asci in water slide mounts using the X100 objective & phase microscopy. Photos taken 12 July 2025. Left photo: asci 85–100 × 22–23 μm, spores 12–14 × 7.5–8 μm. Middle photo: closeup of left ascus in left photo. Right photo: closeup of right ascus in left photo.**



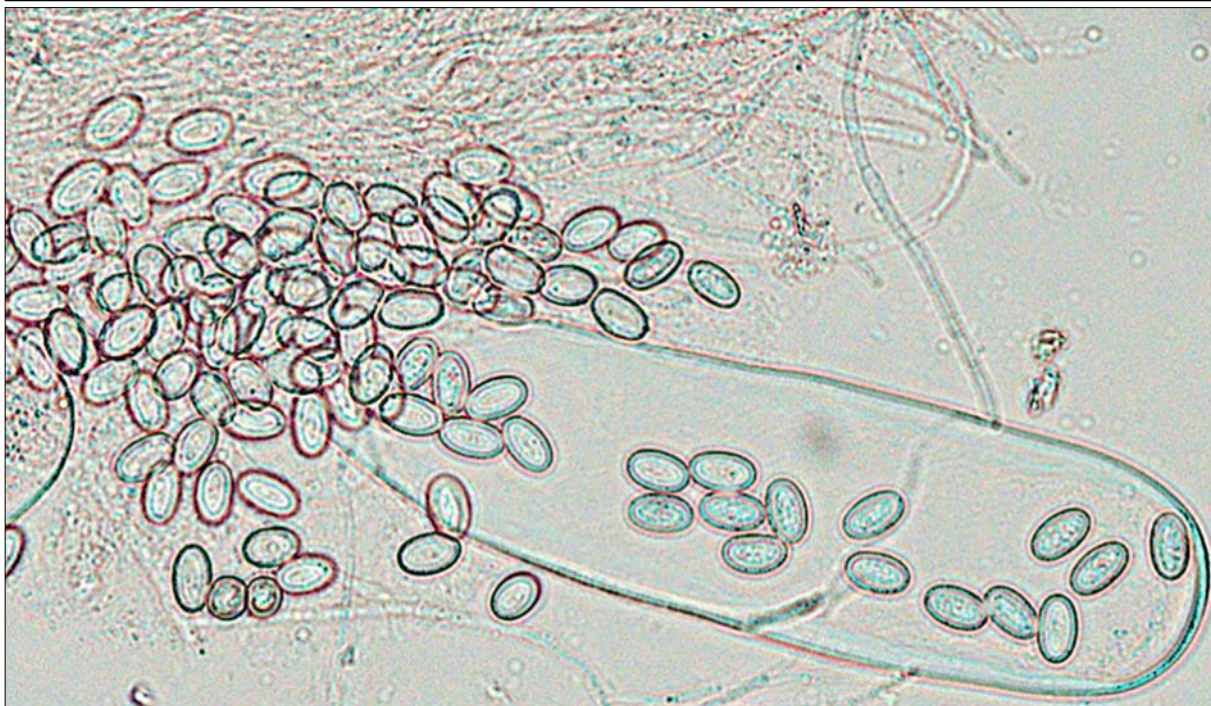
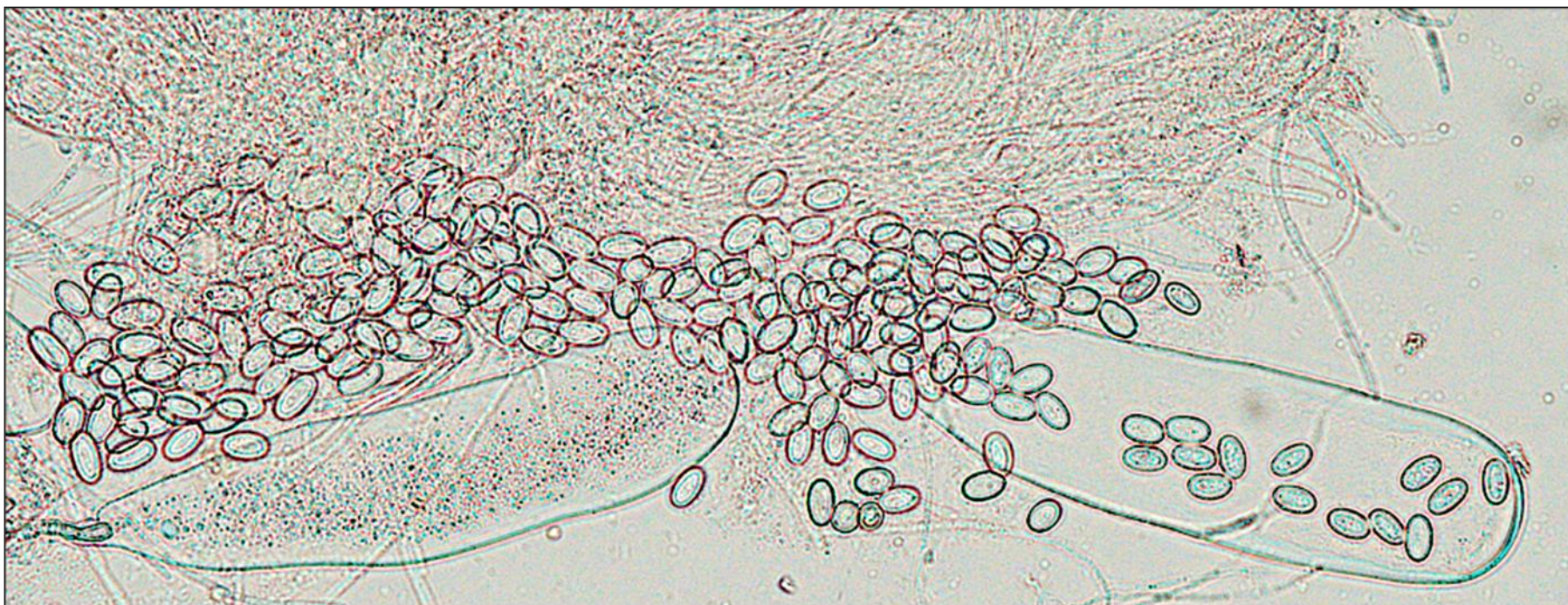


***Coprotus winteri*. Apothecium squash in a water mount, brightfield, using a X10 objective (left) & X20 obj. (right). Note the multi-spored asci and the makeup of the ectal excipulum. The dark brown area is where this sessile ascoma was attached to the dung and helped me orient differences in the excipulum.**

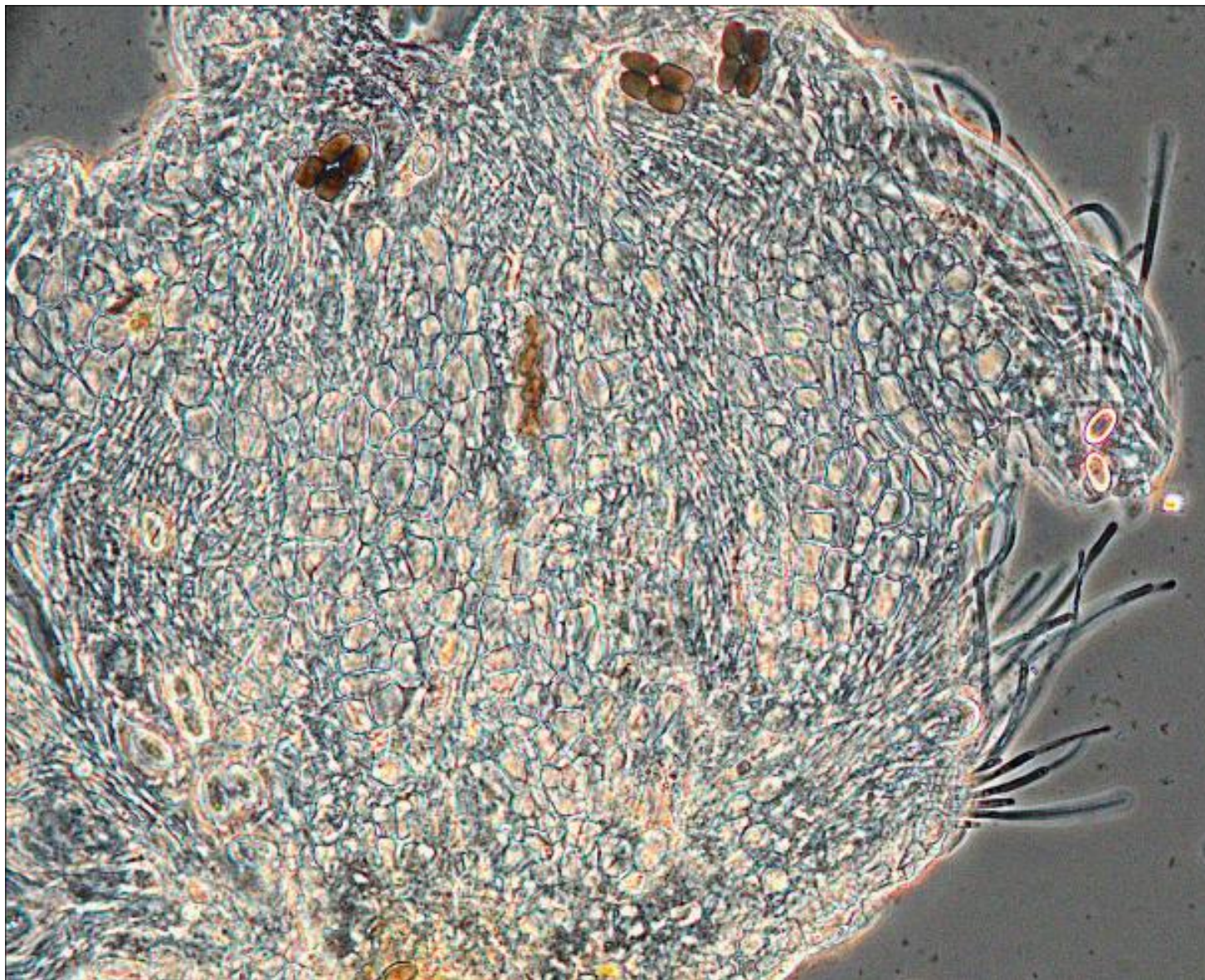




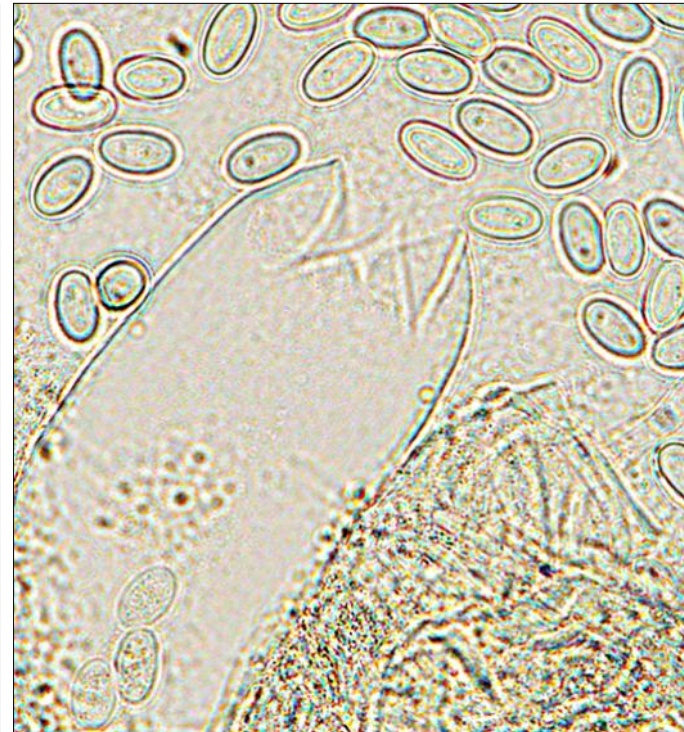
***Coprotus winteri*. 3 asci as seen using the X40 objective after a further squash of the apothecium on the previous page. Left: ascus $150 \times 37.5 \mu\text{m}$. Middle: ascus $167.5 \times 50 \mu\text{m}$. Right: ascus $207 \times 70 \mu\text{m}$.**



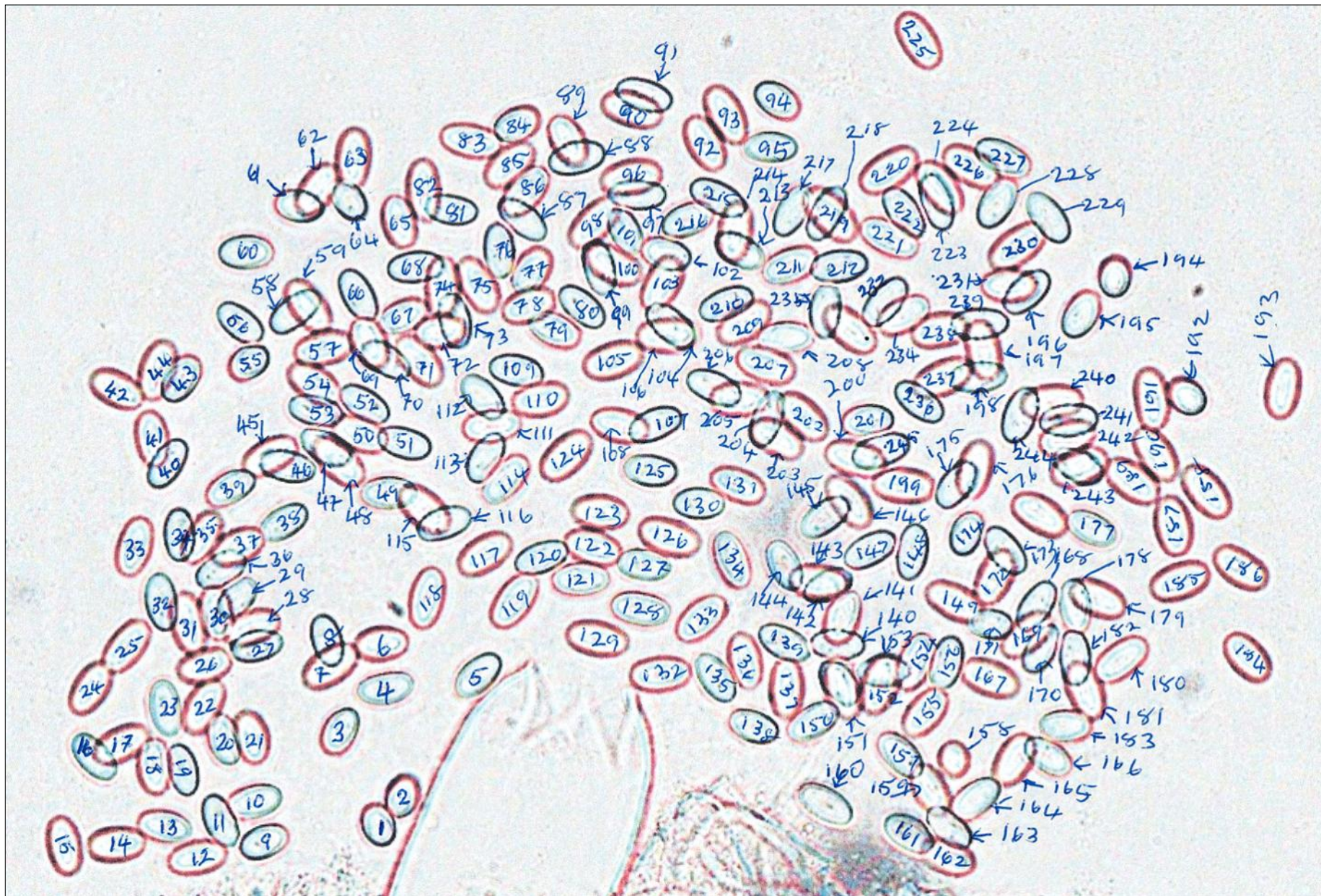
***Coprotus winteri*.** Empty asci and free ascospores ($\approx 10 \times 6.25 \mu\text{m}$) from a different area of the same water mount (slightly more squashed) seen on the previous page. Once photographed on 12 July 2025, the water mt. from which photos on the previous 2 pages were taken was irrigated with (SMF) and used as voucher material for this species. The species was seen only once more (see the next few pages).



***Coprotus winteri*.** This rather poor X40 objective, phase, water mount on 17 July 2025 resulted during my various mounts of single apothecia which I thought might be *C. sexdecimsporus*. In this case, while this photo was a disappointment, it was accompanied by ONE mature ascus and its free ascospores. Photos of these are presented on the following pages.



***Coprotus winteri*.** Previous page apothecium slide, here with its single ascus & free ascospores in a water mt. shown using the X40 & X100 objectives. 245 spores surround the ascus tip + 4 below (arrowed).



Coprotus winteri. 245 numbered ascospores surround the ascus tip (see left photo on previous page). With the other 4 spores arrowed there, below the ascus tip, 249 ascospores were seen. 256 ascospores are predicted assuming that all mitotic divisions occur & that all divisions develop into ascospores. Ascospores shown here were measured at $\approx 10 \times 6.25 \mu\text{m}$.