***Thecotheus pelletieri* (P. Crouan & H. Crouan) Boud. – AEB 1374 (= PDD 121664) A good match**

Collected: 11 March 2024

Substrate: horse dung

Collection site: Remutaka Forest Park, Five Mile Loop Track

Collector: Ann Bell; **Identifiers:** Ann Bell & Dan Mahoney

Voucher materials: No dried herbarium specimen but 5 Shear's mounting fluid (SMF) semi-permanent microscope slides; photos of in-situ apothecia using a Zeiss dissecting microscope and photos of microscopic detail using an Olympus BX51 compound scope with a DP28 camera; references consulted & Dan's comments.

References consulted:

1) Aas O. 1992. A world-monograph of the genus *Thecotheus* (Ascomycetes, Pezizales) [Thesis (Doctor Scientiarum)]. Norway: Botanical Institute, University of Bergen. 211 pages Includes a key to 17 accepted species. The entire thesis is available online to members of Ascomycete.org.

2) Hideyuki N. et al. 2003. The genus *Thecotheus* (Pezizales) in Australia: *T. urinamans* sp. nov. from urea-treated jarrah (*Eucalyptus marginata*) forest. Mycologia 95:(4), 688-693. A revised key to the species of *Thecotheus* is presented.

3) English version of the article "Doveri F. & Coué B., 2008. Sur deux taxons nouveaux de Thecotheus. On two new taxa of Thecotheus. Documents Mycologiques 34 (135-136): 15-40. Includes a Worldwide key to *Thecotheus* (partly based on Aas, 1992 and Doveri, 2004).

4) Fungi Outer Hebrides & Centro de Estudios Micológicos Asturianos - *Thecotheus pelletieri* (online photos)

Comments: Although Mycoportal reports 104 widespread records for *T. pelletieri*, including the earlier name *Ryparobius pelletieri* (P. Crouan & H. Crouan) Sacc., New Zealand (PDD) and Australia (Australian Fungal Atlas) do not record it. However, Ann illustrates it and includes it in the *Thecotheus* key of her 'An Illustrated Guide to the Coprophilous Ascomycetes of Australia. Volume 3 of CBS biodiversity series'. Her unpubllshed data records it from cattle dung collected by Mike Richardson at Shepard's Lookout in Queensland, 28 Oct. 1999. Aas O. (1992) provides extensive coverage of *P. pelletieri* in his world monograph where he notes that it "is perhaps the most frequently collected species of the genus". A portion of that coverage is reproduced on the next page.

Thesis portions from Aas (1992) are reproduced from the pages indicated below.

Pages 134 & 135:

ETYMOLOGY: Latinized from the name **Pelletier:** The Crouan brother's (1857) dedicated this interesting and - to them – rare species to commander Pelletier from Morlaix, a competent illustrator of cryptogams.

Apothecia scattered to gregarious to crowded, sessile or with a short immersed stem-like base, 0.2 - 3 mm diameter, up to 1.5 (-2) mm high; closed till the spores are mature (angiocarpic development). At first globose or shortly cylindrical to obconic, becoming dolabriform to cylindrically doliiform, finally turbinate or broadly discoid. Dry apothecia often sub-cylindrical to cylindrical turbinate, with vertical ridges owing to the large asci. Apothecia at first white, soon becoming dirty white to greyish, with age tinged with brown or red, finally on drying with darker brown or red greyish colour; at first smooth, after drying somewhat dirty white, minutely mealy or pruinose on the surface owing to the slightly protruding ectal cells. Dry apothecia moistened in water mostly with pale yellow to light orange colour. Anchoring hyphae more or less distinct, subhyaline, thin-walled, septate and branched, up to 2.5 µm wide. **Disc** plane or convex, after drying occasionally slightly concave, mostly regular, sometimes irregular due to mutual compression, soft, fleshy. After drying characteristically white-mealy to furfuraceous and roughened by the protruding tips of asci. **Margin** narrow, entire to wavy. **Medullary excipulum** subhyaline, of varying thickness, up to 280 µm at the central growing part, composed of a textura globulosa, with thin-walled loosely arranged globose to subglobose cells, (10-)15 - 30 µm diameter. The cells are intermingled with scattered, septate, filamentous hyphae. **Ectal excipulum** about 60 - 80 µm thick along the sides, composed of two types of cells. Innermost cells composed of a textura angularis, with somewhat elongated, polyhedral, slightly thick-walled, subhyaline cells, 8 - 17 x 14 – 25 µm, with their longitudinal axes perpendicular to the surface. Interspersed are filamentous hyphae, 2 - 4 µm wide, which originate several cell-layers deep and terminate on the surface. Along the sides on the surface, the tips of these terminal cells are thick-walled, inflated up to 5 - 10 µm diameter, encrusted with yellowish to light brownish pigments. **Asci** comparatively few, protruding, hyaline, clavate to broadly clavate, 32-spored, rarely 16- or 64-spored, apex obtuse and with a faint ring in Congo red, dome-shaped, below usually with a short stem-like base, slightly thick-walled when immature, becoming thinner with age, 260 - 460 (-475) x 41 - 70 (-90) µm, with stalk 20 - 90 µm long, p. sp. 240 – 350 µm, the Iodine+ reaction decreasing with age. **Ascospores** non-apiculate, smooth, hyaline, ellipsoid to broadly ellipsoid, slightly narrowed at the ends, 2- to 4- (5) seriate or irregularly disposed, mostly 2-seriate below, (30-) 32 - 40 (-42.5) x (13-) 15 - 22 (-24) µm. In asci with 64 ascospores, the spores are subglobose, 17 - 24.5 x 10 - 16 µm. Ascospores in the 16-spored asci are 32 - 40 x 16 µm. The spores are granular within when young, and with several different-sized vacuoles, initially thick-walled, becoming thin-walled by the time of spore liberation. The wall is composed of three wall layers, a thick inner layer (up to 4 µm in immature spores, mostly 2 - 2.5 µm at maturity, not stained in Cotton blue), a thin (0.5 µm thick) outer layer that stains in Cotton blue. The thin outer wall layer becomes loose and distorted in heated 2% KOH. Such ascospores may appear wrinkled or slightly warty. Rarely very short polar granulations occur that stain in Cotton blue. Each ascospore is surrounded by a thick, up to 6 µm broad, gelatinous perispore. **Paraphyses** slender, septate, simple or branched especially in lower parts, hyaline below, (1-) 1.5 - 2.5 (-3) µm wide, enlarged above to (3.5-) 4 - 8 µm diameter, and there slightly encrusted with brownish or brownish-red pigments. The paraphyses normally reach the same level as the asci, occasionally protruding up to 15 µm.

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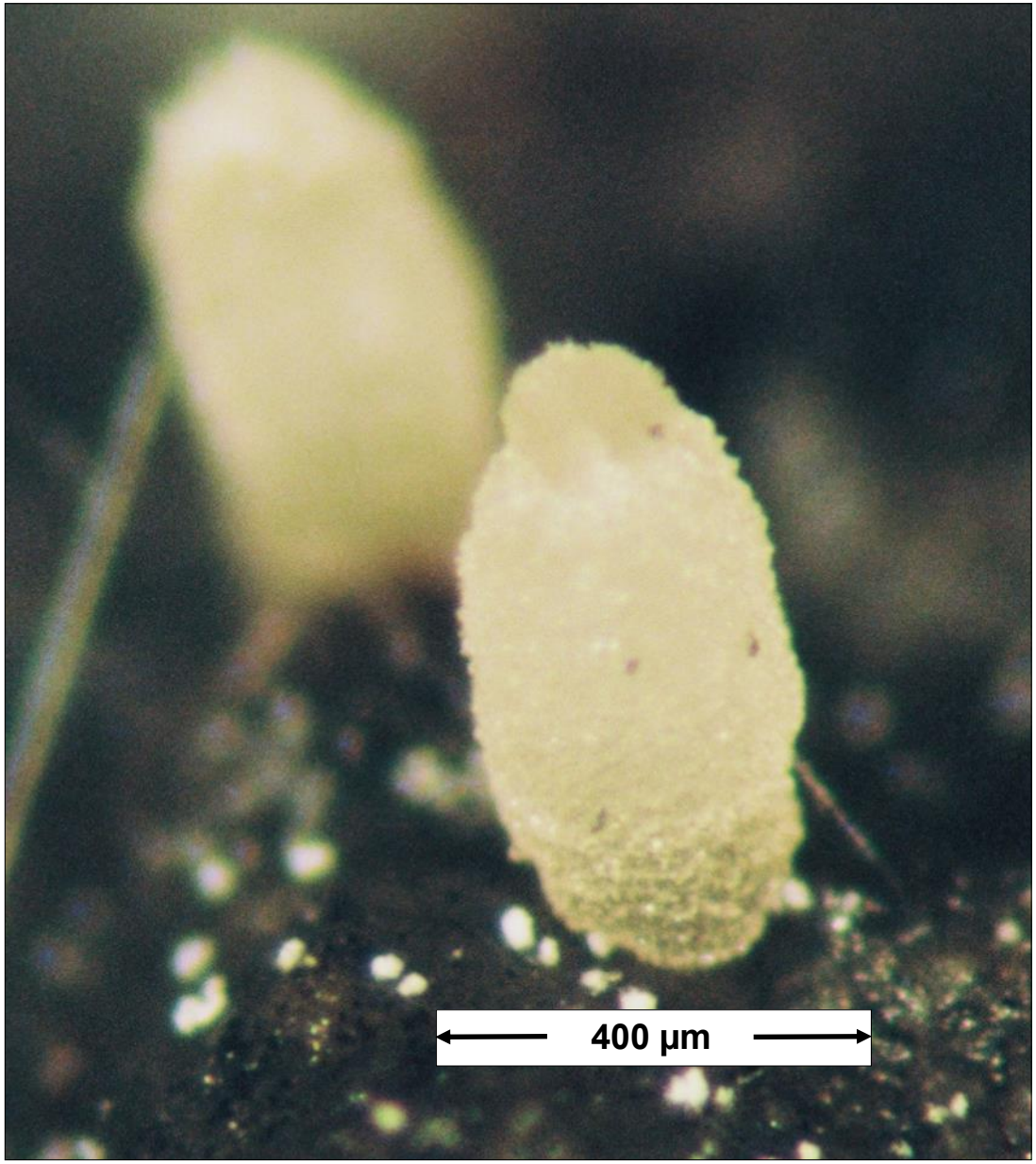
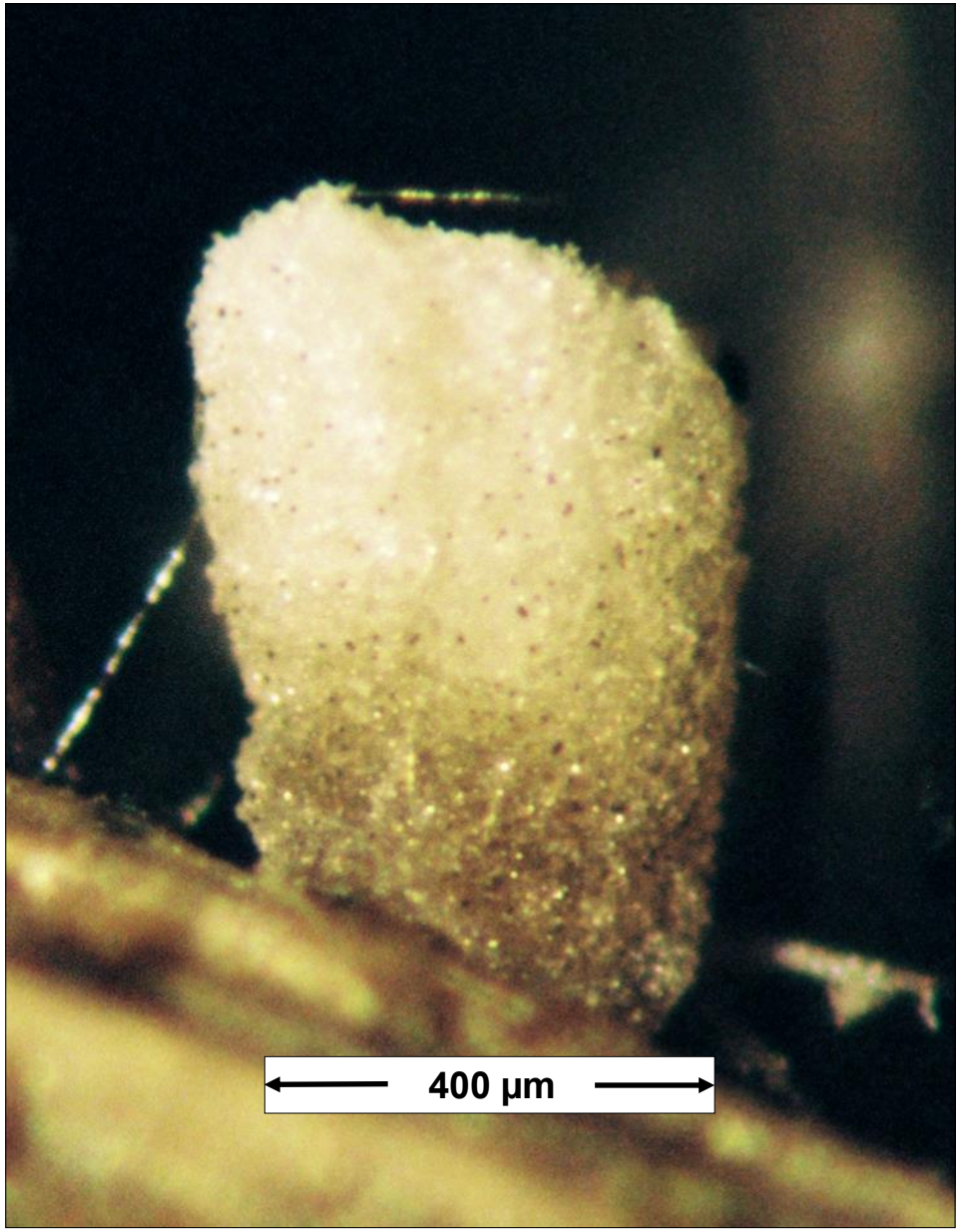
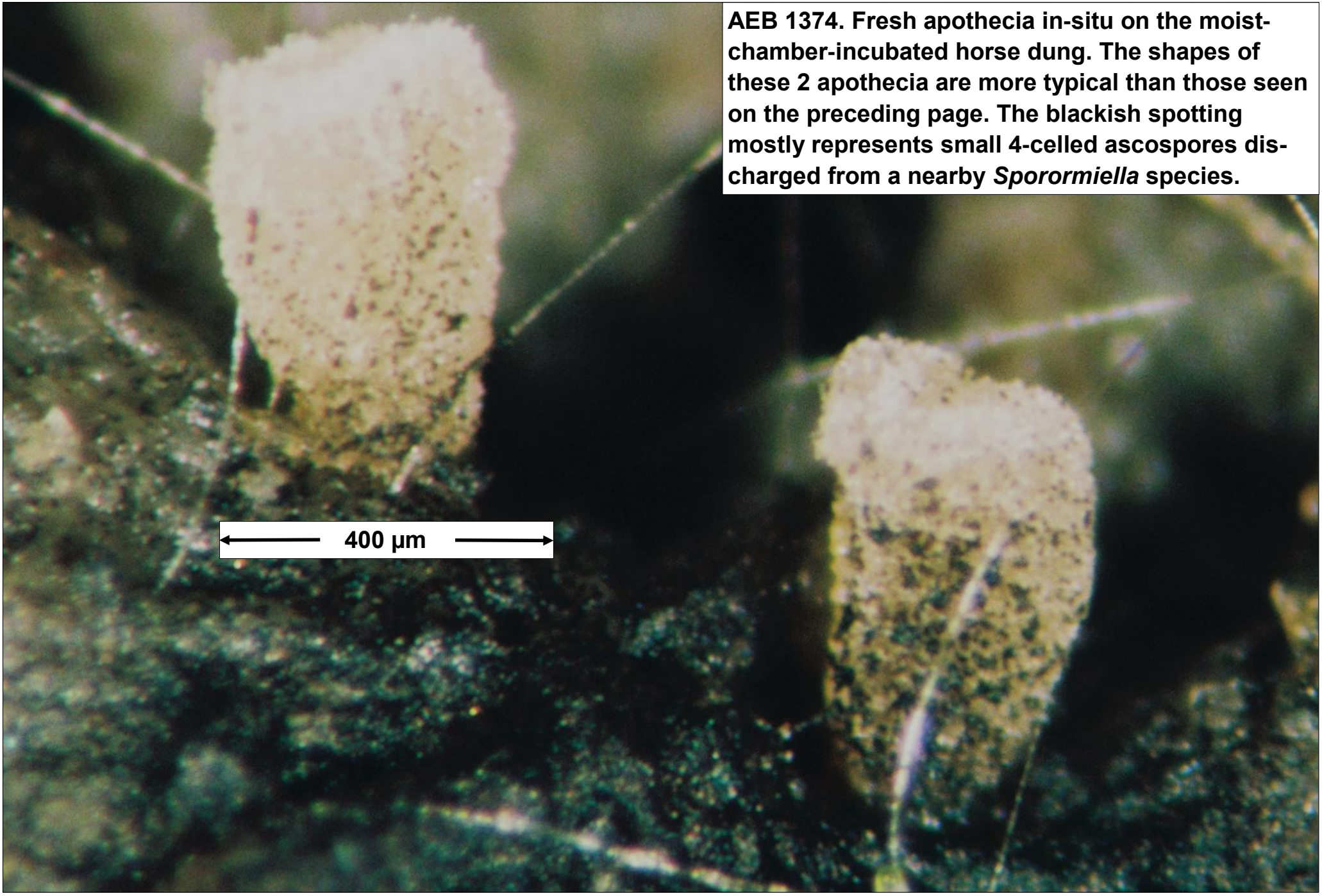
HABITAT AND SUBSTRATE PREFERENCE: *T. pelletieri* is, with one exception, a fimicolous species: 96 (173) finds, from dung of cow 54 (85), horse 36 (66), sheep (6), deer 1 (4) [including red deer 1 and fallow deer (3)], ass 2, dog (2), rabbit (2), burro (= donkey) 1, elephant 1, mule 1, european bison (1), goat (1), and once on soil (Bucknall 1880). The species prefers cow dung, but is also frequently found on one or two additional types of dung.

DISTRIBUTION: *T. pelletieri* is perhaps the most frequently collected species of the genus, known from all the continents. It may be characterized as a "cosmopolitan" species.

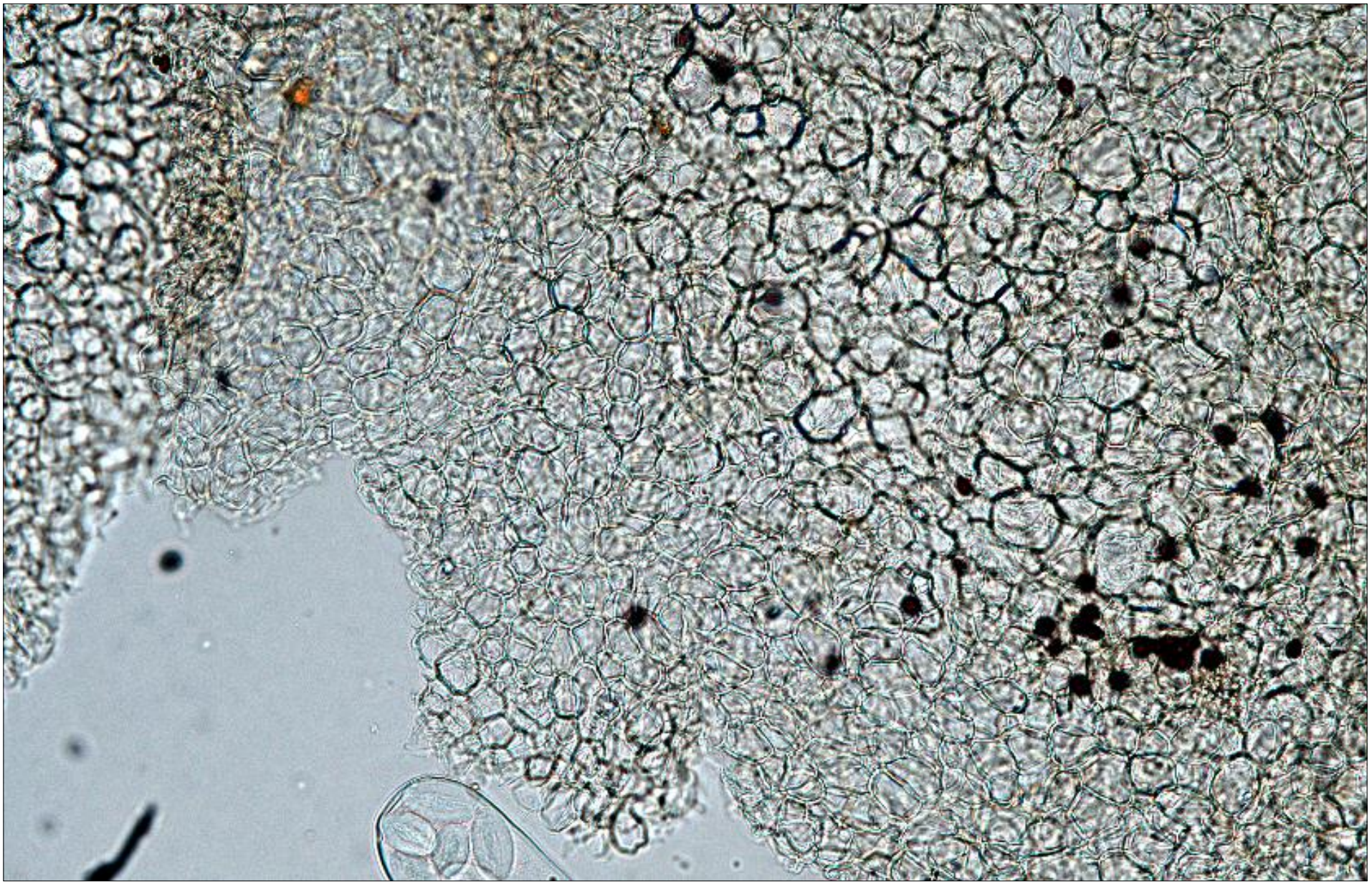




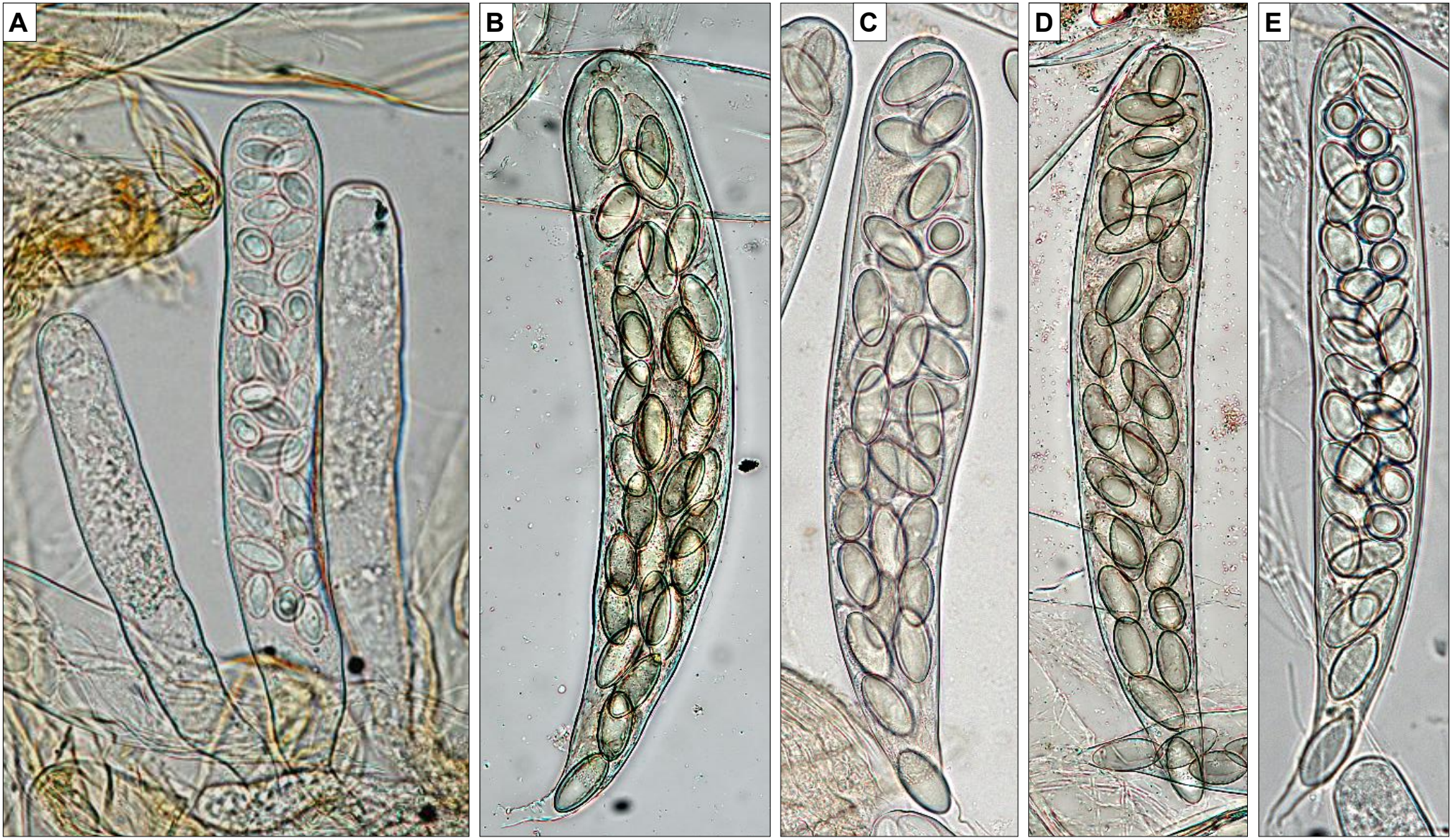
AEB 1374. Fresh apothecia in-situ on the moist-chamber-incubated horse dung. Note the shapes and color. The vertical bulges represent the large internal asci.



AEB 1374. Fresh apothecia in-situ on the moist-chamber-incubated horse dung. The shapes of these 2 apothecia are more typical than those seen on the preceding page. The blackish spotting mostly represents small 4-celled ascospores discharged from a nearby *Sporormiella* species.



AEB 1374. Ectal excipulum from a SMF mount using the DP28 camera mounted on a BX51 Olympus microscope. Note the textura angularis tissue.



AEB 1374. A–E: 32-spored asci from SMF mounts using the X100 objective and a DP28 camera mounted on a BX51 Olympus microscope. A. young asci. B–E. 'mature' asci (B, D & E using the confocal stacking-function of the DP28; note 32 visible ascospores) (C not confocal but better for seeing the gelatinous perispore). Asci measured were 360–395 × 55–65 µm & ascospores 30–35 × 15–17 µm. Young ascospores are thicker-walled & mature thinner.