

obliquely uniseriate, surrounded by a hyaline gelatinous sheath reaching a width of about $5\ \mu$, ellipsoidal, narrowed towards the ends, slightly flattened along one side, $23-25(-27) \times (11-12-13(-15))\ \mu$, occasionally containing one large central deBary bubble, ranging from hyaline when young to yellow-brown, finally dark brown and opaque at maturity; germ slit central, occasionally appearing somewhat thickened, $11-13\ \mu$ long.

HABITAT: on horse dung.

SPECIMEN EXAMINED: U.S.A.: South Dakota: Brown Co.: Aberdeen, horse dung, Sept. 1899, Towne, TYPE (NY).

The holotype is one of the collections which Griffiths (1901) referred to *H. equorum*. This species differs from *H. cataphracta* in a number of respects: the stroma is more restricted and associated with a dark brown hyphal mat; the apical cylinder turns red-brown in Melzer's, in contrast to *H. cataphracta* where it remains blue; the ascospores are shorter and narrower with a slightly shorter germ slit. The only similar species are *H. pachyalax* whose spores each have a shorter and typically thickened germ slit, and *H. stephanophora* which possesses a light brown stromatic ridge and larger spores each with a longer germ slit.

***Hypocopra dolichopoda* Krug & Cain sp. nov.**

Figs. 21-25

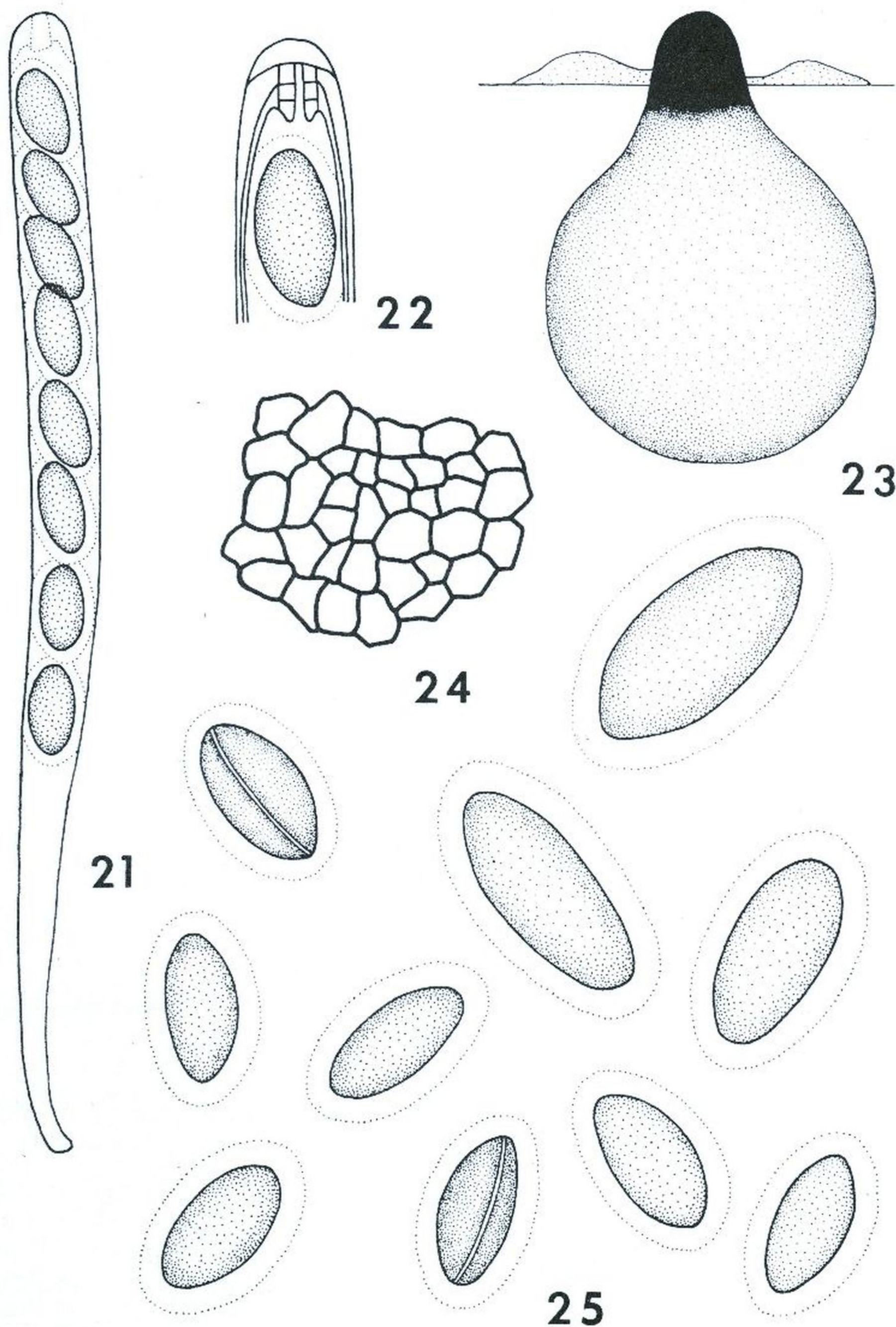
Stromata distincte aggregata, raro confluentia, levia, convexa, magnitudine media, $700-900(-1050)\ \mu$ diametro magna, atribrunnea, clypeiformia, $100-150\ \mu$ crassa, superficialia, stromatis cellulis pseudoparenchymatosis, quadratis, parietibus crassis, brunneis, $7-10 \times 6-8\ \mu$ magnis composita, annulum prominens marginale circa collum exhibens, perithecium unicum continens. Perithecia immersa, ampulliformia, $650-700 \times 500-550\ \mu$ magna; perithecia collum breve, tholiforme, leve, nigrum, prominens, $150-200\ \mu$ longum, supra superficiem stromatis protrudens; peridium obscure aurantiacibrunneum, membranaceum vel subcoriaceum, $30-45\ \mu$ crassum, e stratis duobus compositum. Asci octospori, cylindracei, $(140-150-190) \times 12.5-15\ \mu$ magni, in apice late rotundati, basin versus in stipitem $40-75\ \mu$ longum paulatim attenuati; apparatus apicalis iodo pallide caeruleum colorem accipiens, indistinctus, cylindraceus, annulis tribus indistinctissimus praeditus, circa $5-6 \times 4-5\ \mu$

magnus. Paraphyses numerosae, cylindratae, $2.5-7\ \mu$ latae, guttulate, septatae, hyalinae, raro ramos calcariformes ferentes. Ascospores recte vel oblique uniseriales, vaginā hyalinā gelatinosā postremo $7\ \mu$ latā circumdatae, unicellulares, ellipsoideae, apicibus obtusis vel rotundioribus, interdum in latere uno leviter applanatae, $(16-17-20(-22)) \times 8-10(-11)\ \mu$ magnae, primum pallidae, maturitate confirmatā atribrunneae et opacae; fissura germinalis centralis, qui totam per sporae longitudinem patet.

HOLOTYPE: in equorum fimo lectus est, apud Sundance in Crook comitatu, in Wyoming finibus imperii U.S.A., 3 Sept. 1962, Cain, TRTC 39088. In Torontoensis universitatis Cryptogamarum herbario.

ETYMOLOGY: Greek, *dolichos* ($\delta\omicron\lambda\iota\chi\omicron\varsigma$) = long and *podos* ($\pi\omicron\delta\omicron\varsigma$) = foot, referring to the elongated stipe of the ascus.

Stromata distinctly clustered, rarely confluent, smooth, disc-shaped, medium, $700-900(-1050)\ \mu$ diam, dark brown, clypeate, $100-150\ \mu$ thick, superficial, with each possessing a prominent marginal projecting collar surrounding the neck and containing a single perithecium; stromatic cells pseudoparenchymatous, quadrate, thick-walled, brownish, $7-10 \times 6-8\ \mu$. Perithecia embedded, ampulliform, covered by a white farinaceous material, $650-700 \times 500-550\ \mu$; neck short, dome-shaped, smooth, black, prominent, $150-200\ \mu$ long, protruding above the surface of the stroma, with dark brown, thick-walled, somewhat quadrate to elongated cells measuring $4-7 \times 2-3\ \mu$; ostiole small, very distinct; peridium dark orange-brown to caramel by reflected light, membranaceous to subcoriaceous, $30-45\ \mu$ thick, consisting of an outer layer about $12-15$ cells thick, of oblong, slightly thick-walled, brownish cells measuring $5-8 \times 2-4\ \mu$ and an inner layer about $3-5$ cells thick, of elongated, thin-walled, hyaline cells measuring $10-15 \times 2-3\ \mu$. Asci eight-spored, cylindrical, $(140-150-190) \times 12.5-15\ \mu$, broadly rounded at the apices, gradually tapering into a very long stipe measuring $40-75\ \mu$ long; apical apparatus I+ (light blue), indistinct, cylindrical, with three very indistinct rings measuring about $5-6 \times 4-5\ \mu$. Paraphyses abundant, tubular, $2.5-7\ \mu$ broad, guttulate, septate, hyaline, rarely with spur-like branches, longer than and mixed with the asci. Ascospores one-celled, vertically to obliquely uniseriate, surrounded by a hyaline gelatinous



FIGS. 21-25. *H. dolichopoda* (TRTC 39088). Fig. 21. Ascus and ascospores, showing the very long ascus stipe. $\times 700$. Fig. 22. Apical apparatus. $\times 1150$. Fig. 23. Perithecial body and associated clypeate stroma, showing the prominent stromatic ridge. $\times 50$. Fig. 24. Stromatic cells drawn in sectional view. $\times 1150$. Fig. 25. Ascospores, with two showing germ slit. $\times 1150$ and $\times 2000$.

sheath reaching a width of $7\ \mu$, ellipsoidal, narrowed to somewhat rounded towards the ends, occasionally very slightly flattened on one side, $(16-17-20(-22) \times 8-10(-11)\ \mu$, occasionally containing a single deBary bubble, ranging from pallid when young to dark brown and opaque at maturity; germ slit central, extending the full length of the spore.

HABITAT: on horse, cow, deer, and rabbit dung.

SPECIMENS EXAMINED: CANADA: Alberta: E of Edson, Nojack, horse dung, 2 Aug. 1962, Cain, TRTC C2058a; Jasper National Park: Athabasca Falls, horse dung, 8 Aug. 1962, Cain, TRTC 39017 (TRTC, ZT). Ontario: Kenora District: 28 mi N of Vermilion Bay, Cedar Lake, horse dung, 3 June 1956, Cain, ex TRTC 35826, under *Coniochaeta scatigena* (UPS). U.S.A.: Colorado: Moffat Co.: Elk Springs, horse dung, 20 Aug. 1957, Cain, TRTC 45146; Maybell, rabbit dung, 20 Aug. 1957, Cain, TRTC 45673. Montezuma Co.: W of Mount Hesperus, Bob Creek, elev. 10 500 ft, cow dung, 2 July 1898, Baker, Earle et Tracy 1105, Plants of Southern Colorado, as *Hypocopa fimicola* (BPI, NY). Park Co.: W of Lake George, deer dung, 4 Aug. 1960, Cain, TRTC 38088. Teller Co.: N of Woodland Park, cow dung, 4 Aug. 1960, Cain, TRTC 38113. Idaho: Fremont Co.: Targhee Pass, Campsite, horse dung, 1 Sept. 1962, Luck-Allen, TRTC 40410. Montana: Gallatin Co.: West Yellowstone, horse dung, 2 Sept. 1957, Cain, TRTC 44873 (TNS, TRTC). Treasure Co.: Big Horn, horse dung, 4 Sept. 1957, Cain, TRTC 42141. Nevada: Elko Co.: 30 mi S of Wendover, rabbit dung, 21 Aug. 1957, Cain, TRTC 39940. White Pine Co.: 60 mi S of Wendover, rabbit dung, 21 Aug. 1957, Cain, TRTC 42022. North Dakota: Billings Co.: Medora, horse dung, 4 Sept. 1957, Cain, TRTC 45251. Utah: Duchesne Co.: Duchesne, rabbit dung, 21 Aug. 1957, Cain, TRTC 36301. Wyoming: Albany Co.: Bosler, cow dung, 1 Sept. 1964, Cain, TRTC 43798. Campbell Co.: Gillette, horse dung, 3 Sept. 1962, Cain, TRTC 42431. Converse Co.: E of Orin, cow dung, 2 Sept. 1964, Cain, TRTC 42515. Crook Co.: Sundance, horse dung, 3 Sept. 1962, Cain, TRTC 39088, TYPE (BPI, K, PC, TRTC, UPS), Luck-Allen, TRTC 40144, cow dung, 3 Sept. 1962, Cain, TRTC 39066 (DAOM, L, TRTC), Luck-Allen, TRTC 40143, 40162. Niobrara Co.: N of Lusk, cow dung, 2 Sept. 1964,

Cain, TRTC 42468. Platte Co.: Glendo, horse dung, 2 Sept. 1964, Cain, TRTC 42546. Teton Co.: Teton National Forest: Moran, horse dung, 30 June 1955, Cain, TRTC 31909 (LE, TRTC).

The diagnostic features are the thick, disc-shaped stroma: the very long ascus stipe; and the small ascospores with a germ slit extending full spore length, and frequently possessing rounded ends. *Hypocopa ornithophila* is quite similar but has a shorter stipe and generally larger spores with more tapered ends. Superficially, *H. parvula* might be confused but can be distinguished by the much smaller spores whose germ slit measures not quite full spore length.

Among the collections cited above, that distributed in Baker, Earle, and Tracy's "Plants of Southern Colorado" differs in possessing a germ slit which is slightly shorter than full spore length. Normally, the length of the germ slit is quite significant but, in this instance, the deviation is considered to represent a morphological variation since in all other respects the material compares favorably with the holotype.

Hypocopa elachyglossina Krug & Cain sp. nov.

Figs. 26-30

Stromata distincte aggregata, levia, late extensa aut raro tholiformiora, magnitudine media, nigra, clypeiformia, $30-50\ \mu$ crassa, partim immersa, annulum pallide brunneum circa collum exhibentia, perithecia plura continentia; stromatis cellulae pseudoparenchymatosae, quadratae, atribrunneae, parietibus crassis. Perithecia immersa, ampulliformia, $700-900 \times 550-650\ \mu$ magna; perithecia collum breve, tholiforme, leve, nigrum, distinctissimum, $150-200\ \mu$ longum, supra superficiem stromatis protrudens; peridium pallide brunneum, subcoriaceum, $35-45\ \mu$ crassum, e stratis duobus compositum. Asci octospori, cylindracei, $275-340 \times 25-30\ \mu$ magni, in apice obtusi, basin versus in stipitem circa $(15-20-35\ \mu)$ longum attenuati; apparatus apicalis iodo caeruleum colorem accipiens, indistinctior, cylindraceus, 1-2 annulis satis inconspicuis praeditus, circa $11-14 \times 9-10.5\ \mu$ magnus. Paraphyses numerosiores, cylindraceae, $4-6\ \mu$ latae, guttulatae, septatae, hyalinae. Ascospores oblique uniseriales, vaginā hyalinā gelatinosā postremo $12\ \mu$ latā circumdatae, bicellulares, e cellula superiore grandi et cellula inferiore parvā sistentes; cellula superior ellipsoidea, apice obtuso vel late rotundato, in latere