
Studies of coprophilous ascomycetes in Kenya: Coprophilous *Schizothecium* from wildlife dung

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Schizothecium encompasses species whose morphological features make them easily confused with *Podospora* and *Cercophora*. This study, carried out between September 2008 and October 2010, set out to characterize *Schizothecium* species from wildlife dung and determine their ecological attributes. Dung from Cape buffalo, zebra, giraffe, hippopotamus, impala, Jackson's hartebeest, sable antelope and waterbuck was incubated in a moist chamber culture. Morphological features of sporulating ascomycetes were used to characterize and identify the species. Five species, *Schizothecium conicum*, *S. curvuloides* var. *curvuloides*, *S. dakotense*, *S. dubium* and *S. glutinans* were isolated and described. *Schizothecium dakotense*, *S. dubium* and *S. glutinans* are new records. *Schizothecium curvuloides* var. *curvuloides* and *S. dakotense* were fairly common.

Key words – *Arnium* – jacket paraphyses – Lasiosphaeriaceae – species diversity – taxonomy – wild herbivores

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Introduction

Schizothecium Corda, Emend. Lundq.

The genus *Schizothecium* in Podosporoideae N. Lundq. (Lasio-sphaeriaceae Nannf.), is differentiated from the closely related *Podospora* Ces., *Arnium* Nitschke ex G. Winter and *Cercophora* Fuck. emend. Lundq. by having ascomata with either agglutinated or sometimes isolated, articulated or one celled, swollen hairs, often in a palisade of triangular scales at the base of the perithecial neck (Lundqvist 1972, Cai et al. 2005, Hu et al. 2006, Doveri 2008) or even scattered over the venter. The perithecia are often covered with hyphoid hairs and the peridium is membranaceous, pseudoparenchymatous,

composed of a *textura globulosa* or *globulosa-angularis* (Lundqvist 1972, Doveri 2008). Asci are 4- to poly-spored, cylindrical to clavate and often lacking an apical ring. Unlike these related genera, true paraphyses that mix with asci are absent. Instead asci are usually surrounded by broad, moniliform paraphyses (“jacket” paraphyses according to Bell & Mahoney 1995). The uni- to multi-seriate ascospores are 2-celled at maturity after undergoing an early transverse septation, have a plasma-filled, usually cylindrical and persistent hyaline pedicel, a single germ pore and normally a thin gelatinous sheath and/or solid lash-like caudae (Lundqvist 1972, Bell & Mahoney 1995, Hu et al. 2006, Doveri 2008). Molecular studies (Hundhorf et al.

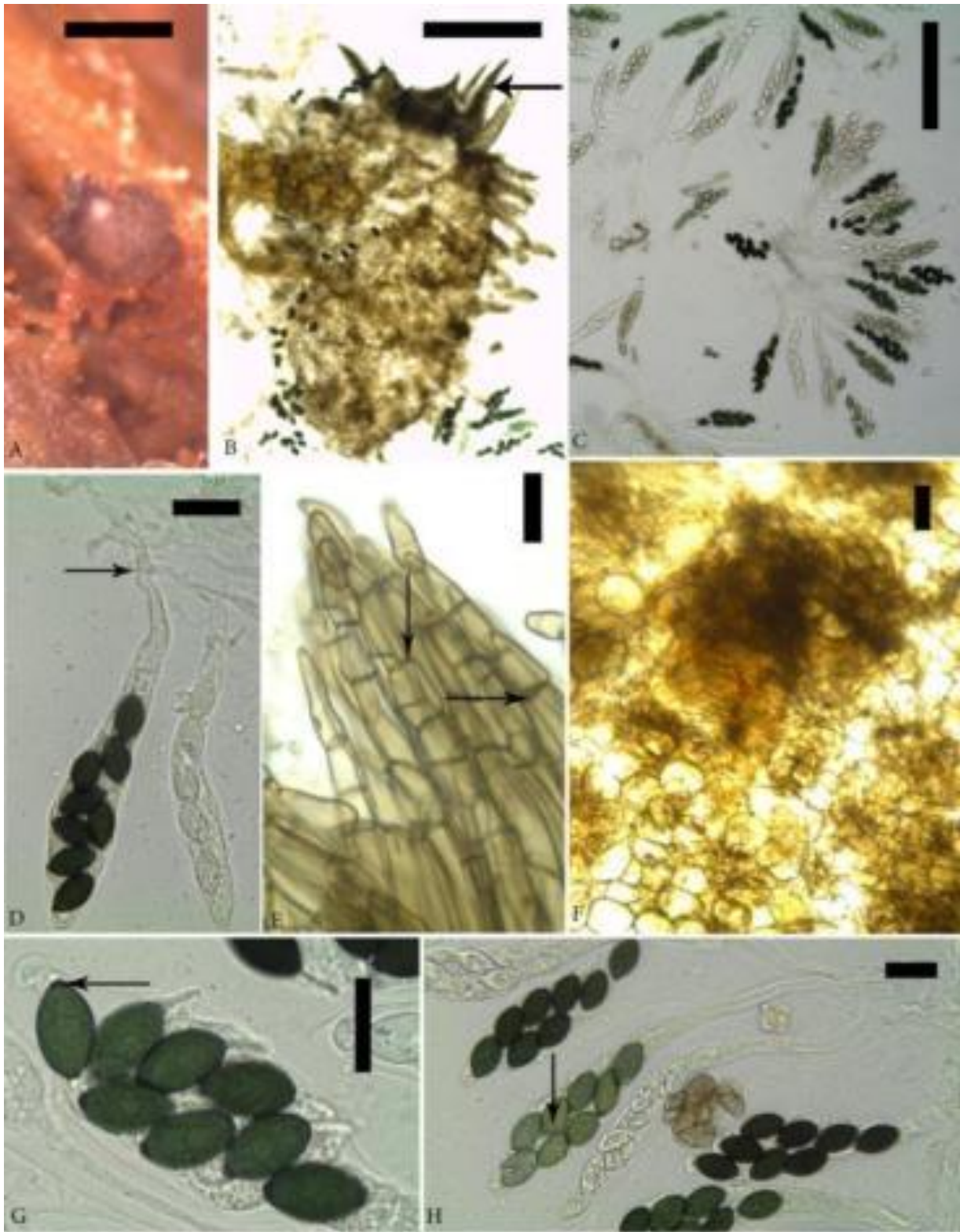


Fig. 1 – *Schizothecium conicum* (KWSNNP015-2010). **A** Ascoma on dung. **B** Squashed ascoma, note agglutinated hairs at the neck base(arrow). **C** Mature and immature Asci. **D** Mature (with pigmented ascospores) and immature ascus, note long stipe (arrow). **E** Upper part of a triangular scale of agglutinated hairs on base of neck, note the septation of each hair (arrow). **F** Details of the *textura globulosa-angularis* of the exoperidial wall. **G** Mature ascospores inside the ascus, note the germ pore (arrow). **H** Asci, ascospores and paraphyses, note biseriate spore arrangement (arrow). **Scale bars:** **A** = 500 μm , **B-C** = 200 μm , **D, H** = 50 μm , **E-G** = 20 μm .

2004, Cai et al. 2005, Cai et al. 2006) have improved the knowledge of this genus and contributed to better circumscribe species.

Schizothecium is cosmopolitan and usually coprophilous (Bell & Mahoney 1995, Doveri 2004, Bell 2005). It has been recorded in Europe (Caretta et al. 1994), Asia (Furuya & Udagawa 1972), Americas (Richardson 2008) and Africa (Krug & Khan 1989). Of significance to this study is the fact that *Schizothecium* has been recorded from herbivore dung in past surveys in Kenya (Caretta et al. 1998).

The objectives of this survey are to: 1) study the taxonomy of *Schizothecium* species found on various dung types in Kenyan wild herbivores and 2) document species diversity and distribution of *Schizothecium* associated with different dung types in wild herbivores.

We describe and illustrate five species of coprophilous *Schizothecium* in this paper.

Materials and Methods

Twelve dung samples obtained from Cape buffalo, zebra, giraffe, hippopotamus, impala, Jackson's hartebeest, sable antelope and waterbuck were collected from Aberdares, Nairobi and Tsavo East National Parks, Aberdares Country Club Game Sanctuary, Kinondo and Shimba Hills Forest Reserves. Materials and methods used in a study on coprophilous *Ascobolus* and *Saccobolus* in Kenya are employed here (Mungai et al. 2012a, b).

Taxonomy

Schizothecium conicum (Fuckel) N. Lundq., Symb. Bot. Upsal. 20 (1): 253, 1972.

Figs. 1A–H, 2A–G

≡ *Cercophora conica* Fuckel, Jahrb. Nass. Ver. Naturk. 23–24: 245, 1869.

= ? *Malinvernina pauciseta* Rabenh., Herb. Myc. (ed. II): 526, 1857.

= ? *Sphaeria fimiseda* Fuckel, Fungi rhenani exsic.: 2037, 1866.

= *Sordaria curvula* de Bary, Morph. Physiol. Pilze: 133, 1866.

= ? *Malinvernina breviseta* Fuckel, Jahrb. Nass. Ver. Naturk. 23–24: 243, 1869.

= *Sordaria curvula* de Bary f. *coronata* G. Winter, Abh. Nat. Ges. Halle 13 (1): 102,

1873.

= *Podospora curvula* (de Bary) Niessl, Hedwigia 22: 156, 1883.

= *Sordaria curvula* de Bary var. *tetraspora* Marchal, Bull. Soc. Roy. Bot. Belg. 23 (2): 12, 1884.

= *Sordaria pseudominuta* Speg., Bol. Acad. Nac. Cienc. Córdoba: 189, 1887.

= *Pleuraea curvula* (de Bary) Kuntze, Rev. Gen. Plant. 3 (3): 505, 1898.

= *Sordaria hispidula* Speg., Anal. Mus. Nac. Buenos Aires 6: 255, 1899.

= *Bombardia curvula* (de Bary) Kirschst., Krypt. Flora Brandenburg 7 (2): 183, 1911.

= *Podospora curvula* (de Bary) Niessl var. *charcoviensis* Milovtz., Trav. Inst. Bot. Univ. Kharkov. 2: 19, 1937.

= *Schizothecium hispidulum* (Speg.) N. Lundq., Symb. Bot. Upsal. 20 (1): 254, 1972.

≡ *Podospora conica* (Fuckel) A. Bell & Mahoney, Mycologia 87: 379, 1995.

= ? *Schizothecium fimicolum* Corda, Icones Fung. 2: 29, 1838.

(Adopted from Doveri 2004, 2008)

Ascomata perithecioid, semi-immersed to superficial, 890–1200 × 570–750 μm, gregarious, dark above and olivaceous-brown below, sub-pyriform-conical. *Neck* relatively short, with pronounced crown of long tufts of swollen agglutinated septate hairs with segments 26–84 × 14–28.5 μm, terminal cells more elongated and pointed, black, opaque. *Peridium* three-layered: inner layer of pale polygonal cells; middle layer of pale flat thin-walled cells; outer layer thick-walled cells, semi-transparent, with distinct *textura globulosa-angularis* cells 18–24.5 × 16–19.5 μm. *Jacket paraphyses* cylindrical-moniliform, septate, evanescent. *Asci* 8-spored, 214–321 × 31.5–38 μm, cylindrical-clavate broadly rounded above, with an indistinct apical ring, tapering below into a long stipe 36–100 × 1–4 μm. *Ascospores* uniseriate to biseriate or irregularly disposed in central part, two-celled at maturity: spore head 26–29 × 15–17 μm, broadly ellipsoidal with truncate base and somewhat umbonate apex, ranging through light greenish to olivaceous-black in reflected light, with an apical germ pore; lower cell (pedicel) cylindrical, slender 12–14 × 2–3 μm, pointed and slightly curved; *upper cauda*

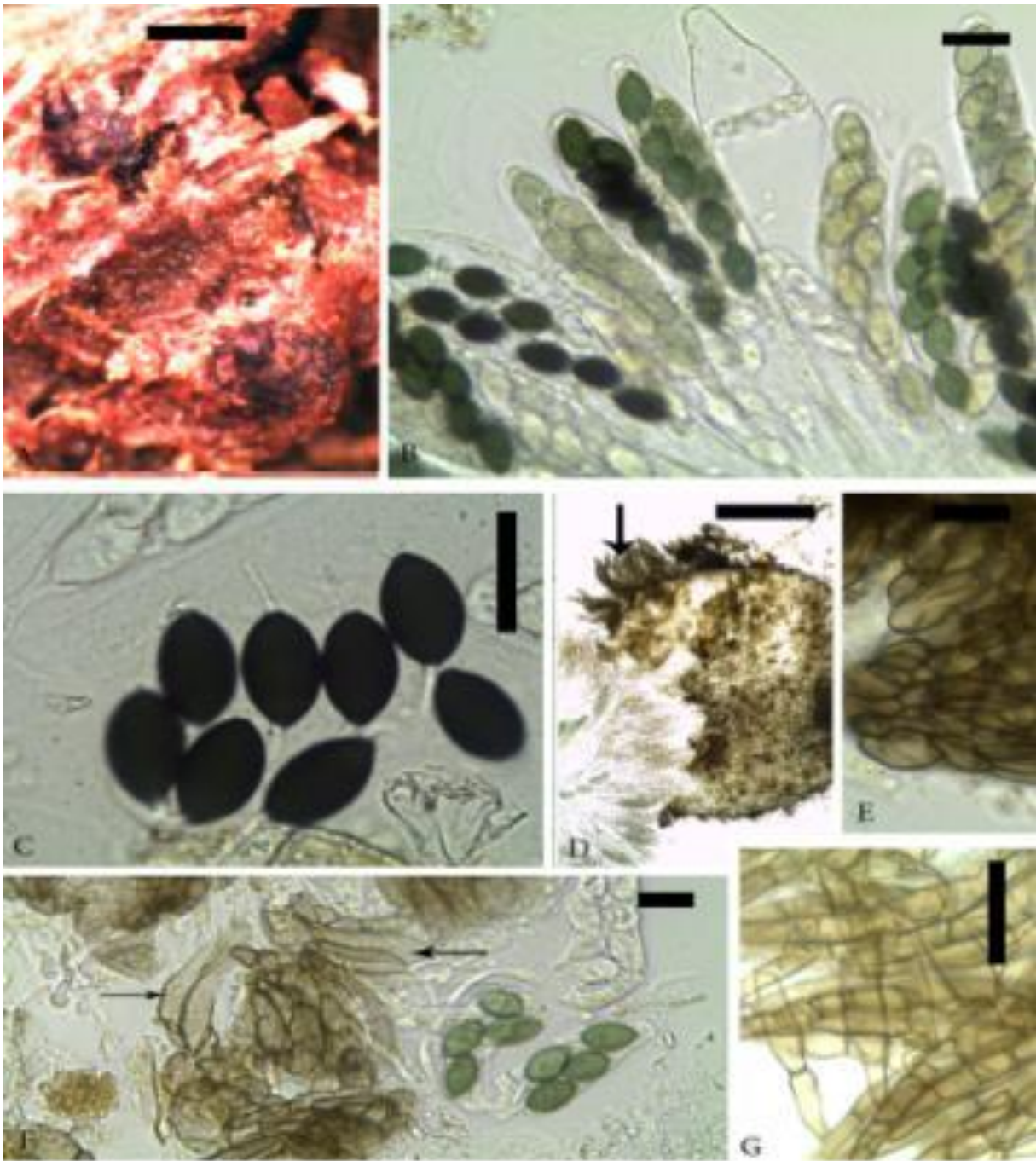


Fig. 2 – *Schizothecium conicum* (KWSNNP015-2010). **A** Ascomata on dung. **B** 8-spored asci and an empty ascus. **C** Free mature ascospores. **D** Squashed ascoma showing agglutinated hairs at the neck (arrow). **E-G** Swollen cells of agglutinated hairs **Scale bars:** **A** = 500 μm , **B** = 50 μm , **C, E-G** = 20 μm , **D** = 200 μm .

slightly eccentric, 30–60 \times 4–6 μm , *lower cauda* central, 8.5–12 \times 2–3.5 μm .

Material examined – dung incubated for 19 days – KENYA, Nairobi National Park, Nairobi Province, GPS 37M0255191 9849808, altitude 1693 m, Cape buffalo dung, 20 August 2010, P. Mungai, KWSNNP015-2010.

Notes – *S. conicum* is similar to *S. aloides* (Fuckel) N. Lundq., but it differs in

having smaller ascospores (spore head 23–28 \times 13–16 Mirza & Cain 1969; 26–30 \times 13–17, Lundqvist 1972; 22–29 \times 13–18, Bell & Mahoney 1995; 26–29.5 \times 12.5–16.5, Doveri 2008) and not so long agglutinated hairs [according to Bell & Mahoney 1995, Chang et al. 2005 and Chang et al. 2010 J.H. Chang & Y.Z. Wang]. Other similar species include *S. curvuloides* (Cain) N. Lundq, *S. glutinans*

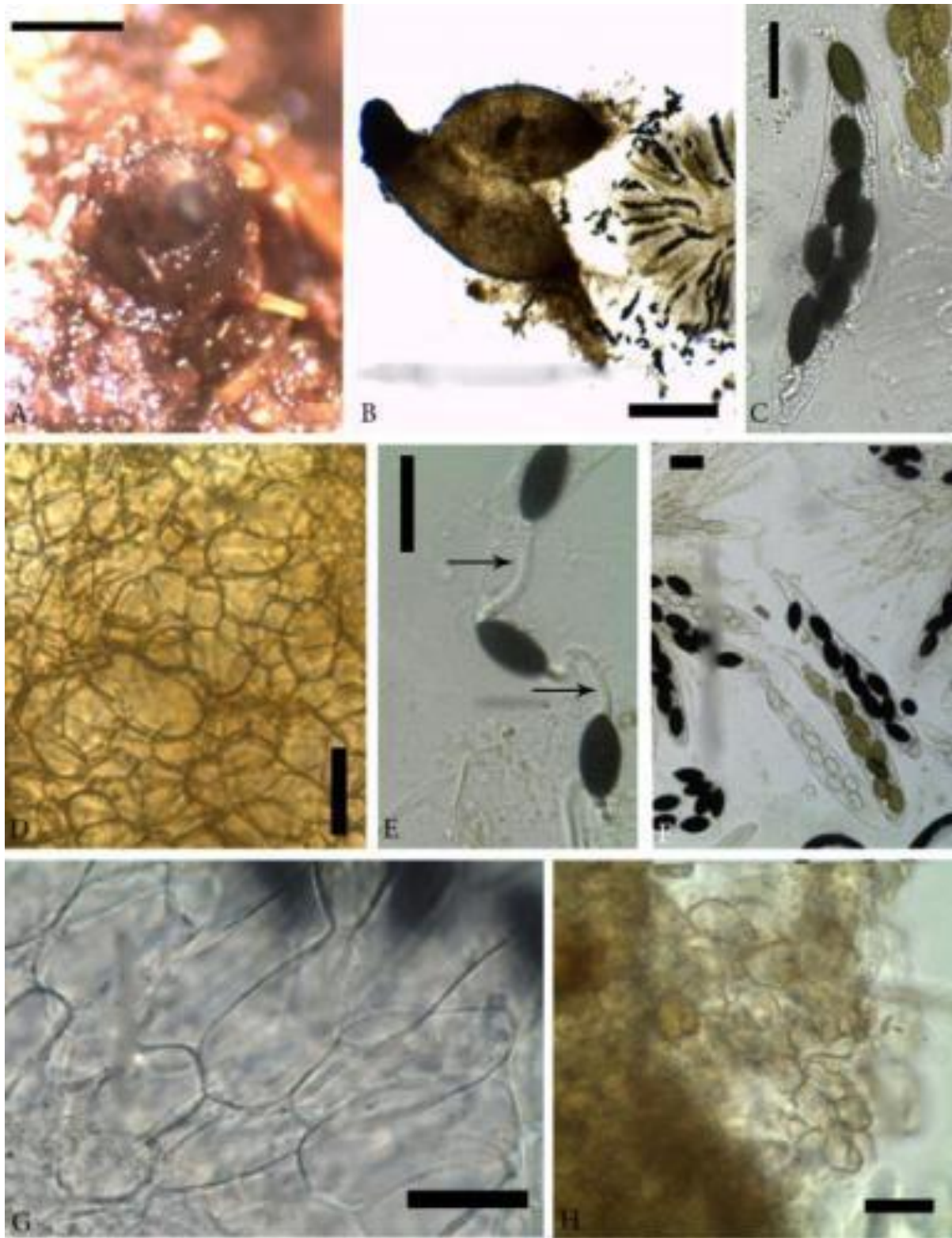


Fig. 3 – *Schizothecium curvuloides* var. *curvuloides* (KWSNNP008-2009). **A** Ascoma on dung. **B** Squashed ascoma **C** Mature ascus. **D** Details of exoperidial wall. **E** Mature ascospores showing caudae (arrows). **F** Immature and mature asci. **G** Jacket paraphyses. **H** Agglutinated hairs. **Scale bars:** **A-B** = 500 μ m, **C, E-F** = 50 μ m, **D** = 20 μ m **G-H** = 20 μ m.

(Cain) N. Lundq and *S. miniglutinans* (J.H. Mirza & Cain) N. Lundq as described in this paper. Our Kenyan material has ascospores that fall within the range observed in previous

investigations (Mirza & Cain 1969, Lundqvist 1972, Bell & Mahoney 1995, Doveri 2008). *Schizothecium conicum* is a new record for Kenya.

Schizothecium curvuloides (Cain) N. Lundq. var. *curvuloides*, Thunbergia 25: 10, 1996, [1997]. Figs.3A–H, 4A–G

≡ *Podospora curvuloides* Cain, Can. J. Bot. 40: 453, 1962.

Ascomata perithecioid, superficial, 630–1100 µm high, 350–850 µm diam., scattered or in small groups, pale brown, ovate-pyriform to pyriform, membranaceous, hairy, with a black, coriaceous, sometimes curved, conical or subcylindric neck, 270–300 µm high, 210–220 µm diam., adorned at its base with few inconspicuous clusters of swollen, agglutinated, thick-walled, curved hairs, ca. 32 × 7 µm formed of 1–4 cells, terminal cells more elongate, rounded with darker end wall; long flexuous hairs covering the venter. *Peridium* layered with an exostratum composed of *textura globulosa-angularis*, thick-walled cells 9–23 × 7–14 µm. *Jacket Paraphyses* moniliform, hyaline, septate, 9.5–10 µm broad at septa, mid-section 15–20 µm broad. *Asci* 8-spored, 243–320 × 26–40 µm, cylindrical-clavate, easily swelling in water up to 70 µm diam., apex simple with a cytoplasmic plug, apical ring indistinct, with long crooked stipes. *Ascospores* uniseriate to biseriate above; spore head 35–45 × 17.5–23.5 µm, elongate-ellipsoidal, olivaceous-black, thick-walled, apex umbonate; transverse striations visible in young, scarcely pigmented spores but occasionally lacking in some collections, with an apical germ pore; *pedicel*, thin, hyaline, cylindrical, 6–9 × 2–4 µm, pointed at the apex; *upper cauda* eccentric, cylindrical, 26–60 × 5.5–7 µm, with few grooves on one side; *lower cauda* arising from the distal end of pedicel, lash-like, 26–50 × 1.5–2 µm broad at the base.

Material examined: 4 specimens on dung incubated for 41, 42, 50 and 54 days – KENYA, Nairobi National Park in Nairobi, GPS S01°21'15.1" E036°46'54.1" altitude 1768 m, impala, 31 August 2009, P. Mungai, KWSNNP008-2009; GPS S01°20'50.1", E036°47'51.3", altitude 1681 m, grassland, hartebeest, 31 August 2009, P. Mungai, KWSNNP013-2009; GPS S01°20'50.1", E036°47'51.3", altitude 1695 m, wetland grassland, hippopotamus, 31 August 2009, P. Mungai, KWSNNP012-2009; Aberdares Country Club Game Sanctuary, Central

Province, GPS S00°19'28.1", E36°55'54.3", altitude 2161 m, grassland, zebra, 30 August 2009, P. Mungai, KWSACC002-2009.

Notes – *Schizothecium curvuloides* var. *curvuloides* resembles *S. glutinans*. It is, however, differentiated from the latter by having narrowly rather than broadly ellipsoidal, transversely striated ascospores with shorter pedicels (Cain 1934, Bell & Mahoney 1995, Doveri & Coué 2008). *Schizothecium curvuloides* var. *curvuloides* is easily confused with the closely related *S. curvuloides* var. *megasporum* Doveri & Coué but the latter can be differentiated by having larger perithecia, asci, and spore heads lacking transverse striations (Doveri & Coué 2008). *Schizothecium curvuloides* var. *curvuloides* is fairly common from wildlife dung in Kenya.

Schizothecium dakotense (Griffiths) N. Lundq., Symb. Bot. Upsal. 20 (1): 254, 1972.

Figs.5A–I, 6A–D

≡ *Philocopra dakotensis* (Griffiths) Sacc., Syll. Fung. 17: 607, 1905.

≡ *Pleurage dakotensis* Griffiths, Mem. Torrey Bot. Club 11: 87–88, 1901.

≡ *Podospora dakotensis* (Griffiths) Mirza & Cain, Can. J. Bot. 47: 2016, 1969.

Ascomata perithecioid, immersed to nearly superficial, 520–750 µm high, 120–200 µm diam., scattered, olivaceous brown, elongate-pyriform, with short, blackish, sometimes curved swollen hairs, scattered all over the venter. *Neck* curved, black, subcoriaceous, conical, 140–270 × 120–140 µm; swollen agglutinated hairs forming a collarete at the base of the neck and on upper peridium 1–3 cells, hyaline to pale brown with darker apices 12–30 × 5–10 µm, terminal cell of each hair more elongate; ostiole 60–110 µm diam. *Peridium* membranaceous, semi-transparent; *endoperidium* pseudoparenchymatous of thin walled cells; *mesoperidium* of flattened parallel cells; *exoperidium* a *textura globulosa-angularis* with cells 11–13 × 6.5–11 µm from which hyphoid hyaline to pale brown hairs originate. *Jacket paraphyses* ephemeral, hyaline, 6–7 µm broad, septate, with hyaline vacuoles. *Asci* 32-spored, 200–260 × 38–52 µm, clavate-lageniform, swelling in water, slightly pointed apex, indistinct apical ring, contracted below

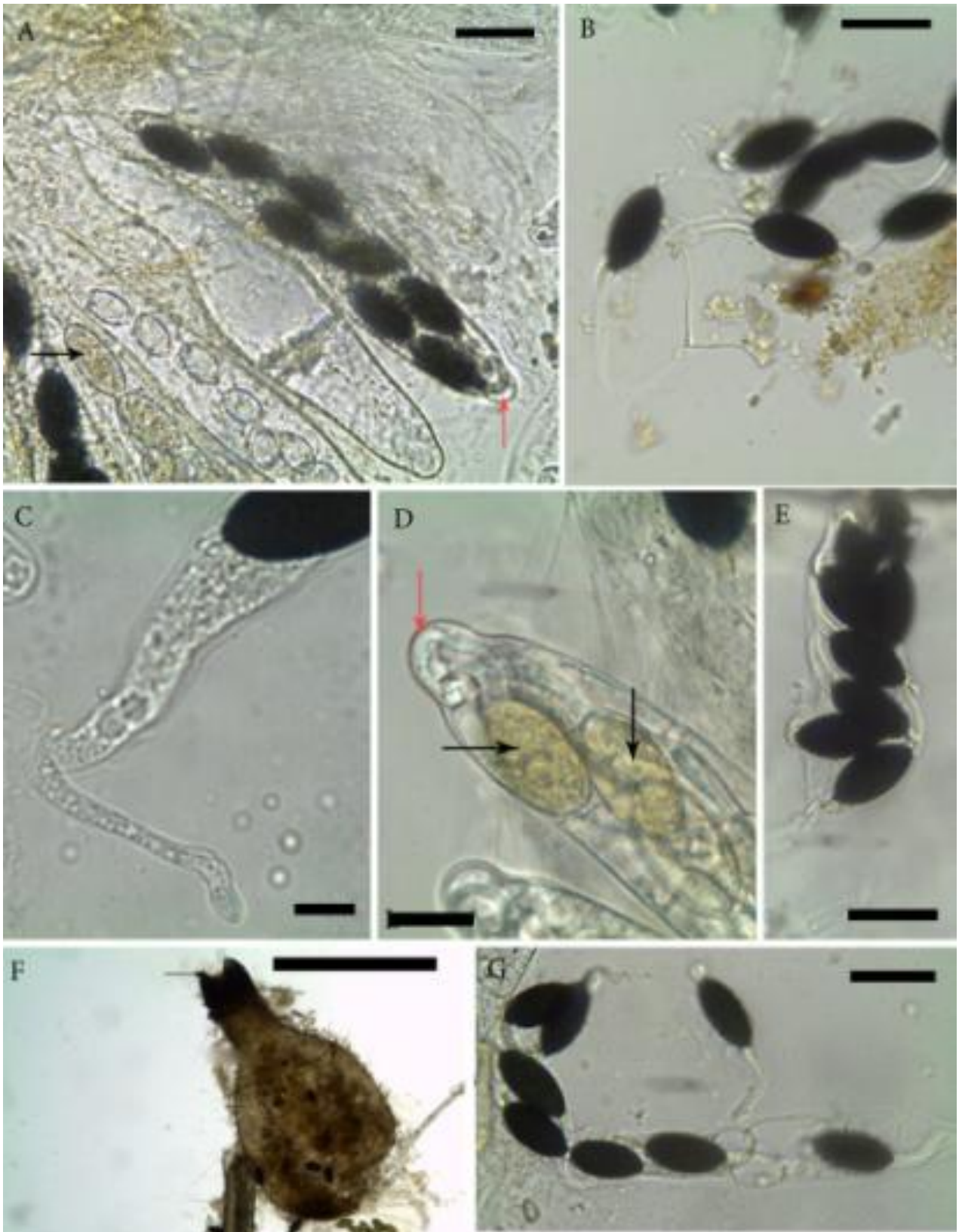


Fig. 4 – *Schizothecium curvuloides* var. *curvuloides* (KWSNNP008-2009). **A** Asci showing ornamented immature spores (black arrow) and pore plug (red arrow). **B** Free mature ascospores. **C** Ascus stipe. **D** Ascus apex with immature spores (black arrow), note pore plugging (red arrow). **E** Mature ascospores. **F** Squashed ascoma showing the venter (arrow). **G** Mature ascospores. **Scale bars:** **A-D, E G** = 50 μm , **F** = 200 μm .

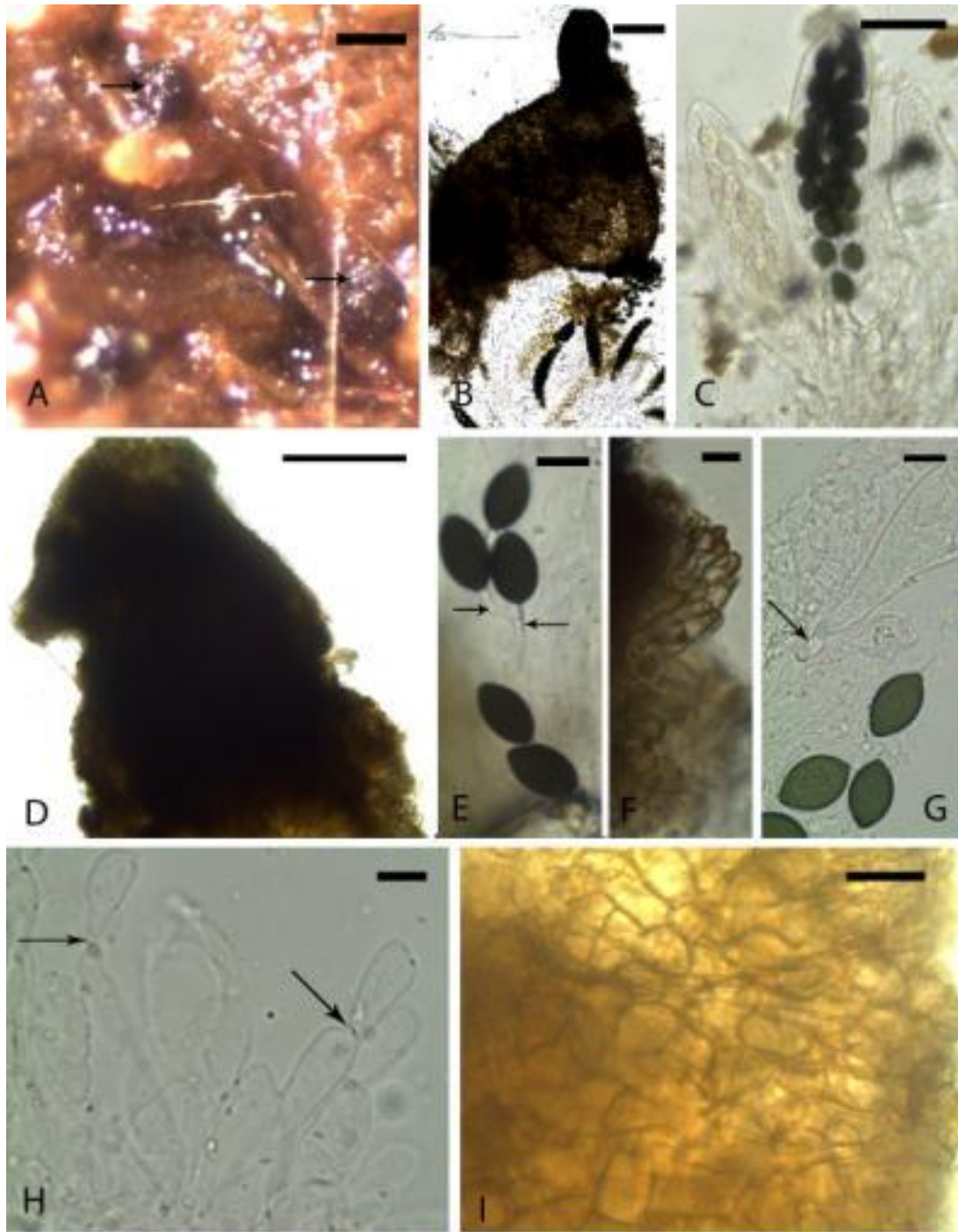


Fig. 5 – *Schizothecium dakotense* (KWSNNP010-2009). **A** Superficial ascomata on dung, note hairs on necks (arrows). **B** Squashed ascoma. **C** Mature and immature asci with ascospores. **D** Perithecial neck. **E** Ascospores showing pedicels (arrows). **F** Agglutinated hairs at the neck. **G** Ascus stipe (arrow) and free ascospores. **H** Jacket paraphyses, note septation (arrows). **I** Exoperidial wall. **Scale bars:** **A** = 500 μm , **B** = 200 μm , **C-D** = 50 μm , **E-I** = 20 μm .

into a stipe 40–80 $\mu\text{m} \times 5\text{--}6.5 \mu\text{m}$. *Ascospores* irregularly multi-seriate, two-celled at maturity; dark cell 19–23 \times 11.5–14.5 μm , light greenish to olivaceous brown in reflected light, ellipsoidal, smooth, flattened at the base, with slightly umbonate apices and an apical germ pore, ca. 1.5 μm diam.; pedicel 6–7.5 \times

1.5–2 μm , cylindrical, plasma filled, persistent; lash-like *caudae* one from apex of spore head, hollow, eccentric to germ pore and the other surrounding the whole pedicel, 25–36 μm long.

Material examined – 4 specimens on dung incubated for 12, 39, 40 and 50 days – KENYA, Nairobi National Park in Nairobi

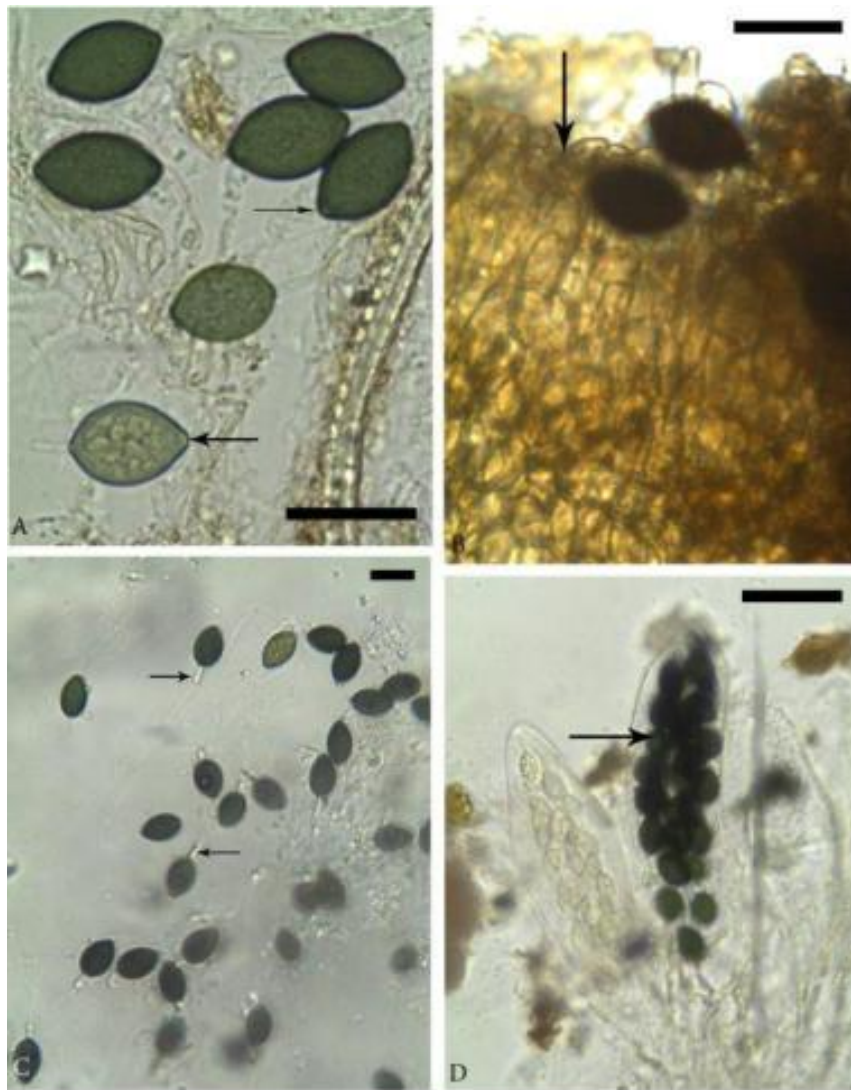


Fig. 6 – *Schizothecium dakotense* (KWSNNP010-2009). **A** Free mature ascospores, note germ pore (arrow). **B** Details of peridium showing agglutinated hairs (arrow). **C** Free mature ascospores, note pedicel. **D** Mature and immature asci with ascospores note spore arrangement (arrow). **Scale bars:** **A-B** = 20 μm , **C-D** = 50 μm .

Province, GPS S01°21'25.5" E036°47'51.6", altitude 1748 m, wooded grassland, reticulated giraffe, 31 August 2009, P. Mungai, KWSNNP010-2009; GPS S01°21'21.8", E036°46'51.8", altitude 1765 m, grassland, zebra, 31 August 2009, GPS S01°21'15.1", E036°46'54.1", altitude 1768 m, grassland, impala, 31 August 2009, P. Mungai, KWSNNP008-2009; Aberdares National Park, Central Province, GPS S00°20'23.2", E036°47'11.1", altitude 1768 m, montane forest, waterbuck, 29 August 2009, P. Mungai, KWSANP005-2009.

Notes – *Schizothecium dakotense* is close to *S. alloeochaetum* (Mirza & Cain) L. Cai from which it is differentiated by having

somewhat larger ascospores [spore size in *S. alloeochaetum* = 15.5–18.5 \times 11–13.5 (Mirza & Cain 1969)]. *Schizothecium formosanum* (Y-Z Wang) L. Cai is differentiated from *S. dakotense* by the 64-spored asci and lower cauda not covering the whole pedicel. *Schizothecium simile* (E.C. Hansen) N. Lundq. has both 16 and 32-spored asci but can be differentiated by its larger spores with a sheath and the presence of rigid hairs at the perithecial neck. The morphological features of our Kenyan collections of *S. dakotense* match those of the Japanese, Italian and Australian collections (Furuya & Udagawa 1972, Doveri 2004, Bell 2005).

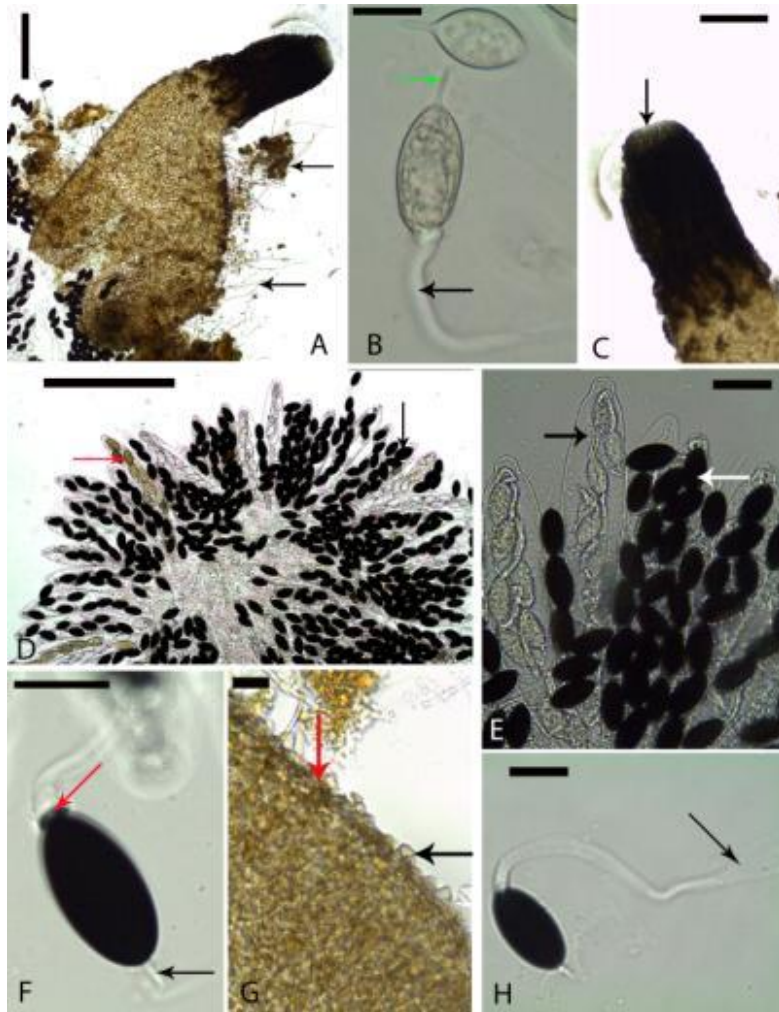


Fig. 7 – *Schizothecium dubium* (KWSNNP008-2009). **A** Squashed perithecium showing long flexuous hairs (arrows). **B** Free immature spores, note cauda (black arrow) and pedicel (green arrow). **C** Neck showing ostiole (arrow). **D** Section of centrum showing mature asci with ascospores. **E** Mature (white arrow) and immature asci (black arrow). **F** Free mature ascospore, note pedicel (black arrow) and upper cauda over a wide germ pore (red arrow). **G** Details of peridium, note swollen hairs (red and black arrows). **H** Free mature ascospore showing lash-like cauda with broadened end (arrow). **Scale bars:** A, C–D = 200 µm, E, G = 50 µm, B, F, H = 20 µm.

Schizothecium dubium (E.C. Hansen) N. Lundq Symb. Bot. Upsal. 20 (1): 254, 1972.

Figs.7A–H

≡ *Sordaria dubia* E.C. Hansen, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 59: 337, 1877.

≡ *Philocopra dubia* (E.C. Hansen) Sacc., Syll. Fung. (Abellini) 1: 251, 1882.

≡ *Podospora dubia* (E.C. Hansen) Niessl, Hedwigia 22: 156, 1883.

= *Sordaria linguiformis* Cain, Univ. Toronto St. Biol. Ser. 38: 42, 1934 (fide Lundqvist 1972).

≡ *Pleurage dubia* (E.C. Hansen) C. Moreau, Encyclop. Mycol. 25: 238, 1954.

Ascomata perithecioid, superficial, 650–1030µm high, 300–500 µm diam., scattered, subglobose to pyriform, exposed part covered with long flexuous septate, olivaceous-brown hairs 2–3.5 µm broad. *Neck* 255–330 × 160–175 µm, black, usually straight, cylindrical, with fascicles of agglutinated short brown hairs, consisting of swollen cells. Some swollen hairs also present in the upper part of the venter. *Peridium* membranaceous, semi-transparent: endostratum *textura angularis* of small polygonal cells and exostratum *textura globulosa angularis* of roundish to polygonal cells. *Jacket paraphyses* moniliform, hyaline, septate, exceeding the asci. *Asci* 16-spored,

252–302 × 33–56 µm, unitunicate, fusiform-clavate, broadly rounded above, tapering below into a long, thin crooked stipe, with an indistinct apical ring. *Ascospores*, two-celled at maturity, biseriate; apical dark cell 34–40 × 16.5–20 µm, ellipsoidal, hyaline at first, through olivaceous to dark brown and opaque, with a wide apical germ pore; *pedicel* slender, sub-cylindrical to obconical, 6–7.5 × 2.0–2.5 µm, persistent; *caudae* lash-like, granulose, upper one hollow, 65–100 × 4–10 µm, the end broader than the base; lower one hyaline, enveloping the pedicel, ca. 50 × 5.5 µm.

Material examined – dung incubated for 80 days, KENYA, Nairobi National Park, Nairobi Province, GPS S01°21'15.1" E036°46'54.1", altitude 1768 m, impala dung, 31 August 2009, P. Mungai, KWSNNP008-2009.

Notes – *Schizothecium dubium* has some similarities with the 16-spored form of *S. simile* from which it is distinguished by lacking rigid, erect hairs on the neck, lacking a gelatinous sheath around the spore head, and having a broader hollow rather than solid upper cauda (Cain 1934, Lundqvist 1972, Doveri 2004, 2008). *S. dubium* is also similar to *S. dakotense* but the latter not only has smaller 32-spored asci but also smaller spores and smaller perithecia (Lundqvist 1972, Doveri 2008). This is a new record for Kenya.

Schizothecium glutinans (Cain) N. Lundq., Symb. Bot. Upsal. 20 (1): 254, 1972. (Figs.8A–G, 9A–F)

≡ *Sordaria glutinans* Cain, Univ. Toronto Stud., Biol. Ser. 38: 40, 1934.

≡ *Pleurage glutinans* (Cain) C. Moreau, Encycl. Mycol. 25: 237, 1953.

≡ *Podospora glutinans* (Cain) Cain, Can. J. Bot. 40: 460, 1962.

Ascomata perithecioid, immersed with only the neck protruding, rarely semi-immersed, 450–610 × 165–340 µm, scattered, broadly ellipsoidal to pyriform, membraneaceous, semi-transparent, olivaceous brown, with a papilliform, bluntly conical, black neck covered at its base with a crown of short 10–25 µm long articulated (one to three cells high), swollen hairs forming almost triangular scales. Some scattered swollen hairs also present on the remaining part of the perithecium. Lower

part of the perithecium also with short, flexuous, densely septate hairs. *Peridium* 2-layered, pseudoparenchymatous. *Endoperidium* of pale, thin-walled polygonal cells. *Exoperidium a textura globulosa-angularis* of thick-walled cells 4–8 × 5–10 µm. *Jacket Paraphyses* hyaline, reduced to shapeless material surrounding the asci, vanishing. *Asci* 8-spored, 250–336 × 25–32 µm, cylindrical, apex slightly rounded, apical ring indistinct, long stipitate. *Ascospores* two-celled at maturity, usually obliquely uniseriate, rarely biseriate; apical dark cell 26.5–30.5 × 15.5–20 µm, olivaceous-black, broadly ellipsoidal, with a small germ pore at the slightly umbonate apex; pedicel hyaline, straight or slightly curved, cylindrical, 6.5–13.5 × 2–3.5 µm, persistent; *cauda* at apex of pedicel long and lash-like, longer than the apical one, 4–4.5 µm diam., continuous with a thin gelatinous sheath over the pedicel; the other *cauda* at apex of spore, covering the germ pore, broader, lash-like, furrowed, 3–7.5 µm diam.

Material examined – dung incubated for 54 days, KENYA, Shimba Hills National Reserve, Coast Province, GPS S04°14'04.4" E039°26'06.8", altitude 361 m, sable antelope dung, 24 August 2009, P. Mungai, KWSSH005-2009.

Notes – *Schizothecium glutinans* is closely related to *S. miniglutinans* (J.H. Mirza & Cain) N. Lundq, however the former has larger asci and ascospores (Bell & Mahoney 1995, Doveri 2004, 2008). Ascospore size range for this Kenyan collection (26.5–30.5 × 15.5–20 µm) is very close to those reported by a majority of previous investigators (Cain 1934, Mirza & Cain 1969, Lundqvist 1972, Bell & Mahoney 1995, Doveri 2004, 2008, Bell 2005).

Taxonomy

Mirza & Cain (1969), Lundqvist (1972), Bell & Mahoney (1995) and Doveri (2004, 2008) made very detailed studies on *Schizothecium*. After decades of debate on whether to treat this genus as distinct from *Podospora* (Lundqvist 1972, Krug & Khan 1989, Bell & Mahoney 1995, Doveri 2004, 2008), phylogenetic studies (Huhndorf et al. 2005, Cai et al. 2006) established it to be different but closely related to it.

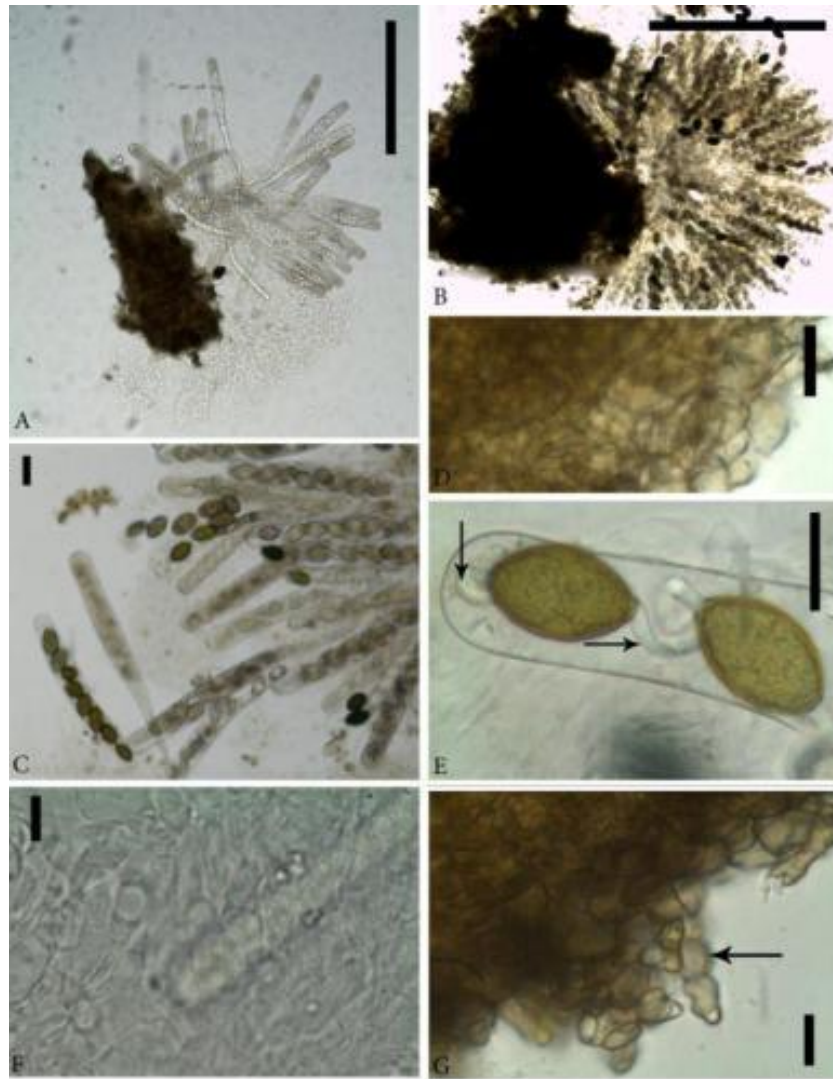


Fig. 8 – *Schizothecium glutinans* (KWSSH005A-2008). **A-B** Ascoma squash. **C** Immature asci and ascospores. **D** Details of peridium. **E** Immature ascospores in ascus apex, note gelatinous appendages (arrows). **F** Paraphyses. **G** Agglutinated hairs and swollen cells (arrow). **Scale bars:** **A-C** = 200 μ m, **D-G** = 20 μ m.

Schizothecium dakotense and *S. glutinans* are new records in Kenya.

Ecology

A correlation was evident between the *Schizothecium* species sporulating and the dung type. With an exception of one isolate of *S. dakotense* from giraffe dung, the rest of the species were isolated from grazers. Grazers such as impala, zebra and waterbuck had the most number of isolates and species diversity. A single isolate of *Schizothecium conicum*, *S. dubium* and *S. glutinans* sporulated on a single dung type each. This may imply a taxon substrate preference or rarity but could also mean a low isolation effort or limited sampling. Grassland produced the most isolates.

Coprophilous fungi substrate fidelity deduced from this study seems to agree with studies by other investigators (Krug & Khan 1989, Ebersohn & Eicker 1992, Caretta et al. 1998).

Conclusion

The species diversity of coprophilous *Schizothecium* from wildlife dung in Kenya is very high. Most of our isolates and species were obtained from grazers. The correlation observed between the structure of dung and type on one hand and coprophilous fungi on the other hand need further elucidation. We hope that this study will create awareness and generate interest to carry out more surveys and highlight the importance of mycology to biodiversity conservation.

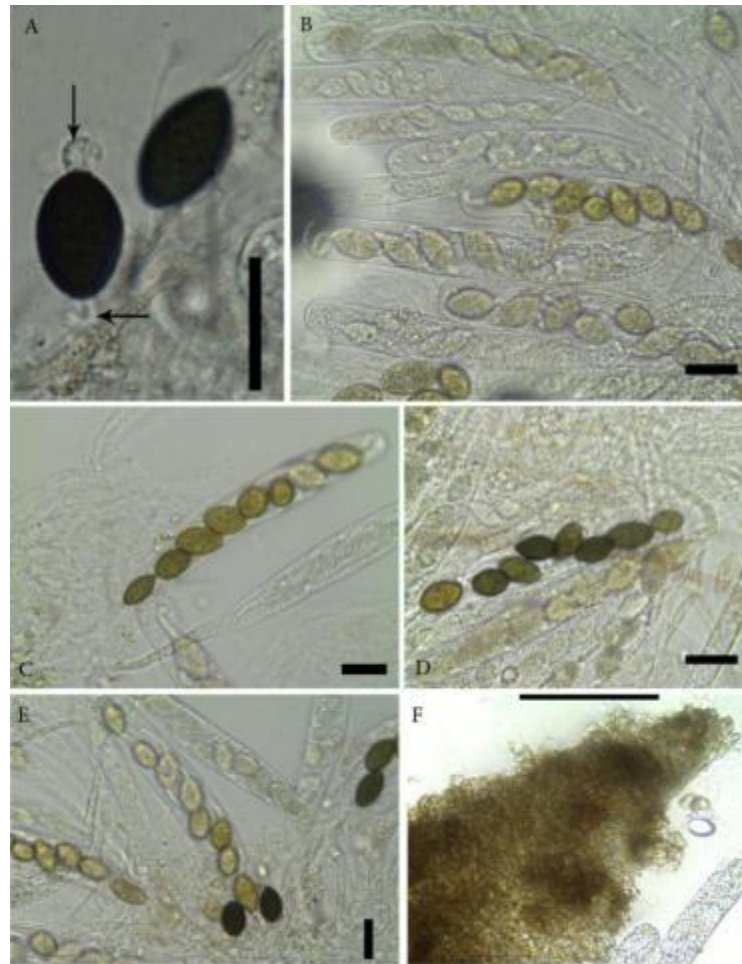


Fig. 9 – *Schizothecium glutinans* (KWSSH005A-2008). **A** Mature ascospores, note pedicel and cauda appendages (arrows). **B-E** Mature and immature asci with usually uniseriate ascospores. **F** Ascoma squash in water mount showing peridium and agglutinated hairs. **Scale bars:** **A** = 20 μm , **B** = 50 μm , **C** = 200 μm , **D-F** = 50 μm .

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in the laboratory, grammar and spell-checking the text. We wish to clarify that the views expressed herein are not necessarily those of our institutions of affiliation.

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