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Dung beetles (Coleoptera: Scarabaeidae: Aphodiinae) of the Mpala Research Centre and environs, Laikipia District, Kenya

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Dung beetles (Coleoptera: Scarabaeidae: Aphodiinae) of the Mpala Research Centre and environs, Laikipia District, Kenya

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Abstract. The dung beetle fauna of the subfamily Aphodiinae occurring in the Laikipia District of Kenya was surveyed. In total, 14 genera and 29 species were found and these taxa are placed in identification keys. Known generic distributions are provided and species collection data listed.

Keywords: Aphodiinae, keys, dung preference, Kenya

Introduction

East Africa is home to one of the largest, most spectacular concentrations of large mammals, both herbivores and their carnivore predators, in the world. The immense amount of dung deposited by these animals forms a resource that supports great dung beetle diversity and biomass.

Dung beetles mostly belong to two subfamilies of Scarabaeidae, Aphodiinae and Scarabaeinae. The former subfamily is dealt with here; the Scarabaeinae will be treated in a subsequent publication.

The dung beetle fauna of Kenya is extremely rich and diverse but, as is true of most African countries, it is far from being well known. Although many specialists have dealt with the coprophagous Scarabaeidae of this region for almost two centuries, the knowledge of taxa of these two subfamilies is still largely incomplete from both systematical and zoogeographical viewpoints. For these reasons we consider it useful to compile a checklist of taxa found recently in central Kenya, and to propose some ecological considerations.

This study was undertaken as part of a collaborative effort between the Smithsonian Institution, Washington, DC (USNM), International Center of Insect Physiology and Ecology, Nairobi (ICIPE), and National Museums of Kenya (NMK), to inventory invertebrates at Mpala Research Centre. Field investigations of dung beetle diversity and habitat preference were conducted during two visits to Mpala Research Centre (MRC) by one of us (RDG) in 2001 (February) and 2002 (May), and by year round sampling conducted by Kadir Abdi, MRC staff, from April 2001 to April 2002. In addition, specimens were available to us from collections made by Scott Miller, Smithsonian Institution, and associates over period of years, and from a collection made by Trond Larsen, Princeton University, in January 2002. The area sampled consisted of MRC, the adjacent Mpala Ranch, and immediate surroundings.

Mpala Research Centre is a biological field station centered on 0.293° N, 36.899° E, and managed by the Kenya Wildlife Service, National Museums of Kenya, Princeton University, and the Smithsonian Institution (Miller and Lazell 2001). It is located 50 km north of the equator, northwest of Mount Kenya, in the semi-arid savanna of the Laikipia Plateau of central Kenya at 1650 m elevation.

Precipitation at MRC normally consists of heavy rains from April to July and light rains in October through November (Keesing 2000). Soil types consist of red, sandy soils; dark soils with a high clay content ("black cotton"); and narrow riverine strips that are a mixture of the previous two types. These riverine strips are highly sandy in some places, usually moist even in periods of drought, and are used by many dung beetle species during dry seasons. Vegetation is dominated by species of acacia, and vegetation composition is quite different between the red and dark soils. For additional information on MRC plant diversity see Young et al. (1998) and Keesing (2000).

In total, 14 genera and 29 species were found during this study. Four of these are new Kenya records: *Lorditomaeus tanganyicanus* Balthasar, *Mesontoplatys bolzi* (Petrovitz), *Pharaphodius resplendens* (Balthasar), and *Plagiogonus clypeodentatus* Bordat.

Materials and Methods

Dung beetle sampling at MRC consisted primarily of three methods; 1) hand collecting individual specimens from dung pats or pellets; 2) pitfall traps baited with dung of various mammal species; and 3) nocturnal collecting for those species attracted to light. The pitfall traps consisted of small bowls (cereal bowls) placed flush with the ground with a small bait container suspended over the bowl by a wire loop. These traps were moved to new sites daily. Dung type was varied at intervals with buffalo, elephant, eland and impala most frequently used. Light collecting used existing lights as well as UV light operated from a 12-volt battery.

The term "epistome" is used here and should be interpreted at referring to that part of the head between clypeus and vertex.

Specimens were either prepared (pinned) at MRC or layered in tissue paper for transport and subsequent preparation.

Taxa are identified in keys to genera and species. Literature references are limited to the most recent and/or most complete taxonomic treatments.

Voucher specimens are deposited in (NMK), (USNM), and (MRC) collections. If a species is represented by a single specimen, that specimen is placed in the NMK, assuring that the NMK has a synoptic specimen set of the taxa included herein.

Systematics

Key to Aphodiini genera of the Laikipia plateau, Kenya

1. Elytra with less than ten striae; epistome with some large setigerous punctures, setae straight; epipleura very broad; color sericeous, brownish yellow, elytra pale, with or without preapical spots; length 5.0-8.0 mm ..... ***Lorditomaeus* Péringuey**

— Elytra with ten striae; epistomal setae, epipleura, color, and length variable **2**

2(1). Scutellum large, at least as long as 1/6 of sutural margin of elytra or longer **3**

— Scutellum small, at most as long as 1/7 of sutural margin of elytra or shorter **5**

3(2). Elytral disc regularly convex; scutellum broad, triangular; claws of male middle tarsi modified, large and unequal; color blackish, elytra mostly reddish brown; length 3.5-5.0 mm .... ***Macroretrus* Péringuey**

— Elytral disc more or less strongly flattened; scutellum long; claws of male middle tarsi not modified; length variable **4**

4(3). Relatively larger body size (length 8.0-16.0 mm); elytra feebly flattened on disc; body yellow, sometimes pronotal and elytral disc dark brown, rarely completely blackish; epipharynx with

anterior margin deeply excised medially, bearing 1 to 6 long spinules .... ***Calocolobopterus*** **Dellacasa**

— Relatively smaller body size (length 5.0-12.0 mm); elytra strongly flattened on disc; pronotum black, with lateral margins yellowish; elytra yellowish with cloudy discal spot dark brown or completely blackish; epipharynx with anterior margin arcuate, spinules entirely lacking or present in varying numbers ..... ***Neocolobopterus*** **Landin**

5(2). Seventh and ninth elytral interstices joined preapically, raised into a prominent oblique fold; body oval, elongate, glabrous, shiny; dark brown or blackish; length 2.5-4.0 mm .... ***Plagiogonus*** **Mulsant**

— Seventh and ninth elytral interstices normally shaped; body shape and color variable **6**

6(5). Elytral striae not joined apically; body convex, rather stout, subshiny, glabrous; color blackish or brownish; length 5.0-7.5 mm ..... ***Pharaphodius*** **Reitter**

— Elytral striae joined apically; body convex or elongate, shiny or not, color and size variable **7**

7(6). Scutellum pentagonal **8**

— Scutellum triangular **11**

8(7). Hind tibiae apically fimbriate with short, equal spinules; base of pronotum not bordered; elytra dirty yellowish, usually with discal brownish spot; length 3.0-7.0 mm .... ***Labarrus*** **Mulsant and Rey**

— Hind tibiae apically fimbriate with unequal, elongate spinules; base of pronotum not bordered; elytra yellowish or not **9**

9(8). Clypeal margin fimbriate; small species, rather stout, brownish black or brownish yellow; sometimes elytra yellowish with a scutellar blackish spot; length 2.5- 4.0 mm .... ***Mesontoplatys*** **Motschulsky**

— Clypeal margin glabrous; color and body size variable **10**

10(9). Elytral interstices medially tectiform; striae more or less distinctly bordered at each side; color more or less dark brownish; length 3.0-5.0 mm. ..... ***Pleuraphodius*** **Schmidt**

— Elytral interstices flat or convex but never tectiform medially; striae not bordered at each side; color reddish brown or reddish; length 4.0-6.0 mm. ..... ***Koshantschikovius*** **Schmidt**

11(7). Basal margin of pronotum bordered with marginal bead; clypeus widely rounded at sides; color blackish or brownish with reddish elytra; length 3.0-5.0 mm ..... ***Nobius*** **Mulsant and Rey**

— Basal margin of pronotum not bordered; clypeus rounded or angulate at sides; color and length variable **12**

12(11). Elytral intervals with row of more or less long, erect setae on coarse punctures aligned near striae; color blackish or brownish; elytra often with cloudy yellowish or reddish discal spots; length 3.0-6.0 mm ..... ***Aganocrossus*** **Reitter**

— Elytral pubescence, if present, recumbent, short; color variable; body length variable **13**

13(12). Head and pronotum completely pubescent, or at least pubescent on sides; epistome and pronotal disc coarsely densely punctured; distal segment of male labial palpi cylindrical and feebly rounded; color yellowish or more or less dark brown; elytra with or without darker preapical spot; length 2.5-5.0 mm ..... ***Trichaphodius*** **Schmidt**

— Head and pronotum glabrous; epistome and pronotal disc finely or very finely punctured; distal segment of male labial palpi elliptical and strongly flattened; color brownish; elytra yellow, more or less variegated with darker spots; length 5.0-6.0 mm .. ***Trichaphodioides*** **Paulian**

GENUS *Aganocrossus* (Reitter)

Aphodius (*Aganocrossus*) Reitter, 1895: 208.
Aganocrossus: G. Dellacasa et al. 2001: 71.

Distribution: Afrotropical, Australian, Oriental and Palearctic regions.

Key to Laikipia species of *Aganocrossus*

1. Elytra entirely setose, setae long, erect ..... ***A. vestitus* (Boheman)**
— Elytra glabrous ..... ***A. meticulosus* (Paulian)**

***Aganocrossus meticulosus* Paulian**

Aganocrossus meticulosus Paulian, 1942: 49.
Aphodius (*Aganocrossus*) *meticulosus*: Bordat, 1992b: 357

Specimens examined (5): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Zebra dung (1); *idem*, leg. R Gordon, African Buffalo dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.VIII.2001, leg. Kadir Abdi, Waterbuck dung (1); Laikipia Plateau, Mpala Research Centre, N00°17'-E36°53' E, 1650 m, 17-20 Sept. 1999, S.E. Mille, T. M. Kuklenski & R.R. Snelling (2). (MRC) (NMK) (USNM).

Geographical distribution: Eastern Africa (Kenya and Tanzania) and Zaire.

Dung preference: Not known, specimens were found in buffalo and waterbuck dung.

***Aganocrossus vestitus* (Boheman), n. comb.**

Aphodius vestitus Boheman, 1857: 359.
Aphodius (*Aganocrossus*) *vestitus*: Bordat, 1992b: 362.

Specimens examined (17): Laikipia, Impala Ranch, N00°30'-E36°51', 1-13.V.2002, #6, leg. R. Gordon, Impala dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 15-29.II.2001, 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (16). (MRC) (NMK) (USNM).

Geographical distribution: Eastern and southern Africa.

Dung preference: Apparently a generalist, taken from dung of several mammals including waterbuck, hippo, etc.

GENUS *Calocolobopterus* Dellacasa

Aphodius (*Calocolobopterus*) G. Dellacasa, 1986: 216.
Calocolobopterus G. Dellacasa et al., 2001: 110.

Distribution: Afrotropical Region.

Key to Laikipia species of *Calocolobopterus*

1. Anterior clypeal margin strongly reflexed, clypeal surface with dense, coarse punctures; elytral intervals slightly convex, densely, distinctly punctured ..... ***C. magnicornis* Bordat**
— Anterior clypeal margin feebly reflexed, clypeal surface with punctures less dense, not coarse; elytral intervals flat, finely, indistinctly punctured ..... ***C. principalis* (Harold)**

***Calocolobopterus magnicornis* (Bordat), n. comb.**
Aphodius (*Calocolobopterus*) *magnicornis* Bordat, 1992c: 101.
Calocolobopterus magnicornis: G. Dellacasa et al., 2001: 110.

Specimens examined (6): Laikipia Plateau, Mpala Research Centre, N00°17'-E36°.899', 23-25.V.1998, 1650 m, S.E. Miller & T.M. Kuklenski (4); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (2). (MRC) (NMK) (USNM).

Geographical distribution: Eastern Zaire, Kenya, Tanzania and Ethiopia.

Dung preference: Not known, all specimens were taken at light.

***Calocolobopterus principalis* (Harold), n. comb.**
Aphodius principalis Harold, 1861: 94.
Aphodius (*Calocolobopterus*) *principalis*: G. Dellacasa, 1986: 220.

Specimens examined (11): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, African Buffalo dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.V.2001, leg. Kadir Abdi, African Elephant dung (6); *idem*, leg. Kadir Abdi, ultra violet light (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.VIII.2001, leg. Kadir Abdi, Waterbuck dung (1). (MRC) (NMK) (USNM).

Geographical distribution: Afrotropical region.

Dung preference: Probably a generalist, found in dung of buffalo, elephant, and waterbuck, also taken at light.

GENUS *Craterocyphus* Schmidt
Aphodius (*Craterocyphus*) Schmidt, 1913: 129.
Craterocyphus: Paulian, 1942: 62; G. Dellacasa et al., 2001: 71.

Distribution: Afrotropical Region.

***Craterocyphus* sp**.

Specimen examined (1): Laikipia Plateau, Mpala Research Centre, N00°17'-E36°53', 20-22.IV.1999, 1650 m, S.E. Miller & R. O'Meara. (NMK).

Dung preference: No data available.

GENUS *Koshantschikovius* Schmidt
Aphodius (*Koshantschikovius*) Schmidt 1913: 89.
Koshantschikovius: Paulian, 1942: 78; G. Dellacasa et al., 2001: 163.

Distribution: African and Oriental Regions.

***Koshantschikovius* near *substriatus* (Schmidt)**
Aphodius substriatus Schmidt, 1911: 48.
Koshantschikovius substriatus: Paulian, 1942: 79.
Aphodius (Artengruppe *Koshantschikovius*) *substriatus*: Endrödi, 1964: 275.

Specimens examined (15): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon,

Impala dung (5); *idem*, leg. R. Gordon, African Buffalo dung (1); *idem*, leg. R. Gordon, Hippopotamus dung (1); *idem*, leg. R. Gordon, pitfall trap cow dung (2); *idem*, leg. R. Gordon, ultra violet light (5). (MRC) (NMK) (USNM).

Distribution: Ethiopia, Kenya, and (?) Cameroon.

Dung preference: Certainly a generalist, taken from dung of buffalo, elephant, and hippo, also attracted to light.

GENUS *Labarrus* Mulsant and Rey

Aphodius (*Labarrus*) Mulsant and Rey, 1870: 516.
Labarrus: Adám, 1994: 14; G. Dellacasa et al., 2001: 165.

Distribution: Subcosmopolitan.

Key to Laikipia species of *Labarrus*

1. Male head with median tubercle small, indistinct, head flat in both sexes; elytral intervals densely, rather coarsely punctured ..... ***L meruensis* (Petrovitz)**
— Male head with median tubercle large, distinct, head convex in both sexes; elytral intervals not noticeably punctate, or with punctures indistinct **2**

2(1). Hind tibia with superior apical spur widened at middle, distinctly longer than first tarsal segment; middle tibia with male inferior apical spur feebly broadened and obliquely truncate apically in both sexes ..... ***L. lividus* (Olivier)**
— Hind tibia with superior apical spur evenly acuminate from base to apex, widest at base, approximately as long as first tarsal segment or slightly longer; middle tibia with inferior apical spur evenly widened, acuminate apically in both sexes .... ***L. pseudolividus* (Balthasar)**

***Labarrus lividus* (Olivier)**

Scarabaeus lividus Olivier, 1789: 86.
Labarrus lividus: G. Dellacasa et al., 2001: 166.

Specimens examined (1): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (1). (NMK).

Geographic distribution: Probably cosmopolitan.

Dung preference: This widespread species is a known dung generalist.

***Labarrus meruensis* (Petrovitz), n. comb**

Aphodius (*Nialus*) *meruensis* Petrovitz, 1961: 350

Specimens examined (43): Laikipia, MRC, 1800 m, N00°17'-E36°53', 15-28.II.2001, #1, leg. R. Gordon, ultra violet light (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Impala dung (3); *idem*, leg. R. Gordon, ultra violet light (28); *idem*, leg. R. Gordon, pitfall trap cow dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (2); *idem*, leg. R. Gordon, Impala dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.XII.2001, leg. Kadir Abdi, Impala, Hippopotamus, Zebra dung (1). (MRC) (NMK) (USNM).

Geographical distribution: Ethiopia, Kenya, Tanzania and Rwanda.

Dung preference: This is a generalist species, found in dung of cattle, elephant, hippo, impala, and zebra.

***Labarrus pseudolividus* (Balthasar)**
Aphodius (*Nialus*) *pseudolividus* Balthasar, 1941: 148.
Aphodius (*Labarrus*) *pseudolividus*: Bordat, 1990a: 36.
Labarrus pseudolividus: M. Dellacasa et al., 2002: 170.

Specimens examined (12): Laikipia Plateau, Mpala Research Centre, N00° 17'-E36°53' , 15-17.I.1999, 17-20.IX.1999, 30-31.V.2001, 1650 m, leg. S. E. Miller & T.M. Kuklenski, S.E. Miller & V. Shitakule, leg. S.E. Miller, T.M. Kuklenski & R.R. Snelling (12). (MRC) (NMK) (USNM).

Geographical distribution: Subcosmopolitan.

Dung preference: This is another known dung generalist, also attracted to light.

GENUS *Lorditomaeus* Péringuey
Lorditomaeus Péringuey, 1901: 436; G. Dellacasa et al., 2001: 176.

Distribution: Afrotropical Region.

***Lorditomaeus tanganyicanus* Balthasar**
Lorditomaeus tanganyicanus Balthasar, 1965: 211.

Specimens examined (1): Kenya, Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Hippopotamus dung (1). (Specimen lost in shipment).

Geographical distribution: Tanzania. This may be the first Kenya record.

Dung preference: Not known, the only specimen found was taken from hippo dung.

GENUS *Macroretrus* Péringuey
Macroretrus Péringuey, 1908: 632; G. Dellacasa et al., 2001: 179.

Distribution: Afrotropical Region.

***Macroretrus confusus* (Harold)**
Macroretrus confusus Harold, 1862: 154; Bordat et al., 2000: 110.

Specimens examined (46): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Hippopotamus dung (31); *idem*, leg. R. Gordon, Impala dung (3); *idem*, leg. R. Gordon, Zebra dung (2); *idem*, leg. R. Gordon, ultra violet light (6); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #7, leg. R. Gordon, African Elephant dung (2); *idem*, leg. R. Gordon, Zebra dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #8, leg. R. Gordon, Giraffe dung (1). (USNM) (NMK) (USNM).

Geographical distribution: Senegal, Ethiopia and Kenya.

Dung preference: Probably a generalist dung feeder, specimens were taken from dung of elephant, hippo, giraffe, and zebra.

GENUS *Mesontoplatys* Motschulsky
Mesontoplatys Motschulsky, 1863: 462; G. Dellacasa et al., 2001: 190.

Distribution: Afrotropical and Oriental Regions.

***Mesontoplatys bolzi* (Petrovitz) n. comb.**
Aphodius (*Mesontoplatys*) *bolzi* Petrovitz, 1967: 211.

Specimens examined (4): Kenya, Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Impala dung (4). (MRC) (NMK) (USNM).

Geographical distribution: Tanzania, these specimens may be the first Kenya records.

Dung preference: All four specimens were found in impala dung.

GENUS *Neocolobopterus* Landin
Colobopterus (*Neocolobopterus*) Landin, 1974: 235.
Neocolobopterus: G. Dellacasa et al., 2001: 198.

Distribution: Afrotropical Region.

***Neocolobopterus maculicollis* (Reiche), n. comb.**
Aphodius maculicollis Reiche, 1847: 341.
Aphodius (*Neocolobopterus*) *maculicollis*: G. Dellacasa, 1986: 209.
Neocolobopterus maculicollis: Cambefort and Bordat 2003: 572.

Specimens examined (36): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon (14); *idem*, leg. R. Gordon, cattle dung (5); *idem*, leg. R Gordon, African Buffalo dung (3); *idem*, leg. R. Gordon, pitfall trap Impala dung (1); *idem*, leg. R. Gordon, pitfall trap cow dung (11); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #3, leg. R. Gordon, cattle dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.VIII.2001, leg. Kadir Abdi, Zebra dung (1); *idem*, leg. Kadir Abdi, Waterbuck dung (2). (MRC) (NMK) (USNM).

Geographical distribution: Afrotropical region.

Dung preference: A dung generalist, specimens found in dung of cattle, impala, waterbuck, and zebra.

GENUS *Nobius* Mulsant and Rey
Aphodius (*Nobius*) Mulsant and Rey, 1870: 563.
Nobius: Paulian, 1942: 86; G. Dellacasa et al., 2001: 211.

Distribution: Palearctic and Afrotropical Regions.

***Nobius hepaticus* (Roth, 1851)**
Aphodius hepaticus Roth, 1851: 132
Nobius hepaticus: Paulian, 1942: 87
Aphodius (Artengruppe *Nobius*) *hepaticus* Endrödi, 1960: 207

Specimens examined (10): Laikipia, Impala Ranch, N00°30'-E36°51', 1-13.V.2002, #6, leg. R. Gordon, Impala dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Impala dung (2); *idem*, leg. R. Gordon, African Buffalo dung (1); *idem*, leg. R. Gordon, ultra violet light (3); *idem*, leg. R. Gordon, pitfall trap cow dung (1). (MRC) (NMK) (USNM).

Geographical distribution: Eastern and central Africa.

Dung preference: A generalist, taken from dung of buffalo, cattle, impala, and also at light.

GENUS *Pharaphodius* Reitter

Aphodius (*Pharaphodius*) Reitter, 1892: 172.
Pharaphodius: Paulian, 1942: 31; G. Dellacasa et al., 2001: 241.

Distribution: Afrotropical, Oriental, and Palearctic Regions, also the Mexican Transition Zone.

Key to Laikipia species of *Pharaphodius*

1. Length less than 5.0 mm ..... ***P. ignotus* (Schmidt)**
— Length more than 5.0 mm **2**

2(1). Elytral intervals flat, striae feebly impressed; dorsal surface pale yellowish brown ..... ***P. resplendens* (Balthasar)**
— Elytral intervals strongly convex, striae strongly impressed; dorsal surface brown, reddish brown, or piceous **3**

3(2). Clypeal apex abruptly angulate or slightly toothed on each side of median emargination; pronotal surface smooth, polished ..... ***P. fiechteri* (Balthasar)**
— Clypeal apex rounded or slightly angulate on each side of median emargination; pronotal surface at least slightly alutaceous, dull or feebly shiny **4**

4(3). Posterior pronotal angle slightly sinuate; elytral intervals moderately convex, wide, 3X or more width of striae; dorsal color reddish brown ..... ***P. infinitus* (Schmidt)**
— Posterior pronotal angle broadly rounded; elytral intervals strongly convex, narrow, 2X width of striae; dorsal color dark brown to blackish ..... ***P. impurus* Roth**

***Pharaphodius* (*s. l.*) *fiechteri* (Balthasar), n. comb.**

Aphodius (*Pharaphodius*) *fiechteri* Balthasar, 1941: 127.
Aphodius (Artengruppe *Pharaphodius*) *fiechteri*: Endrödi, 1960: 125.

Specimens examined (14): Kenya, Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (4); *idem*, leg. R. Gordon, Hippopotamus dung (1); *idem*, leg. R. Gordon, African Buffalo dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #3, leg. R. Gordon, Cattle dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.VIII.2001, leg. Kadir Abdi, Waterbuck dung (1) MRC, 1800 m, N.00°17', E36°53', 15-28.II.2001, #1, leg. R. Gordon, African buffalo dung (5). (MRC) (NMK) (USNM).

Geographical distribution: Eastern Africa.

Dung preference: A generalist, found in dung of buffalo, cattle, elephant, hippo, and waterbuck, also attracted to light.

***Pharaphodius* (*s. l.*) *ignotus* (Schmidt), n. comb.**

Aphodius ignotus Schmidt, 1916: 99.
Aphodius (Artengruppe *Pharaphodius*) *ignotus*: Endrödi, 1964: 124.

Specimens examined (9): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (9). (MRC) (NMK) (USNM).
Geographical distribution: Afrotropical region.

Dung preference: Unknown, all specimens were taken at light.

***Pharaphodius* (*s. l.*) *impurus* (Roth)**
Aphodius impurus Roth, 1851: 131.
Pharaphodius impurus: Paulian, 1942: 40.
Aphodius (*Pharaphodius*) *impurus:* Bordat, 1990a: 68.

Specimens examined (42): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-30.IV.2002, leg. Kadir Abdi, Hippopotamus dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, African Buffalo dung (3); *idem*, leg. R. Gordon, ultra violet light (3); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #3, leg. R. Gordon, Cattle dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (1); *idem*, 15-28.II.2001, #1, leg. R. Gordon, Waterbuck dung (12); *idem*, #1, leg. R. Gordon, Hippopotamus dung (7); *idem*, #1, leg. R. Gordon, African elephant dung (10); *idem*, #1, leg. R. Gordon, Giraffe dung (1); Laikipia Plateau, Mpala Research Centre, N00°17' N-E36°53', 1650 m, 17-20.IX.1999, leg. S.E. Miller, T.M. Kuklenski & R.R. Snelling (2). (MRC) (NMK) (USNM).

Geographical distribution: Afrotropical region.

Dung preference: This is a certain generalist species.

***Pharaphodius infinitus* (Schmidt)**
Aphodius (*Pharaphodius*) *infinitus* Schmidt, 1920: 139.
Pharaphodius infinitus: Paulian, 1942: 40.
Aphodius (Artengruppe *Pharaphodius*) *infinitus*: Endrödi, 1964: 113.

Specimens examined (17): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (10); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.XII.2001, leg. Kadir Abdi (6). (MRC) (NMK) (USNM).

Geographical distribution: Eastern Africa.

***Pharaphodius* (*s. l.*) *resplendens* (Balthasar), n. comb.**
Aphodius (*Pharaphodius*) *resplendens* Balthasar, 1941: 128.
Aphodius (Artengruppe *Pharaphodius*) *resplendens*: Endrödi, 1964: 119.

Specimen examined (1): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (1). NMK (specimen damaged in shipment).

Geographical distribution: Somalia. This is the first Kenya record.

Dung preference: Not known, the only specimen collected was take from elephant dung.

GENUS *Plagiogonus* Mulsant
Plagiogonus Mulsant, 1842: 306; G. Dellacasa et al., 2001: 243.

Distribution: Afrotropical, Oriental, and Palearctic Regions.

Key to Laikipia species of *Plagiogonus*

1. Clypeal apex deeply emarginate medially, lateral angles dentate or abruptly angulate .... ***P. clypeodentatus* (Bordat)**

— Clypeal apex feebly emarginate, nearly truncate, lateral angles rounded ... ***P. tertius* (Bordat)**

***Plagiogonus clypeodentatus* (Bordat), n. comb.**
Aphodius (*Plagiogonus*) *clypeodentatus* Bordat, 1990b: 141.
Plagiogonus clypeodentatus: Bordat, 2005: 55.

Specimens examined (5): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon (1); *idem*, leg. R. Gordon, Impala dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #8, leg. R. Gordon, Giraffe dung (3). (MRC) (NMK) (USNM).

Geographical distribution: Somalia. This may be the first Kenya record.

Dung preference: Probably a generalist, taken from dung of giraffe and impala.

***Plagiogonus tertius* (Bordat), n. comb.**
Aphodius (*Plagiogonus*) *tertius* Bordat, 1992a: 136.
Plagiogonus tertius: Bordat, 2005: 54.

Specimens examined (3): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, cattle dung (1); *idem*, leg. R. Gordon, Impala dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, cattle dung (1). (NMK) (USNM).

Geographical distribution: Kenya.

Dung preference: Almost certainly a generalist, found in dung of cattle and impala.

GENUS *Pleuraphodius* Schmidt
Aphodius (*Pleuraphodius*) Schmidt, 1913: 121.
Pleuraphodius: Paulian, 1942: 26; G. Dellacasa et al., 2001: 249.

Distribution: Afrotropical, Oriental, and Palearctic Regions.

Key to Laikipia species of *Pleuraphodius*

1. Length 3.0 mm or less ..... ***P.* sp. nr. *kavani* (Balthasar)**
— Length 4.0 mm or more ..... ***P. leo* Paulian**

***Pleuraphodius kavani* (Balthasar), n. comb.**
Aphodius (*Trichaphodius*) *kavani* Balthasar, 1935: 69.
Aphodius (Artengruppe *Pleuraphodius*) *kavani*: Endrödi, 1964: 89.

Specimens examined (4): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Impala dung (1); *idem*, leg. R. Gordon, pitfall trap cow dung (3). (MRC) (NMK) (USNM).

Geographical distribution: Eastern Africa.

Dung preference: Probably a generalist, taken from dung of cattle and impala.

***Pleuraphodius leo* Paulian**
Pleuraphodius leo Paulian, 1942: 30.
Aphodius (*Pleuraphodius*) *leo*: Bordat, 1990a: 75.

Specimens examined (5): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, Hippopotamus dung (1); *idem*, leg. R. Gordon, Impala dung (1); *idem*, leg. R. Gordon, African Buffalo dung, (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (2). (MRC) (NMK) (USNM).

Geographical distribution: Eastern Africa and Madagascar.

GENUS *Trichaphodioides* Paulian

Trichaphodioides Paulian, 1942: 52; G. Dellacasa et al., 2001: 289.

Distribution: Afrotropical Region

Key to Laikipia species of *Trichaphodioides*

1. Elytra completely pubescent, pubescence on disc distinctly visible ..... ***T. cinerascens* (Klug)**
— Elytra with apical and lateral pubescence, disc not pubescent, or if so pubescence not distinctly visible **2**

2(1). Ventral surface yellow, if dark then legs pale yellow; elytra pale brownish yellow, with contrasting transverse dark mark on apical declivity of each elytron ..... ***T. schaumi* (Harold)**
— Ventral surface brown or dark brown, legs brown or yellowish brown; elytra brown, with or without obscure transverse mark on apical declivity of each elytron **3**

3(2). Dorsal color predominantly reddish brown; elytral intervals alutaceous, shiny; body comparatively short, wide ..... ***T. calcaratus* (Boheman)**
— Dorsal color predominantly dark brown; elytral intervals alutaceous, dull; body comparatively elongate, narrow ..... ***T. pulchellus* (Müller)**

***Trichaphodioides calcaratus* (*s. l.*) (Boheman)**

Aphodius calcaratus Boheman, 1857: 353.
Trichaphodioides calcaratus: Paulian, 1942: 52.

Specimens examined (21): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #8, leg. R. Gordon, African Elephant dung (18); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon (1); *idem*, leg. R. Gordon, ultra violet light (2). (MRC) (NMK) (USNM).

Geographical distribution: This taxon, *sensu lato*, is known from eastern, central and southern Africa.

Dung preference Unknown, specimens were found in elephant dung and at light.

***Trichaphodioides cinerascens* (Klug)**

Aphodius cinerascens Klug, 1855: 656.
Trichaphodioides cinerascens: Paulian, 1942: 53.

Specimens examined (3): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.III.2001, leg. Kadir Abdi, Burchell's Zebra dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (2). (NMK, two specimen lost in shipment).

Geographical distribution: Eastern, Western, central and southern Africa.

Dung preference: Probably a dung generalist, found in elephant and zebra dung.

***Trichaphodioides pulchellus* (Müller) n. comb.**
Aphodius (*Trichaphodius*) *pulchellus* Müller, 1941: 344.

Specimens examined (72): Laikipia, Impala Ranch, N00°30'-E36°51', 1-13.V.2002, #6, leg. R. Gordon, Impala dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.III.2001, leg. Kadir Abdi, Burchell's Zebra dung (3); Kenya, Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon (1); *idem*, leg. R. Gordon, ultra violet light (25); *idem*, leg. R. Gordon, cattle dung (9); *idem*, leg. R. Gordon, Hippopotamus dung (3); *idem*, leg. R. Gordon, Impala dung (10); *idem*, leg. R. Gordon, African Buffalo dung (1); *idem*, leg. R. Gordon, Zebra dung (1); *idem*, leg. R. Gordon, pitfall trap cow dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #7, leg. R. Gordon, African Elephant dung (17); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2002, #8, leg. R. Gordon, African Elephant dung (2); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.VIII.2001, leg. Kadir Abdi, Zebra dung (1). (MRC) (NMK (USNM).

Geographical distribution: Eastern Africa.

Dung preference: A generalist, found in almost all mammal dung examined, and also attracted to light.

***Trichaphodioides schaumi* (Harold), n. comb.**
Aphodius schaumi Harold, 1859: 205.
Aphodius (*Trichaphodioides*) *schaumi*: Bordat, 1994: 18.

Specimens examined (2): Laikipia, MRC, 1800m, N 00°17' E 36°53', 15-28.II.2001, #1, R. Gordon, Hippopotamus dung (1); *idem*, R. Gordon, Waterbuck dung (1). (NMK) (USNM).

Geographical distribution: Nigeria, Ethiopia and Kenya.

Dung preference: Unknown, only two specimens found.

GENUS *Trichaphodius* Schmidt
Aphodius (*Trichaphodius*) Schmidt, 1913: 136.
Trichaphodius: Paulian, 1942: 53; G. Dellacasa et al., 2001: 291.

Distribution: Afrotropical, Oriental and Palearctic Regions

***Trichaphodius humilis* (*s. l.*) (Roth)**
Aphodius humilis Roth, 1851: 132.
Trichaphodius humilis: Paulian, 1942: 57.
Aphodius (*Trichaphodius*) *humilis*: Bordat, 1989: 305.

Specimens examined (6): Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-31.III.2001, leg. Kadir Abdi, Burchell's Zebra dung (1); Laikipia, MRC, 1800 m, N00°17'-E36°53', 1-13.V.2003, #1, leg. R. Gordon, ultra violet light (5). (MRC) (NMK) (USNM).

Geographical distribution: Eastern, central and southern Africa. The true *T. humilis* should be distributed in southern Africa only.

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