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A new and unusually ornate southern African dung beetle species in d'Orbigny's *Onthophagus* Group 18 (Coleoptera: Scarabaeidae: Onthophagini)

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Abstract

Onthophagus pragtig Deschodt, new species is described and illustrated from South Africa. Its known collection localities are shown. We also briefly describe and illustrate three distinct subgroups in the18th *Onthophagus* group of d'Orbigny (1913) and further provide a checklist of the known species in this group while dividing them into these subgroups where known.

Key words: Food specialists, millipede carcass, sandy habitat, new subgroup association

Introduction

The extensive works published by Henri d'Orbigny in 1913–1914 examined the taxonomy and classification of the entire known generic and species membership of the dung beetle tribe Onthophagini present in Africa. In these publications, d'Orbigny (1913, 1914) divided the genus *Onthophagus* Latreille, 1802 into clear species groups based on shared morphological characters. Subsequently, several of those groupings have been elevated to generic level, recent examples being the works by Roggero *et al*. (2016, 2019) and Dierkens *et al*. (2017). Further investigation might also warrant group 18 being raised to generic level, based on group characters that were well defined by d'Orbigny (1913). Pending such a study, we confine ourselves to describing a new species of the genus *Onthophagus*, which we place in d'Orbigny's group 18.

The species of group 18 are known to be strongly millipede associated (Moretto 2010a, 2010b) in central Africa, with recent observations in southern Africa confirming at least five species (marked with * in list below) that have been observed to feed on the viscera of dead millipedes (CMD and Hennie de Klerk, field observations). However, some species have also been collected from carrion and seen feeding on dead frogs or chicken livers (Davis *et al*. 2020; CMD and Hennie de Klerk, field observations). The beetles enter the millipede carcass via any breach in the integument of the millipede. As freshly killed and unutilised millipede carcasses are naturally somewhat uncommon and ephemeral, sympatric species (CMD, field observations) and conspecific individuals often enter the tubular carcasses together and feed in a tightly packed aggregation, each beetle behind the next (CMD, field observations). The species newly described herein is such a millipede feeder.

All of the known species in the group are characterised by a glabrous habitus; an epistome that is rounded, truncate or slightly sinuate; and a pronotum with simple punctation and a clear depression on both anterolateral sides. Most species range in colour from black, brown, and orange to shiny cupreous, but some are metallic blue, green and red, and very few species having coloured spots or other markings (d'Orbigny 1913). The anterior sculpture of the pronotum varies greatly and is, here, putatively divided into three subgroups only on the grounds of the shape of the pronotum. The pronotum of subgroup 1 shows a wide angular protuberance with two tiny, lateral mini-horns (sometimes absent) between the two depressions, as in *Onthophagus bicavifrons* d'Orbigny, 1902 (Fig. 1A). The pronotum of subgroup 2 shows a somewhat sharp, anteriorly-pointed, triangular protuberance between the two depressions, as in *Onthophagus cupricollis* Péringuey, 1888 (Fig. 1B). The pronotum of subgroup 3 has elaborate,

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triangular, hornlike structures laterally, with up to four deep depressions, as in *Onthophagus splendidus* Boucomont, 1932 (see Josso 2013: 20 for a picture). There is little variation within each subgroup, with species mostly separated by differences in the size and arrangement of pronotal punctures and armament on the head. We speculate that the morphology represented by the limited protuberances or elaborate extensions in *O. bicavifrons* is more basal while the more elaborate morphology of *O. cupricollis* and *O. splendidus* is more derived.

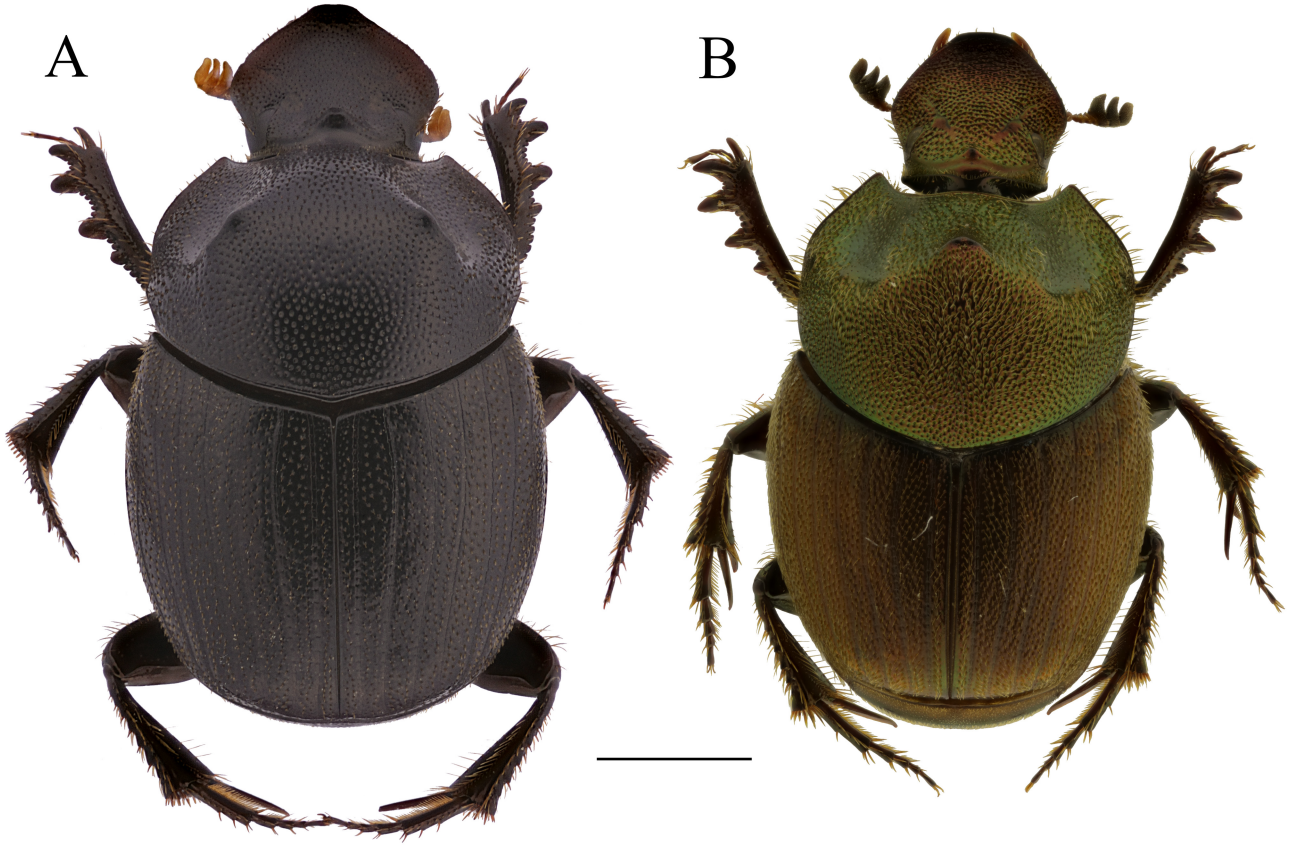

FIGURE 1. Subgroups 1 and 2 of *Onthophagus* group 18 of d'Orbigny (1913). (A) subgroup 1: *Onthophagus bicavifrons* d'Orbigny, 1902, male. (B) subgroup 2: *Onthophagus cupricollis* Péringuey, 1888. Scale bar is 2 mm.

We believe that the combination of the concavities, protuberances and/or extensions enable the beetles to move more easily within the close confines of the soft and semi-liquid environment inside the millipede carcasses on which they mainly feed, by breaking the impeding action of suction. Other speculation is that the blade- and scoop-like morphology of the anterior of the pronotum may be used to scrape edible tissue together and push it forward within the millipede body (Riaan Stals, personal communication).

The current paper examines the taxonomy of Group 18, subgroup 3, now comprising three elaborate and peculiar *Onthophagus* species. After the description of *Onthophagus splendidus*, 81 years elapsed before the description of a second species, *Onthophagus splendidoides* Josso, 2013. In the following pages we describe and provide pictures of a third, distinct species within this subgroup, *Onthophagus pragtig* Deschodt, new species (Figs 2 and 3). We also present a distribution map (Fig. 4) showing the known collection localities of the three recognised African species in subgroup 3 of *Onthophagus* Group 18 and we present a list of known species belonging to group 18 including subgroup associations.

Material and methods

Type specimens are deposited in the following specimen collections: Ditsong National Museum of Natural History, Pretoria, South Africa (TMSA); National Museum, Bloemfontein, South Africa (BMSA); South African National Collection of Insects, Roodeplaat, South Africa (SANC); and the Christian Deschodt Private Collection, Tshwane, South Africa (CDPC). The colour images in Figs 1 and 3 were made using a Canon 760D camera body mounted

with a Canon MPE 65 mm macro lens and a Canon 1.4 x extender. Consecutive in-focus pictures were made using Helicon Remote. Image stacking for these multiple pictures were done with Helicon Focus to generate a single in-focus picture. Label data are conveyed verbatim and enclosed in double parentheses, with separate lines on any label indicated by a single vertical bar "|" and separated from a subsequent label by a double vertical bar "||" and square brackets indicate authors personal comments. Distribution data were compiled using the coordinate data for all known specimens in various institutions and the relevant literature and the soil type data is from ISRIC 2018. The map was generated using QGIS version 3.36.0-Maidenhead.

Taxonomy

Genus *Onthophagus* Latreille, 1802

Onthophagus **Latreille, 1802: 141. Type species:** ***Scarabaeus taurus*** **Schreber, 1759, by monotypy**

Onthophagus **(*sensu lato*)** ***pragtig*** **Deschodt, new species**
Figs 2, 3A–E, 4

Type locality: Cinergy Game Farm, Limpopo Province, South Africa.

Type material. Holotype, male, **South Africa: Limpopo Province:** "South Africa | Northern Province | Cinergy Game Farm | 24°38'S 28°45'E | 28.i.2001 | C. H. Scholtz" (TMSA). Paratypes, same data as holotype, 2 males (BMSA); **South Africa: Limpopo Province:** "Steenbokpan | -23.677°S 27.307°E | 2024.i.18-21 | H. de Klerk", 1 male and 1 female (TMSA), 1 male (CDPC), 1 male (SANC); **South Africa: Northern Cape Province:** "S.Af.;Northern Cape | SoetvlakteFarm; 1027m | 26[°].45['] S – 22[°].50['] E || 17-19.2.2010;E-Y:3873 | pitfall; Vaalbos in grassl | leg.Robin Lyle" 1 male and 1 unsexed specimen (TMSA).

FIGURE 2. Subgroup 3 of *Onthophagus* group 18 of d'Orbigny (1913): *Onthophagus pragtig* Deschodt, new species. Paratype male in life, Steenbokpan. Photo by Hennie de Klerk, used with permission.

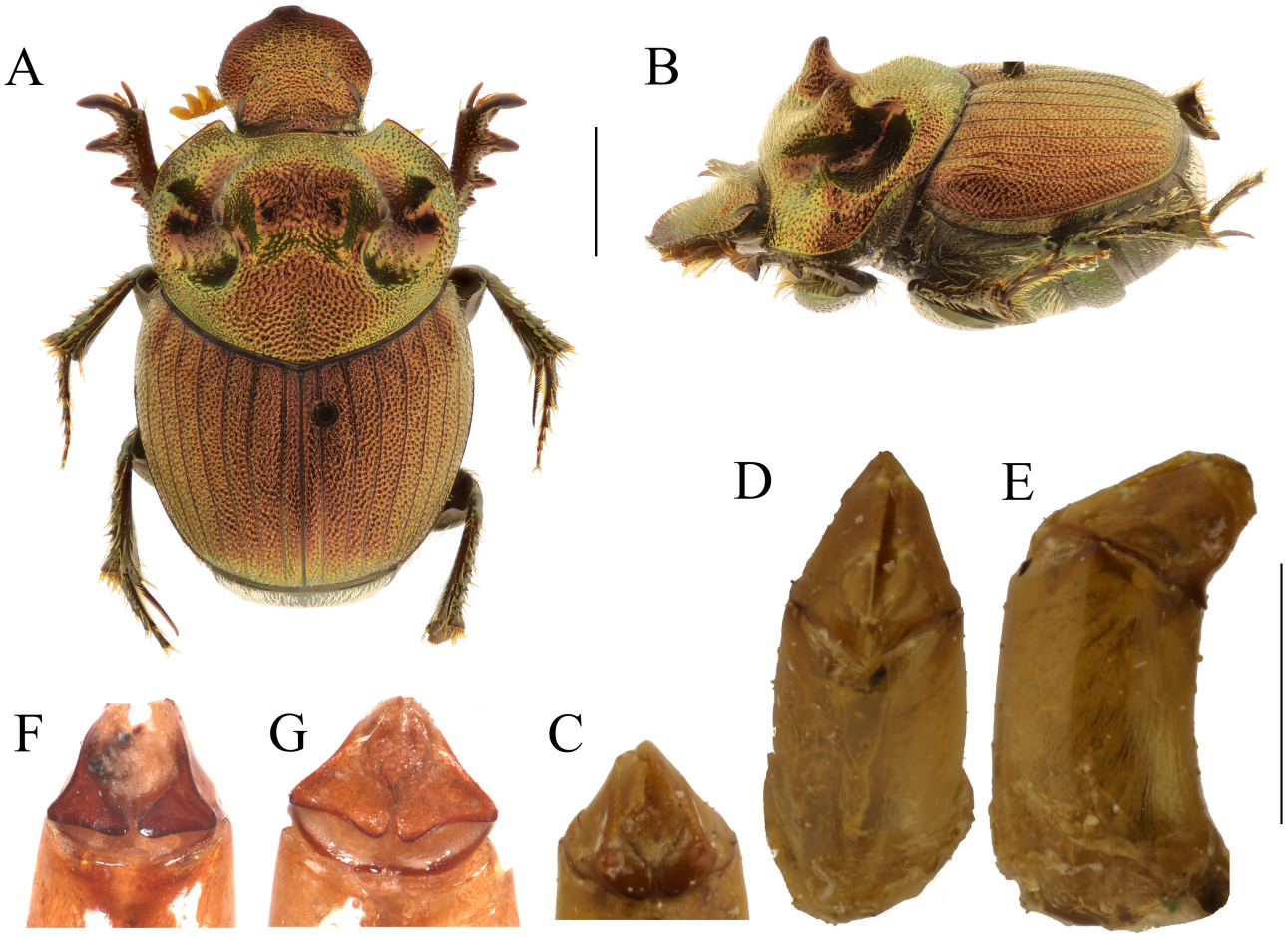

FIGURE 3. Habitus of the holotype of *Onthophagus pragtig* Deschodt, new species in dorsal (A) and lateral (B) view, with its aedeagus in ventral (C), dorsal (D) and lateral (E) view. The ventral views of *Onthophagus splendidoides* Josso, 2013, holotype specimen (F) and *Onthophagus splendidus* Boucomont, 1932 (G) are shown for comparison. Scale bar for habitus is 2 mm and for the aedeagus 1 mm. F and G by Jean-François Josso, used with permission.

Description of the holotype.

Head: Red, bordered anteriorly and laterally; slightly elongate anteriorly with epistome upturned; slightly concave depressions anterior to the eyes; surface without horns or carinae, rugosely punctate and covered with longish erect yellow setae; frontogenal suture visible; antennae orange distally, becoming brown proximally.

Prothorax: Red, border rimmed, surface punctate with short to longish yellow associated setae, setae shorter posteriorly and longer anteriorly; four clear and deep depressions positioned laterally, each with an associated horn; median depressions almost smooth inside, otherwise with shallow punctures, and separated by a low elevated area, surface with longish yellow setae, lateral horns pointing straight upwards and covered with setae; surfaces of lateral depressions smooth with oval punctures and without setae, lateral horns smaller than median horns and without any setae.

Elytra: Surface red, covered with rugose punctures with short posteromedially pointing associated yellow setae; striae narrow but well defined, seventh stria arcuate and incomplete anteriorly.

Legs: Punctate with longish associated yellow setae.

Ventrites: Mesoventrite dark red, punctate, very narrow; metaventrite with surface green-red, covered with punctures, except median area without punctures, clear area narrowing anteriorly and widening posteriad, anteriorly flat and on the same level as mesoventrite, but strongly bulging one-tenth behind anterior margin, anteriorly flat with short setae, elsewhere with long yellow setae.

Abdomen: Surface of abdominal ventrites dark red, with single rows of small punctures.

Pygidium: Punctate with small punctures very closely arranged dorsally, becoming well separated ventrally, with light-coloured setae densely packed and short dorsally, becoming longer medially, absent ventrad.

Aedeagus: Minute spine ventrally on the parameres (Figs 3C–E).

Variation: Females have the pronotal horns smaller and rounder than in major males; minor males are smaller and have the horns almost disappearing; specimens from the western locality with horns pointing more sideways. The colour of the type series ranges from red to green, some specimens with a green prothorax and red elytra. Otherwise very little variation.

Etymology. The specific epithet is the Afrikaans word for "beautiful" or "splendid," therefore nicely linking this species with *Onthophagus splendidus* and *Onthophagus splendidoides*, the other two known species of subgroup 3. Using the International Phonetic Alphabet, it should be pronounced /prɑxtəx/.

Differential diagnosis. *Onthophagus pragtig* Deschodt, new species can easily be distinguished from and *Onthophagus splendidoides* by having two clear pronotal depressions separated by an elevated area while the median depressions of *O. splendidoides* are more or less connected with a slight bulge medially. There is a minute spine present on the aedeagus of *Onthophagus pragtig* Deschodt, new species that is absent from that of *O. splendidoides*. See Fig. 3 F and G for a comparison of the ventral view of the other two closely related species. The lateral horns of the median depressions of *Onthophagus pragtig* Deschodt, new species are pointing straight upwards while those of *Onthophagus splendidus* are pointing horizontally to the sides. The spine that is present on the aedeagus of *O. splendidus* is much longer than that of *Onthophagus pragtig* Deschodt, new species.

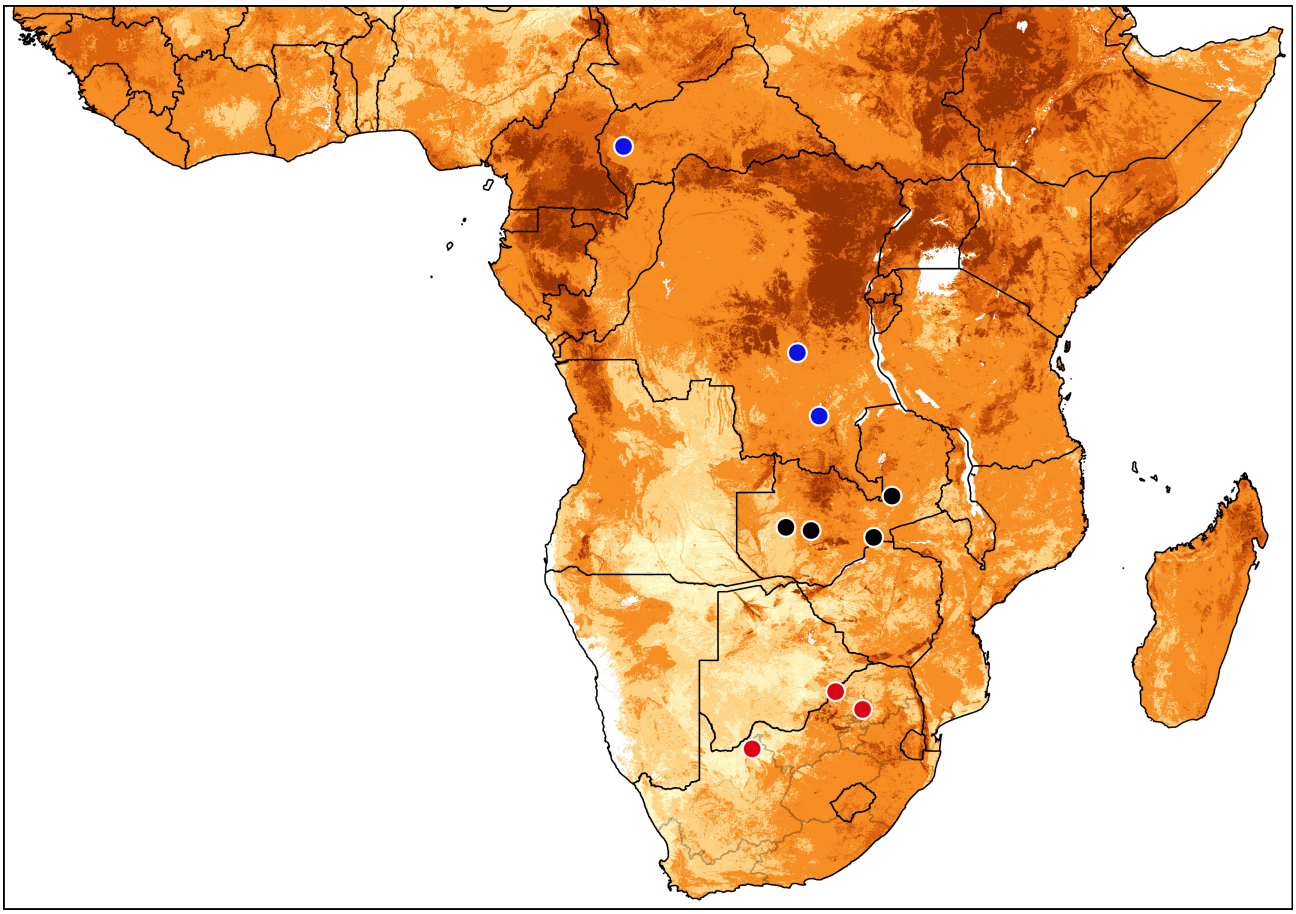

FIGURE 4. Map of Africa south of the Sahara showing the known collection localities of the three subgroup 3 species of *Onthophagus* group 18 (d'Orbigny 1913). *Onthophagus pragtig* Deschodt, new species (●), *Onthophagus splendidus* Boucomont, 1932 (●) and *Onthophagus splendidoides* Josso, 2013 (●). On this map lighter colouring represents sandy soils with gradually darker colouring representing loamier soils ending in clay soils with the darkest colouring.

Additional material examined for comparison:

Onthophagus (*sensu lato*) *bicavifrons* d'Orbigny, 1902

Botswana: "Chobe | -17.863° 25.082° | 15.i.2005 | C. Deschodt" 3 specimens (CDPC); **South Africa: Mpumalanga Province:** "Jakkalsdraai, 1214m | 25.0092°S 30.2965°E | 12.vi.2023 H. de Klerk" 2 specimens (CDPC); **South Africa: Limpopo Province:** Shangai | S22.461° E28.925° | 18-22.i.2023 | C. Deschodt" 1 specimen (CDPC).

Onthophagus (*sensu lato*) *croesulus* Bates, 1888

South Africa: Gauteng Province: "Irene Veld 1471m | S25.89135°E28.23446° | 13.xi.2019 P. Web | Feeding on dead millipede" 7 specimens (CDPC); **South Africa: Gauteng Province:** "Schurveberg 113 | 25.768°S 27.975°E | 2023.xi.23 Dead || millipede carcass | after good rains, cool | morning. C. Deschodt" 3 specimens (CDPC); **South Africa: Mpumalanga Province:** "Jakkalsdraai, 1214m | 25.0092°S 30.2965°E | 12.vi.2023 H. de Klerk" 2 specimens (CDPC).

Onthophagus (*sensu lato*) *cupricollis* Péringuey, 1888

South Africa: Limpopo Province: "Suiferkuil | -23.03° 29.47° | 15.ix.2019 | C. Schoeman" 1 specimen (CDPC); **South Africa: Limpopo Province:** "Tate Vondo | -22.920° 30.334° | 15.iii.2012 | C. Schoeman" 1 specimen (CDPC).

Onthophagus (*sensu lato*) *scapularis* d'Orbigny, 1902

South Africa: Mpumalanga Province: "Jakkalsdraai, 1214m | 25.0092°S 30.2965°E |12.vi.2023 H. de Klerk" 1 specimen (CDPC).

Remarks. As can be noted from the collection localities shown in Fig. 4, the three related species seem to have a preference for sandy to loamy sandy substrates. The species of group 18 have long been neglected with very few new species being described recently. That is probably because they are not readily attracted to the faeces bait that has most often been used in recent dung beetle studies. Hopefully the description of this beautiful new species will encourage other scarab workers in Africa to explore the opportunity to further investigate carrion and millipede carcasses; millipedes are inadvertently killed by vehicles and are also fairly easily found, after rain, especially on gravel roads.

List of the known and valid species of *Onthophagus* group 18 (d'Orbigny 1913) with subgroup association where known

Distribution data were gleaned from d'Orbigny (1913), Josso & Prévost (2006), Josso & Génier (2019) and Schoolmeesters (2023).

***Onthophagus* (*sensu lato*) *bayeri* Balthasar, 1942: 201** (subgroup 1)
Type locality: "Okahandja, Namibia".
Distribution: Namibia.

****Onthophagus* (*sensu lato*) *bicavifrons* d'Orbigny, 1902: 192** (subgroup 1)
Type locality: "Afrique orientale allemande: Ouzambara" [Tanzania: Usambara Mountains].
Distribution: Angola, Botswana, Democratic Republic of the Congo, Kenya, Malawi, Mozambique, Namibia, Somalia, South Africa, Tanzania, Zimbabwe.

***Onthophagus* (*sensu lato*) *chitipaensis* Josso in Josso & Génier, 2019: 12** (subgroup 2)
Type locality: "Malawi, Chitipa".
Distribution: Malawi.

****Onthophagus* (*sensu lato*) *croesulus* Bates, 1888: 238** (subgroup 1)
= *Onthophagus obtusicollis* Péringuey, 1888: 98
Type locality: "Natal".
Distribution: South Africa.

***Onthophagus* (*sensu lato*) *cupricollis* Péringuey, 1888: 98** (subgroup 2)
Type locality: “Lydenburg, Transvaal” [Mashishing, Mpumalanga Province].
Distribution: South Africa.

***Onthophagus* (*sensu lato*) *dorsuosus* d’Orbigny, 1902: 200** (subgroup 1)
Type locality: “Congo français” [Republic of the Congo].
Distribution: Central African Republic, Gabon, Republic of the Congo.

***Onthophagus* (*sensu lato*) *ecopas* Josso & Prévost, 2006: 5** (subgroup 2)
Type locality: “Burkina faso, Diapaga”.
Distribution: Burkina Faso, Benin.

***Onthophagus* (*sensu lato*) *epilamprus* Bates, 1888: 239** (subgroup unknown, probably not group 18 (Philippe Moretto, personal communication))
Type locality: “Cameroons” [Cameroon].
Distribution: Cameroon, Democratic Republic of the Congo, Equatorial Guinea: Bioko, Ghana.

***Onthophagus* (*sensu lato*) *gibbidorsis* d’Orbigny, 1902: 198** (subgroup 1)
Type locality: “Gabon”.
Distribution: Cameroon, Central African Republic, Gabon.

***Onthophagus* (*sensu lato*) *gibbus* d’Orbigny, 1913: 321** (subgroup 1)
Type locality: “Abyssinie: Antotto” [Ethiopia, Intoto mountain].
Distribution: Ethiopia.

***Onthophagus* (*sensu lato*) *helciatus* Harold, 1871: 14** (subgroup 1)
= *Onthophagus informis* d’Orbigny, 1905: 470
= *Onthophagus schimperi* d’Orbigny, 1902: 195
Type locality: “Keren” [Eritrea].
Distribution: Central African Republic, Democratic Republic of the Congo, Eritrea, Ethiopia, Gabon, Malawi, Republic of the Congo, Uganda.

***Onthophagus* (*sensu lato*) *impurus* Harold, 1868: 104** (possibly subgroup 1)
= *Onthophagus discolor* Klug, 1855: 653
Type locality: “Tette” [Tete, Mozambique].
Distribution: Kenya, Malawi, Mozambique, Tanzania, Zimbabwe.

***Onthophagus* (*sensu lato*) *latigibber* d’Orbigny, 1902: 201** (subgroup 1)
Type locality: “Sierra Leone : Rhobomp”.
Distribution: Chad, Burkina Faso, Ghana, Ivory Coast, Niger, Senegal, Sierra Leone.

***Onthophagus* (*sensu lato*) *polyedrus* d’Orbigny, 1905: 469** (subgroup 2)
Type locality: “Afrique orientale anglaise : Sambourou” [Kenya, Samburu].
Distribution: Kenya, Tanzania.

***Onthophagus* (*sensu lato*) *pragtig* Deschodt, new species** (subgroup 3)
Type locality: “Cinergy Game Farm, Limpopo Province, South Africa”.
Distribution: South Africa.

***Onthophagus* (*sensu lato*) *scapularis* d’Orbigny, 1902: 197** (subgroup 1)
Type locality: “Colonie du Cap : Port-Elizabeth” [Gqeberha, Eastern Cape Province, South Africa].
Distribution: South Africa.

***Onthophagus* (*sensu lato*) *splendidoides* Josso, 2013: 23** (subgroup 3)
Type locality: "Zambie, Kasanka Nat. Park" [Zambia, Kasanka Nat. Park].
Distribution: Zambia.

***Onthophagus* (*sensu lato*) *splendidus* Boucomont, 1932: 48** (subgroup 3)
Type locality: "Congo Belge méridional, Katanga" [Democratic Republic of the Congo, Katanga Province].
Distribution: Central African Republic, Democratic Republic of the Congo.

***Onthophagus* (*sensu lato*) *trinominatus* Goidanich, 1926: 40** (subgroup 1)
= *Onthophagus rostratus* d'Orbigny, 1902: 194
= *Onthophagus rostrifer* d'Orbigny, 1904: 327
Type locality: "Soudan français : région de Kourousssa" [Guinée, Kouroussa].
Distribution: Chad, Democratic Republic of the Congo, Ghana, Kenya, Mali, Niger, Nigeria, Senegal, Sudan.

***Onthophagus* (*sensu lato*) *ventrosus* d'Orbigny, 1905: 530** (subgroup 1)
Type locality: "Transvaal" [Gauteng, Limpopo, Mpumalanga, and eastern part of North West Provinces, South Africa].
Distribution: South Africa.

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