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Review of the Genus *Orphnus* Macleay, 1819 (Coleoptera: Scarabaeidae: Orphninae) from Kenya, with Description of New Species †

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Abstract: The Kenyan fauna of the scarab beetle subfamily Orphninae is reviewed for the first time based on representative material. Twelve species of the genus *Orphnus* MacLeay are recorded from the country, including two that are new to science: *O. kenyensis* Akhmetova et Frolov, sp. nov. and *O. tanaensis* Akhmetova et Frolov, sp. nov. Lectotypes are designated for *O. rufithorax* Benderitter, *O. mombasaensis* Benderitter, and *O. jeanneli* Benderitter. Keys, diagnoses, illustrations of habitus and male genitalia, and distributional record maps are given.

Keywords: scarab beetles; scarabs; orphnines; Kenya; East Africa; new species

Citation: Akhmetova, L.A.; Frolov, A.V. Review of the Genus *Orphnus* Macleay, 1819 (Coleoptera: Scarabaeidae: Orphninae) from Kenya, with Description of New Species. *Diversity* **2022**, *14*, 373. https://doi.org/10.3390/d14050373

Academic Editor: Peter Michalik

Received: 24 April 2022
Accepted: 5 May 2022
Published: 7 May 2022

1. Introduction

Orphnine scarab beetles (subfamily Orphninae) are a group comprising over 200 species distributed mostly in the southern continents except for Australia. About half of the known orphnine species inhabit the Afrotropical region, specifically continental Africa south of the Sahara. Afrotropical Orphninae belong mostly to the genus *Orphnus* MacLeay, the most speciose genus of the subfamily, with more than a hundred described species in the Afrotropics [1–3]. However, the orphnine fauna of East Africa is still insufficiently studied. Specifically, publications dealing with the orphnines occurring in Kenya are limited to only two sources. Benderitter [4] recorded four species from the country, three of which he described as new. Paulian, in his revision of African *Orphnus* [3], described *O. chappuisi* on the basis of a single female specimen, but did not provide additional data about Kenyan orphnines.

Consequently, Kenyan orphnines are known from only a few faunistic records and original descriptions of five species. However, in natural history museums and private collections, a reasonable number of the members of this group from Kenya have been accumulated but have not been studied and documented. We revised all these specimens as well as those we collected ourselves. In this material, accounting to 532 specimens, we identified 12 species, two of which proved yet undescribed, as well as many new locality and country records. The goal of this study was to summarize the available data on the orphnines from Kenya, describe new species, and provide diagnostic keys, illustrations, and locality records for all species.

2. Materials and Methods

2.1. Collections

The material used in this work is housed in the collections of the following organizations (curators in brackets):

ARCL—Andreas Reichenbach collection, Leipzig, Germany (Andreas Reichenbach);
BMNH—The Natural History Museum, London, United Kingdom (Maxwell Barclay);

EBCT—Enrico Barbero collection, Torino, Italy (Enrico Barbero);
GDOR—Museo Civico di Storia Naturale Giacomo Doria, Genova, Italy (Roberto Poggi);
HNHM—Hungarian Natural History Museum (Termeszettudomanyi Muzeum), Budapest, Hungary (†Otto Merkl);
MCSNC—Museo Civico di Storia Naturale di Carmagnola, Carmagnola, Italy (Enrico Barbero);
MHNG—Muséum d'histoire naturelle de la Ville de Genève, Geneva, Switzerland (Giulio Cuccodoro);
MNHB—Museum of Natural History, Leibniz Institute for Evolution and Biodiversity Science, Berlin, Germany (Bernd Jaeger);
MNHN—Museum national d'histoire naturelle, Paris, France (Olivier Montreuil);
NHMB—Naturhistorisches Museum, Basel, Switzerland (Eva Sprecher-Uebersax);
NMNHW—National Museum of Natural History, Smithsonian Institution, Washington, U.S.A. (David Furth);
NMPC—National Museum, Prague, Czech Republic (Jiří Hájek);
RMCA—Musee royal de l'Afrique Centrale, Tervuren, Belgium (Marc De Meyer);
SMTFD—Staatliches Museum für Tierkunde, Dresden, Germany (Olaf Jaeger);
TMSA—Ditsong National Museum of Natural History, Pretoria, South Africa (Ruth Müller);
ZFMAKB—Zoologisches Forschungsinstitut und Museum A. Konig, Bonn, Germany (Dirk Ahrens);
ZIN—Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (Andrey Frolov);
ZMUKK—Zoologisk Museum, Universitet Københavns, Copenhagen, Denmark (Alexey Solodovnikov).

2.2. Terminology and Format

Morphological terminology follows Frolov et al. [5]. Lateral pronotal ridges are referred to as bimodal if, in lateral view, they show two peaks, and unimnodal if they show one peak; these terms apply to males with well-developed pronotal armature. Labels of the type specimens are cited verbatim and separated by slashes; authors' comments are in square brackets. The holotypes of the new species are supplied with red labels 'HOLOTYPUS *Orphnus* [species name] Akhmetova & Frolov 2022'; the paratypes are supplied with yellow labels '*Orphnus* [species name] Akhmetova & Frolov 2022'. Non-type material is listed only from Kenya and cited in a standardized way: occurrences are grouped by second-order administrative divisions (provinces) and collection localities.

2.3. Preparation of Specimens

Dry beetles were soaked in water with commercial detergent. Time of soaking varied from a few hours to a day depending on the hardness of a specimen. Soiled beetles were then cleaned in an ultrasonic bath in the same solution, rinsed in distilled water, and air dried. In cases of extensive and hardened soiling, the beetles were soaked in 10% KOH for 5–10 min prior to soaking in water. Genitalia of both sexes were prepared by detaching the abdomen. The membrane connecting the metacoxae and abdominal sternites 1–2 was cut with a micro-knife, and the abdomen was gently torn off with forceps. Normally the abdomen was torn off by the membrane connecting abdominal tergite 1 and the metasternum. The abdomen was then cleaned in either KOH (10% solution, 2–4 h). After cleaning, the abdomen was thoroughly rinsed in water. Membranes connecting the pygidium and abdominal sternite 8 with the genital sclerites were cut with micro-scissors, and genital structures were removed along with the hind gut. The aedeagus was dissected by the membrane connecting the phallobase and spiculum gastrale, and the endophallus was extracted via the apical opening of the parameres. The aedeagus, without endophallus, was air-dried after rinsing in distilled water or hexamethyldisilazane (in the latter case, first dehydrated in ethanol and acetone), glued on a paper card and pinned under the specimen.

The endophallus and spiculum gastrale were either dehydrated in ethanol and embedded in Euparal medium on a transparent PETF card or put in a plastic micro-vial with glycerol.

2.4. Digital Images

Habitus photographs were taken with a Canon D100 camera equipped with a Canon EF-S 60 and MP-E macro lens. The photographs of the aedeagi and endophalli were taken with a Plan 4×/0.10 microscope objective attached to a Canon D100 camera via extension rings. Partially focused serial images were combined in Helicon Focus 7.0 software (Helicon Soft Ltd., Kharkiv, Ukraine) to produce completely focused images. Helicon Focus was used with default settings (method B 'depth map', radius 8, smoothing 4), and the number of stack images varied from 20 to 40. Stacking artefacts were not retouched, and only general image enhancing (levels, background elimination, and slight sharpening) was applied with Adobe Photoshop.

2.5. Locality Maps

Locality maps were generated with ArcGIS 10.6 software (ESRI Ltd., Redlands, CA, USA). Coordinates of the localities were taken from the specimen labels, if available, or from the NGA GEOnet Names Server (GNS).

3. Results/Taxonomy

3.1. Orphnus (Orphnus) rufithorax Benderitter (Figure 1A–G)

Orphnus rufithorax Benderitter, 1914 [3,4].

3.1.1. Differential Diagnosis

Orphnus rufithorax is one of the few *Orphnus* species in which both sexes can be easily separated from other congeners by having the sides (or at least anteriolateral parts) of the pronotum bearing long setae similar to those on the lateral margins (Figure 1A,B).

3.1.2. Type Material Examined

Lectotype, here designated. One female (Figure 1B,C) labeled "Museum Paris Afrique Orient. Angl. Bassin de l'Athi Reg. Kikouyou Tshania-Kamiti Ch. Allaud 1909".

Paralectotypes. One female at MNHN with the same data as the lectotype. One female at MNHN labeled "Museum Paris Afrique Orient. Angl. Kenia (S.-O.) District de Maranga Fort-Hall Ch. Alluaud 1909".

3.1.3. Additional Material Examined

Embu: Seven Forks, 27.XI.1964, J. Clitton leg., five males and eight females, BMNH. **Kiambu**: Thika River, three males, one female, BMNH; Kitui, I.1901, S.L. & H.

Hinde leg., one male, BMNH. **Machakos**: Machakos, XI.1923, van Someren leg., one male, BMNH. **Makueni**: Makueni, IX.1947, van Someren leg., three males and four females, BMNH. **Mombasa**: Mombasa, Topay leg., one male and one female, MHNG, one female, HNHM.

3.1.4. Distribution

This species is endemic to Kenya and is known from a few localities in central and southern parts of the country (Figure 1G).

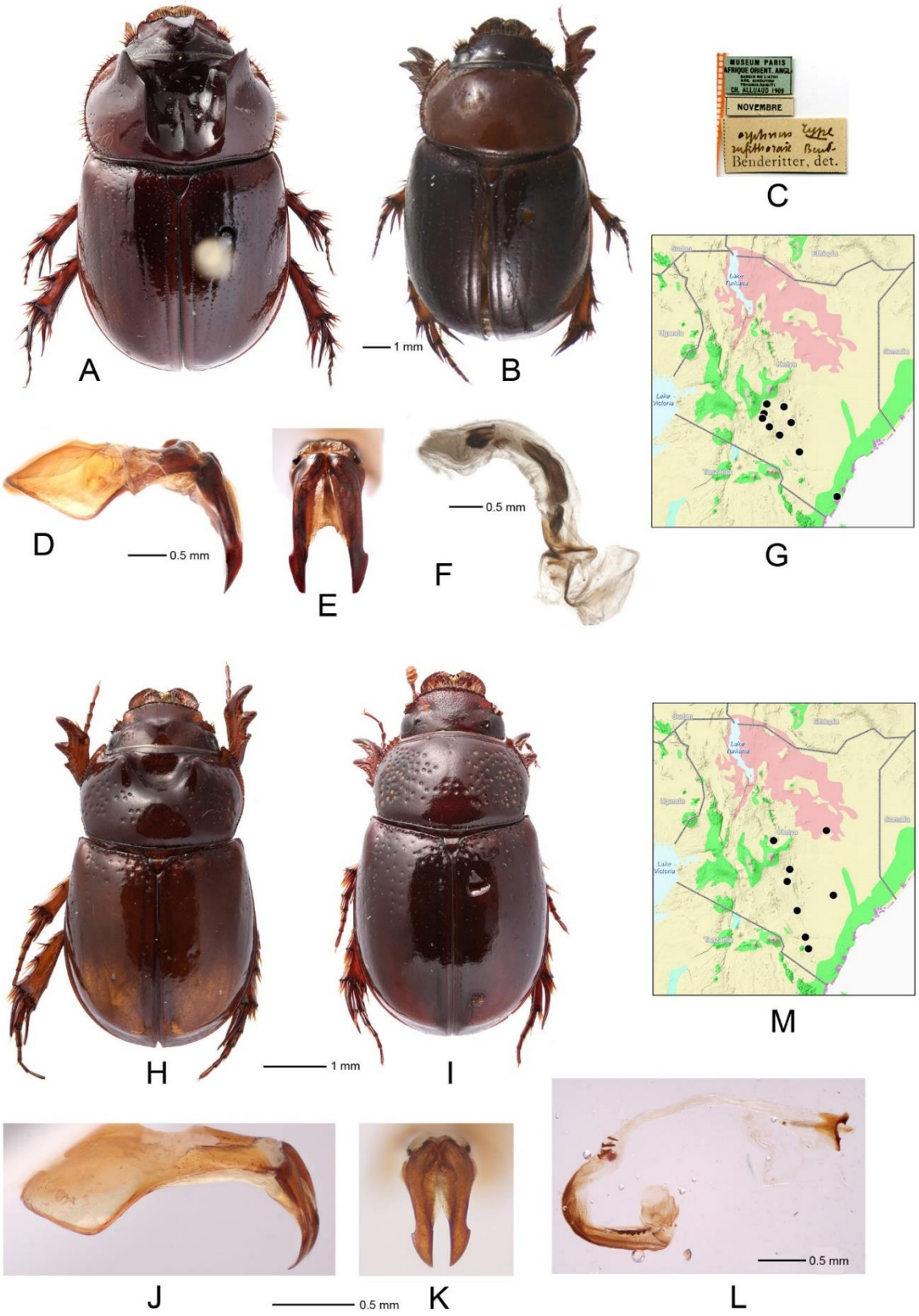

Figure 1. *Orphnus rufithorax* Benderitter, 1914 (**A**–**G**, (**B**,**C**, lectotype)) and *O. thoracicus* Linell, 1896 (**H**–**L**). (**A**,**H**) male, habitus; (**B**,**I**) female, habitus; (**C**) labels; (**D**,**J**) aedeagus in lateral view; (**E**,**K**) parameres in dorsal view; (**F**,**L**) endophallus; (**G**,**M**) distributional record map.

3.1.5. Remarks

Paulian [3] listed the type material of this species as "Type ♂: Bura, pays Taïka; allotype ♀: Afrique orientale, Môмbasa". However, in the original description Benderitter [4] wrote that he had studied three females from "Afrique orientale anglaise: région du Kenya, Fort-Hall (Alluaud, nov. 1908);—rivière Tchania, dans le pays Kikuyu, bassin de l'Athi (Alluaud, novembre 1908)". These specimens are deposited in MNHN and to ensure stability of the nomenclature we here designate the specimen depicted in the Figure 1B as the lectotype.

3.2. Orphnus (Orphnus) thoracicus Linell (Figure 1H–M)

Orphnus thoracicus Linell, 1896 [3,6].

3.2.1. Differential Diagnosis

From the other *Orphnus* species with spinules on the endophallus (Figure 1L), males of *O. thoracicus* differ in having a pronotum with a more or less developed posterio-medial bulge (Figure 1H).

3.2.2. Type Material Examined

Holotype. Male at NMNHW labeled "Tana River East Africa Chanler Exp 92-93//Orphnus thoracicus Type Linnel//Type No. 19 U.S.N.M.".

3.2.3. Additional Material Examined

KENYA. **Isiolo**: Maddo Gashi, 20.I.1934, B. Benzo leg., one female, ZMUKK. **Kitui**: Ikutha, one male and two females, MNHB, Thua River, XI.1933, McArthur leg., one female, BMNH. **Laikipia**: Il Ngwesi Ranch, 18-19.XI.2020, A. Frolov & L. Akhmetova leg., one male and five females, ZIN. **Machakos**: Katutu-Kithioko, 27.XI.1999, M. Snižek leg., one female, ARCL. **Marsabit:** Kulal Mountain, 8.I.1934, B. Benzon leg., one male and one female, ZMUKK. **Taita/Taveta**: Voi, 23.XI., 4.XII.2000, I. Martinů leg., 1 male and 13 females, NMPC, 10-16.XII.2000, I. Martinů leg., one female, NMPC, Tsavo, 7.I.1912, Svatosh leg., one male, ZIN. UGANDA. **Kayunga**: Mulange, one female, MNHB, one male, ZIN.

3.2.4. Distribution

This species was known from the original description from the Tana River region [3,6]. According to the material available to us, it is rather widely distributed in Kenya within the Acacia-Commiphora bushlands and thickets ecoregion (Figure 1M). A male specimen from Mount Kulal has a somewhat different shape of the parameres, but additional material from the area is needed to clarify the taxonomy of this population.

3.3. Orphnus (Orphnus) macleayi Laporte de Castelnau (Figure 2A–F)

Orphnus macleayi Laporte de Castelnau, 1832 [2,3,7].

3.3.1. Differential Diagnosis

Orphnus macleayi is similar to *O. kenyensis* sp. nov. in the shape of the parameres and general pattern of the endophallic armature but differs from it in the shape of the prothoracic lateral ridges, which are unimodal (Figure 2A; as opposed to bimodal in a well-developed state in the latter species), widened, moniliform tarsomeres of anterior legs (Figure 2B; as opposed to being slender, cylindrical in the latter species), and larger number of spinules of the endophallus (Figure 2F).

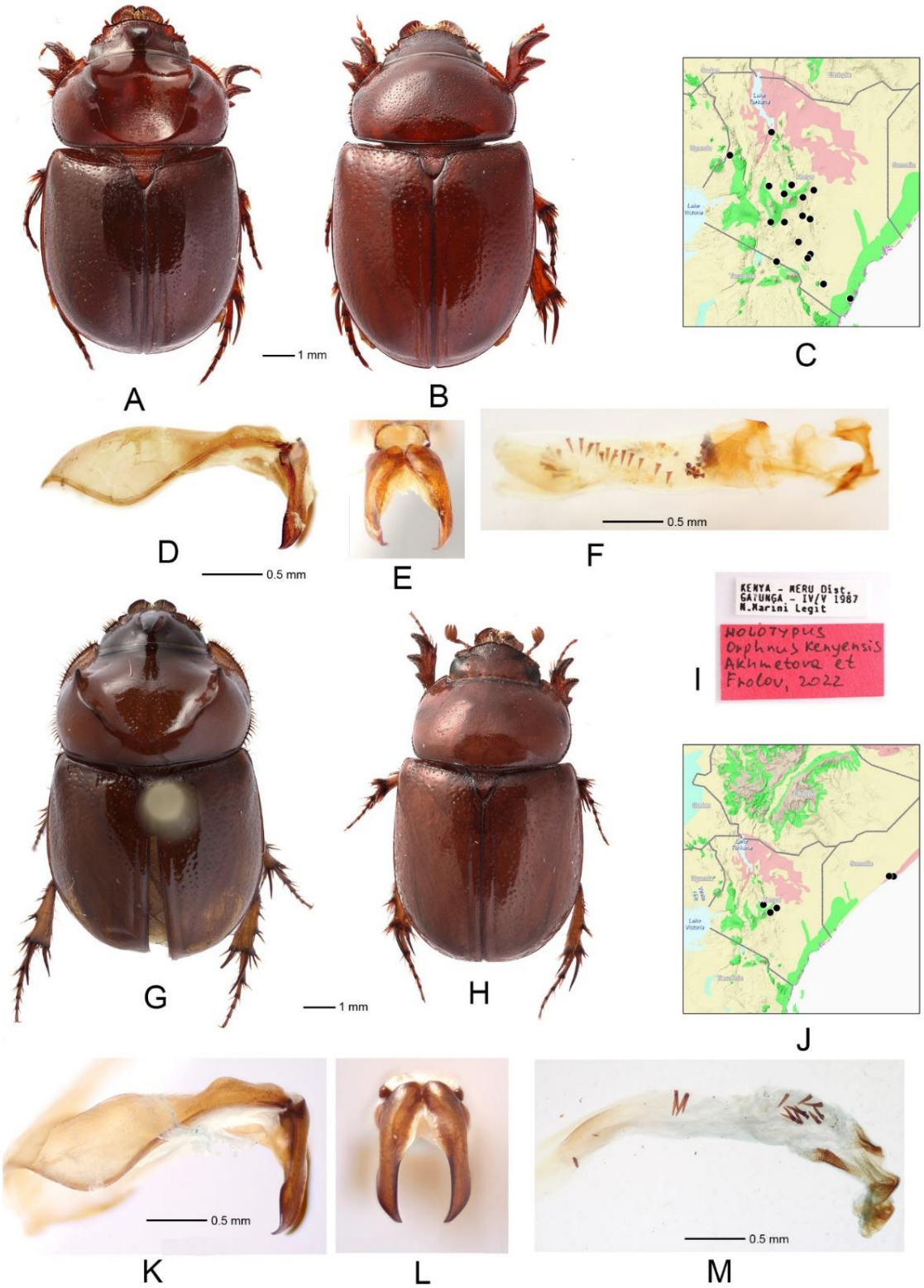

Figure 2. *Orphnus macleayi* Laporte de Castelnau, 1832 (**A**–**F**) and *O. kenyensis* Akhmetova et Frolov, sp. nov. (**G**–**M**, (**G**,**I**,**K**–**M,** holotype)). (**A**,**G**) male, habitus; (**B**,**H**) female, habitus; (**D**,**K**) aedeagus in lateral view; (**E**,**L**) parameres in dorsal view; (**F**,**M**) endophallus; (**I**) labels; (**C**,**J**) distributional record map.

3.3.2. Material Examined

Embu: Seven Forks, 27.XI.1964, J.Clitton leg., four males and seven females, BMNH. **Isiolo**: Il Ngwesi Ranch, 16.XI.2020, A. Frolov & L. Akhmetova leg., nine females, ZIN, Meru National Park, 6.XI.1983, R. Mourglia leg., two males and three females, EBCT. **Laikipia**: Il Ngwesi Ranch, 18-19.XI.2020, A. Frolov & L. Akhmetova leg., 15 females, ZIN, Laikipia, Uaso Nyiro, Machulka leg., 21 males and 9 females, NMPC. **Makueni**: Makueni, IX.1947, van Someren leg., two males, BMNH, Athi, V.1919, C.S.Betton leg., one male and two females, BMNH, Kibwezi, G.Scheffler leg., 13 males and 2 females, MNHB, XI.1907, G.Scheffler leg., one male, MNHB. **Meru**: Mitunguu, 5-13.XI.1988, R. Mourglia leg., one male and two females, MHNG, 18.X.1988, R. Mourglia leg., one male and one female, NHMB, 4.II.1983, R. Mourglia leg., 11 males and 6 females, EBCT, 8.IV.1987, R. Mourglia leg., one male and one female, EBCT, 5-13.XI.1988, D. Gianasso leg., one male and one female, EBCT. **Mombasa**: Mombasa, IV.1913, one female, MNHN, IV.1930, R.E. Dent leg., one male and six females, BMNH, Topay leg., one female, HNHM. **Nakuru**: Kedong, III.1913, one female, MNHN. **Turkana**: south of Lake Turkana, one male and two females, MNHN. **West Pokot**: Kuchelebai [Kacheliba], one female, BMNH. **Kajiado**: Namanga, IX.1961, P.P. de Moor leg., 5 males and 24 females, TMSA. **Kitui**: Mwingi, 29.XII.2007, Snizek leg., one male, ARCL. **Taita/Taveta**: Voi [Tsavo-East], 6-8.XII.1996, P. Croy leg., one male, ARCL, Voi, 14.XII.1999, P. Croy leg., one female, ARCL.

3.3.3. Distribution

This species is rather widely distributed in Kenya (Figure 2C). It was also recorded from several localities, mostly in savannas, in Sub-Saharan Africa [3].

3.4. Orphnus (Orphnus) kenyensis Akhmetova et Frolov, sp. nov. (Figure 2G–M)

3.4.1. Differential Diagnosis

Orphnus kenyensis sp. nov. is similar to *O. macleayi* in the shape of the parameres and general pattern of the endophallic armature but differs from it in the shape of the prothoracic lateral ridges, which are bimodal in well-developed state (as opposed to unimodal in the latter species), slender tarsomeres of anterior legs (as opposed to being widened, somewhat moniliform in the latter species), and fewer number of spinules of the endophallus.

3.4.2. Etymology

The new species name is derived from the name of the country, Kenya.

3.4.3. Type Material

Holotype. Male at ZIN labeled "AF0211 KENYA Eastern Prov. Il Ngwesi Ranch 0°21′43.35″ N 37°21′19.46″ E 16.XI.2020 light trap A.Frolov & L.Akhmetova leg".

Paratypes. KENYA. Isiolo: 22 males and 3 females at ZIN labeled "AF0211 KENYA Eastern Prov. Il Ngwesi Ranch 0°21′43.35″ N 37°21′19.46″ E 16.XI.2020 light trap A.Frolov & L.Akhmetova leg."; two females at RMCA labeled "Coll. Mus. Tervuren Kenya: Meru N. Pk. Mulika Lodge 7.XI.83—R. Mourglia"; six males and three females at EBCT labeled "KENYA Meru dist Meru Park 6.11.83 leg. Mourglia savana"; one male at EBCT labeled "KENYA MERU district Meru Park 9.11.1983 R. Mourglia legit"; two males at ARCL labeled "KENYA Meru NP ca. 700 m XI 2015 local collectors lgt."; one male and one female at GDOR labeled "Kenya, 6.11.83 Meru Park R.Mourglia legit"; three males and two females at NHMB labeled "Meru Park 7.XI.1983 // Kenya Meru Distr. R.Mourglia". Laikipia: five males and one female at ZIN labeled "AF0213 KENYA Eastern Prov. Il Ngwesi Ranch 0°22′56.19″ N 37°22′12.71″ E 18-19.XI.2020 light trap A.Frolov & L.Akhmetova leg.". Meru: two females at MNHN labeled "KENYA Meru distr. Materi (Mitunguu) mt.800 18.10.82 R.Mourglia Legit"; two females at NHMB labeled "Matiri (Mitunguu) 8.XI.83 800m//Kenya Meru Distr. R.Mourglia". SOMALIA. Banaadir: one male at MNHN labeled "SOMALIA—Benadir Balad (Mo) V.1986 R. Giannateili legit". Shabeellaha Hoose: one female at RMCA labeled "Coll. Mus. Tervuren Somalie: Afgoi VIII-1977 leg. Olmi".

3.4.4. Description

Male, holotype (Figure 2G,I,K–M).

Body length 10.8 mm. Color uniformly brown, head slightly darker.

Clypeus wide, with convex anterior margin, slightly rounded laterally, finely crenulate. Genae small, not protruding past eyes. Frontal suture indistinct. Frontoclypeus with a long horn, slightly bent posteriad. Dorsal surface of head finely and densely punctate. Labrum sinuate in the middle, distinctly protruding past clypeus in dorsal view.

Pronotum with rounded sides, about 1.25 times wider than long, without excavation anteriorly in middle, with bimodal lateral processes. Anterior angles acute; posterior angles rounded. Pronotum bordered on anterior margin and base. Lateral margins with long, sparse, brown setae. Sides irregularly punctate with sparse semicircular punctures.

Scutellum subtriangular, narrowly rounded apically, about 1/10 length of elytra.

Elytra about as long as wide, widest in middle, with distinct humeral humps, lateral margins slightly rounded in basal half. First (sutural) stria distinct as feebly impressed groove with row of punctures, other stria indistinct. Elytra covered with rounded punctures separated by about two puncture diameters on disc.

Macropterous.

Legs. Protibiae with three outer teeth. Lateral margin basad of outer teeth not crenulate. Apical spur of protibia absent. Middle and hind legs similar in shape; metafemora and metatibiae about 1/8 longer than the mesofemora and mesotibiae. Mesotibia and metatibiae somewhat triangular with two apical spurs, inner margin almost straight, with one transverse keel. Upper spur of tibiae as long as two basal tarsomeres. Claws 1/3 length of apical tarsomere. Femora almost impunctate.

Abdomen ventrally irregularly punctate, pubescent, with sparse, long setae. Abdominal sternite 8 medially shorter than sternites 4–7 combined. Pygidium invisible from above, with slightly truncate apex in caudal view. Plectrum triangular with rounded apex, wider than long.

Aedeagus. Parameres short (about $\frac{1}{2}$ length of phallobase), curved downwards. In dorsal view, apices without distinct lateral notches. Endophallus with two groups of large spinules and a few fields of minute spinules (Figure 2M).

Female. Female (Figure 2H) differs from the male in having a relatively smaller pronotum without armature, frontoclypeus without process, and short but distinct prothoracic spur.

3.4.5. Paratypes and Variability

The body length of the examined specimens varies from 9.3–12.0 (males) and from 10.0–11.0 (females). Head and pronotal armature in males varies from well-developed with a rather long clypeal horn and bimodal pronotal ridges as in the holotype to a smaller frontoclypeal horn and smaller pronotal ridges.

3.4.6. Distribution

This species is known from a few rather distant localities in central Kenya and coastal Somalia (Figure 2J). However, they lie essentially within the Acacia-Commiphora bushlands and thickets ecoregion and probably the species has a wider range within this ecoregion.

3.5. Orphnus (Orphnus) mombasaensis Benderitter (Figure 3A–F)

Orphnus mombasaensis Benderitter, 1914 [3,4].

3.5.1. Differential Diagnosis

Orphnus mombasaensis is most similar to *O. tristis* but differs from it in the apices of the parameres being slenderer, more tapering apically (Figure 3D,E), pronotal ridges relatively feebly separated (Figure 3A). Females of *O. mombasaensis* have sparser and coarser punctuation of the dorsum (Figure 3B).

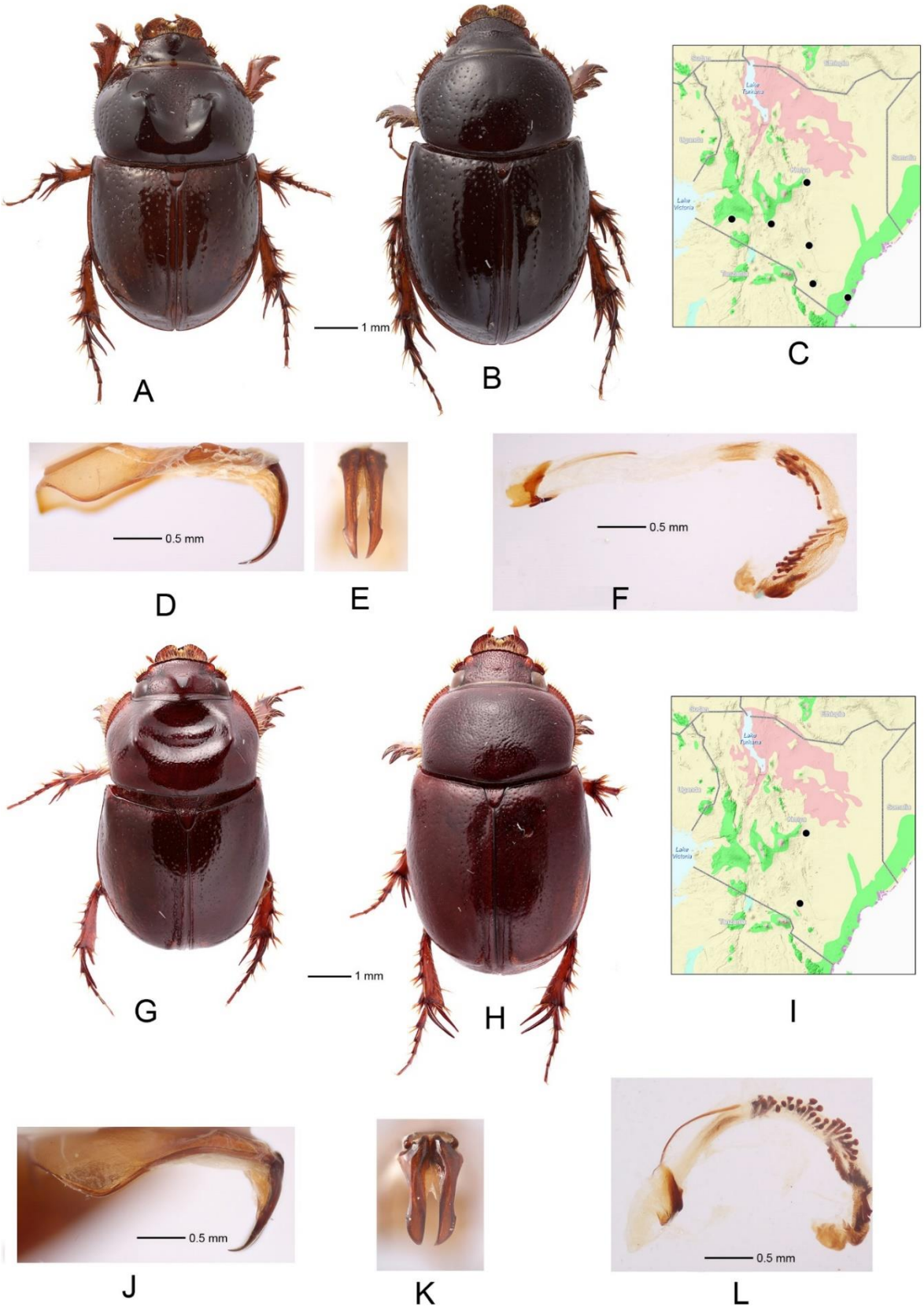

Figure 3. *Orphnus mombasaensis* Benderitter, 1914 (**A**–**F**) and *O. tristis* Pic, 1928 (**G**–**L**). (**A**,**G**) male, habitus; (**B**,**H**) female, habitus; (**D**,**J**) aedeagus in lateral view; (**E**,**K**) parameres in dorsal view; (**F**,**L**) endophallus; (**C**,**I**) distributional record map.

3.5.2. Type Material Examined

Lectotype, here designated**.** Male at MNHN labeled "Afrique Or-le Anglaise Bura (Wa-Taita) Ch. Allaud I-IV 1904".

Paralectotype. Female at MNHN labeled "Afrique Or-le Anglaise Mombasa Ch. Allaud IV 1904".

3.5.3. Other Material Examined

Isiolo: Mururi Swamp, 13.XI.1975, C.F. Dewhurst leg., one male, UPSA. **Kitui:** Ikutha, five males, MNHB. **Narok:** Lemek, one female, MNHN. **Nairobi City:** Nairobi, V.1928, van Someren leg., one male, BMNH.

3.5.4. Distribution

This species was previously known from the original description from two localities in south-eastern Kenya. According to the material available to us, it has a wider distribution in southern and central Kenya within the Acacia-Commiphora bushlands and thickets ecoregion (Figure 3C).

3.5.5. Remarks

To ensure the stability of the nomenclature, the male specimen of the two syntypes is designated here as the lectotype.

3.6. Orphnus (Orphnus) tristis Pic (Figure 3G–L)

Orphnus tristis Pic, 1928 [3,8].

3.6.1. Differential Diagnosis

Orphnus tristis is most similar to *O. mombasaensis* but differs from it in the apices of the parameres being wider and less tapering apically (Figure 3J,K), pronotal ridges relatively widely separated (Figure 3G). Females of *O. tristis* have denser and finer punctuation of the dorsum (Figure 3H).

3.6.2. Material Examined

Isiolo: Meru National Park, 6.XI.1983, R. Mourglia leg., two males, EBCT. **Makueni**: Kibwezi, G. Scheffler leg., two males, MNHB.

3.6.3. Distribution

This species was described from Ethiopia and is recorded here from Kenya for the first time. In Kenya, it is known from two rather distant localities (Figure 3I).

3.7. Orphnus (Orphnus) jeanneli Benderitter (Figure 4A–F)

Orphnus jeanneli Benderitter, 1914 [3,4].

3.7.1. Differential Diagnosis

Orphnus jeanneli can be separated from other species by having an endophallus with a long curved sclerite, without distinct clusters or fields of spinules (Figure 4F), and pronotum of males with four tubercles (in the specimens with well-developed armature) (Figure 4A). Females have a small frontoclypeal tubercle and slightly depressed anterior side of the pronotum (Figure 4B).

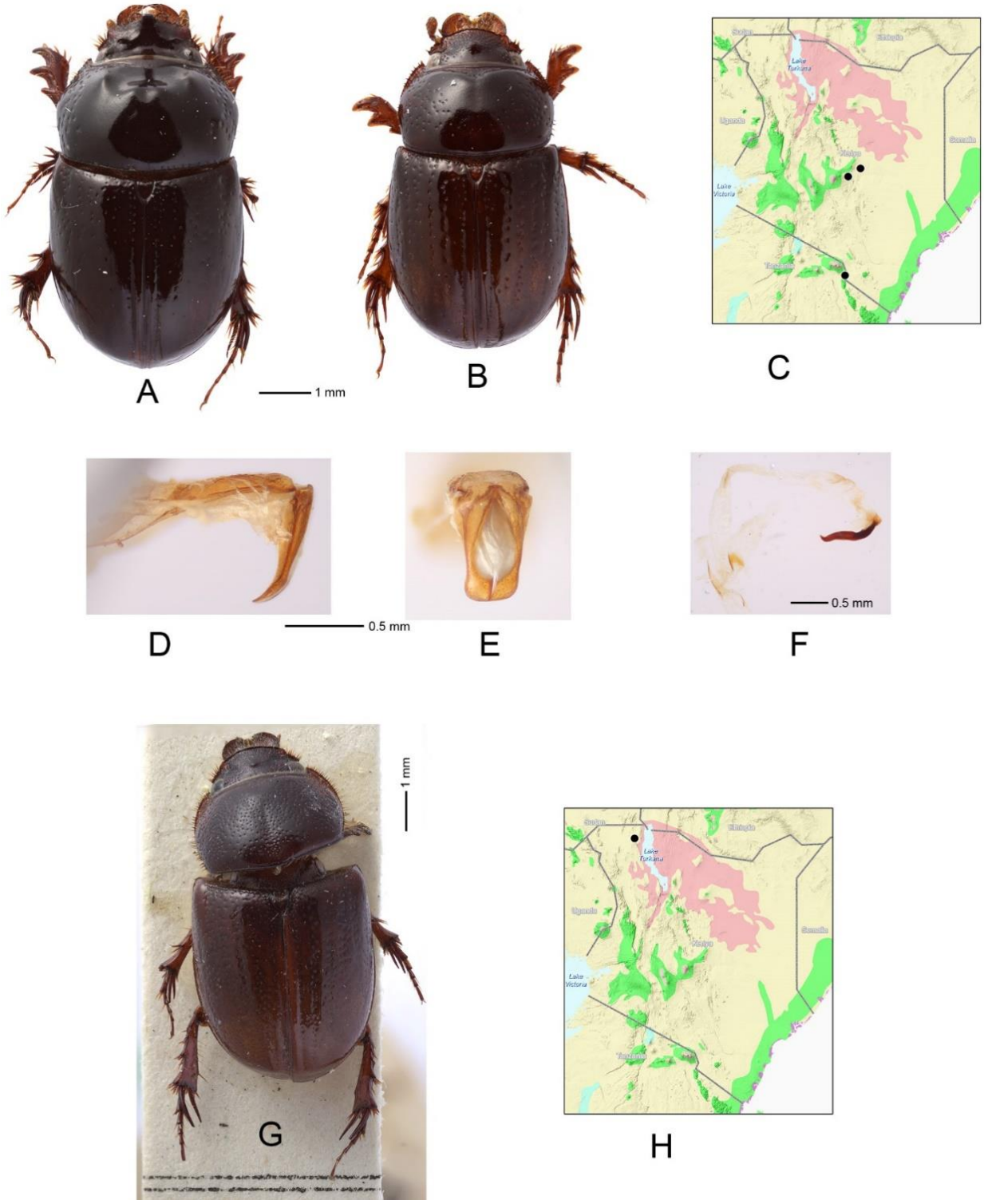

Figure 4. *Orphnus jeanneli* Benderitter, 1914 (**A**–**F**) and *O. chappuisi* Paulian, 1948 (**G**,**H** (**G**, holotype)). (**A**) male, habitus; (**B**,**G**) female, habitus; (**D**) aedeagus in lateral view; (**E**) parameres in dorsal view; (**F**) endophallus; (**C**,**H**) distributional record map.

3.7.2. Type Material Examined

Lectotype, here designated. Male at MNHN labeled "Afrique Orient. Anglaise Taveta Alluaud & Jeannel Mars 1912 750 m—St 65".

Paralectotypes. KENYA. Taita/Taveta: one male and four females at MNHN labeled "Afrique Orient. Anglaise Taveta Alluaud & Jeannel Mars 1912 750 m—St 65".

3.7.3. Additional Material Examined

Isiolo: Meru National Park, 6.XI.1983, R. Mourglia leg., one male, EBCT. **Meru**: Mitunguu, 4.IX.1983, Mourglia leg., one female, EBCT.

3.7.4. Distribution

This species is known only from central and southern Kenya and most probably also occurs in northern Tanzania (Figure 4C).

3.7.5. Remarks

Benderitter [4] based the original description of this species on six specimens of both sexes from the same locality. Paulian [3] mentioned "Type ♂and allotype ♀" with the same label data. All six specimens studied by Benderitter are housed in MNHN; one of them bears red printed labels "TYPE" and "LECTOTYPE", and the others bear labels "PARALECTOTYPE". These labels were added by Paulian or MNHN technical staff. Since Paulian's notation of the "type" does not constitute a lectotype designation, the lectotype is here formally designated based on the specimen that Paulian apparently considered the type of this species.

3.8. Orphnus (Orphnus) chappuisi Paulian (Figure 4G,H)

Orphnus chappuisi Paulian, 1948 [3].

3.8.1. Type Material Examined

Holotype. Female at MNHN labeled "Kenya Monts Murueris TURKANA NORD 800–1000 m/Orphnus chappuisi n. sp./Boucomont det.1934 Orphnus sp. ? ♀/MUSEUM DE PARIS Mission de l'Omo C. ARAMBOURG P. A. CHAPPUIS & R. JEANNEL 1932–33/HOLOTYPE".

3.8.2. Remarks

The holotype differs externally from the females of the other *Orphnus* species that can be found in the area, but due to the lack of male characters the taxonomic status of this species requires clarification.

3.9. Orphnus (Orphnus) sansibaricus Kolbe (Figure 5A–F)

Orphnus sansibaricus Kolbe, 1895 [2–4,9].

3.9.1. Differential Diagnosis

Orphnus sansibaricus is most similar to *O. tanaensis* sp. nov. in having the parameres with apices curved upward (in lateral view, Figure 5D), but differs from it in the shape of the pronotum in males, punctuation, and internal sac armature (Figure 5A,F).

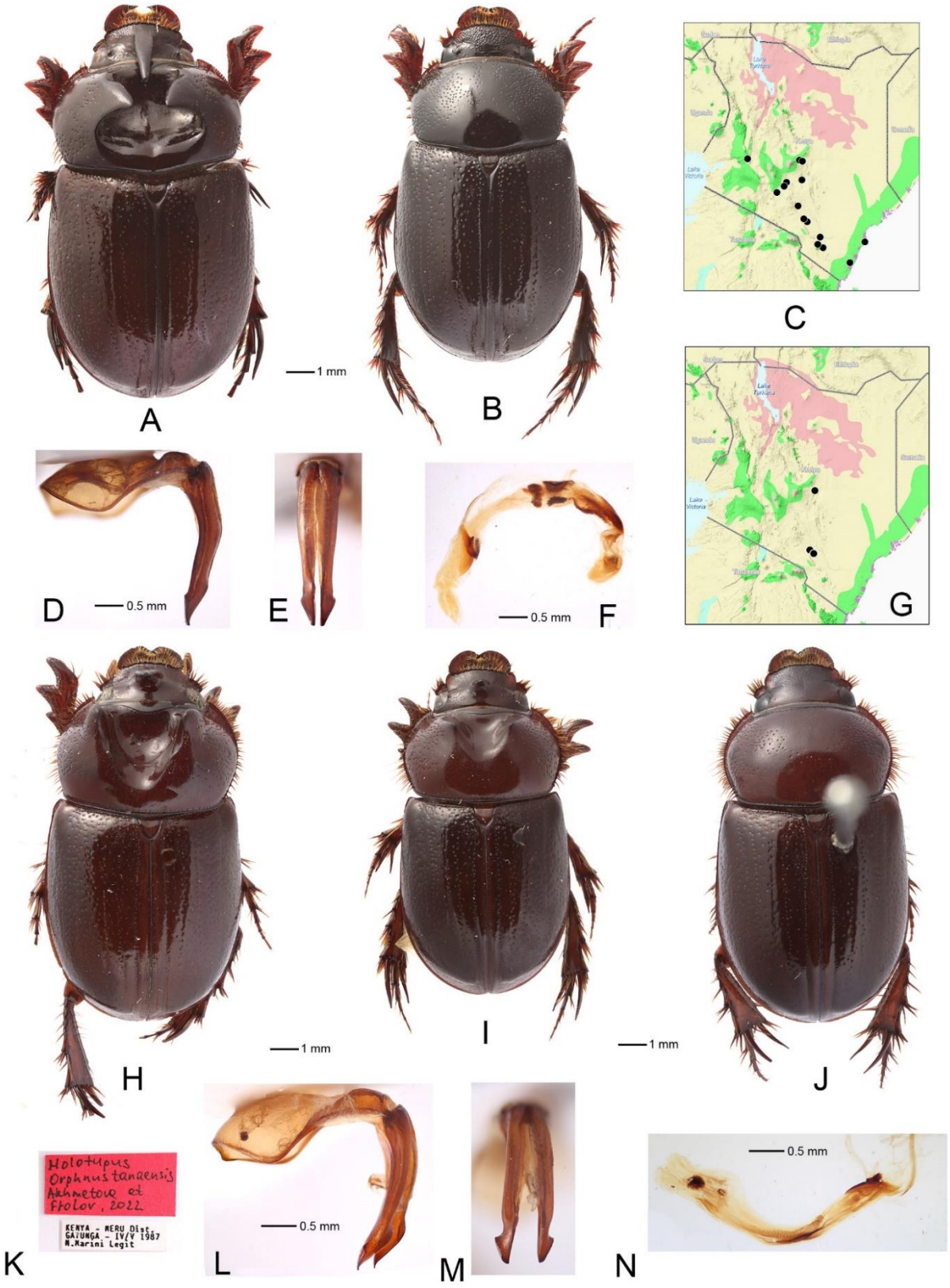

Figure 5. *Orphnus sansibaricus* Kolbe, 1895 (**A**–**F**) and *O. tanaensis* Akhmetova et Frolov, sp. nov. (**G**–**N,** (**H**,**K**–**N,** holotype)). (**A**,**H**,**I**) male, habitus; (**B**,**J**) female, habitus; (**D**,**L**) aedeagus in lateral view; (**E**,**M**) parameres in dorsal view; (**F**,**N**) endophallus; (**K**) labels; (**C**,**G**) distributional record map.

3.9.2. Material Examined

Baringo: Maji Mazuri, 20.XII.1911, Svatosh leg., two males, ZIN. Embu: Seven Forks, 27.XI.1964, J. Clitton leg., 12 males and 18 females, BMNH. **Kiambu**: Thika, 15.XI.2020, A.Frolov & L.Akhmetova leg., two males and eight females, ZIN. **Kilifi**: Sabaki River, IV-V.1932, Turner & McArthur leg., one male, BMNH. **Makueni**: Makueni, IX.1947, van Someren leg., 11 males and 4 females, BMNH, Kibwezi, G.Scheffler leg., one male, MNHB, S. Huebner leg., three males and one female, MNHB, XI.1907, G.Scheffler leg., one female, MNHB, one male, MNHB, Makindu, XII.1933, McArthur leg., two males, BMNH. **Meru**: Mitunguu, 18.X.1988, R. Mourglia leg., one male and one female, EBCT, 8.XI.1983, R. Mourglia leg., three males and two females, NHMB, 4.II.1983, R. Mourglia leg., 17 males and 9 females, EBCT, 8.IV.1987, R. Mourglia leg., one female, EBCT, Nkubu, 12-25.X.1982, R. Mourglia leg., two males and two females, EBCT, 1-10.IV.1987, R. Mourglia leg., one male and two females, EBCT, 2.XI.1988, D. Gianasso leg., one female, MCSNC. **Mombasa**: Mombasa, Topay leg., one female, HNHM. **Murang'a**: Makuyu, III-V.1937, C.D. Knight leg., one male, BMNH. **Taita/Taveta**: 15 km of Voi, 20.XII.1911, Svatosh leg., one male, ZIN, Voi, 4-8.XI.2005, G. Curletti & V. Sakalian leg., two males and two females, MCSNC, one male, EBCT, Tsavo, 26.XII.1990, B.D. Gill leg., one male and one female, EBCT, 25.XII.1990, B.D. Gill leg., two females, EBCT, Kedai, one male, BMNH. **Nairobi City**: Nairobi, X.1960, Breuning leg., 8 males and 10 females, MHNG, zero females, ZIN, two males and two females, RMCA, one male and one female, NMPC, IV.1932, A.F.J. Gedye leg., one male, BMNH, 5.V.1950, one male, TMSA.

3.9.3. Distribution

This species was recorded from Ethiopia, Kenya, Tanzania, and Democratic Republic of Congo [3]. In Kenya, it is rather widely distributed in the central and southern parts of the country (Figure 5C).

3.10. Orphnus (Orphnus) tanaensis Akhmetova et Frolov, sp. nov. (Figure 5G–N)

Orphnus galla Gestro, 1895—Paulian (incorrect identification) [3].

3.10.1. Differential Diagnosis

Orphnus tanaensis sp. nov. is most similar to *O. sansibaricus* Kolbe in having parameres with apices curved upward (in lateral view, Figure 5L), but differs from it in the shape of the pronotum in males, punctuation, and the internal sac armature (Figure 5H,N).

3.10.2. Etymology

The new species name is derived from the name of Tana River, Kenya.

3.10.3. Type Material Examined

Holotype. Male at MHNG labeled "KENYA—Meru Dist. Gatunga—IV/V 1987 M.Marini Legit".

Paratypes. KENYA. Makueni: one male at ZFMAKB labeled "B. E. Africa Kibwezi R. A. Dummer"; two females at MNHB labeled "Br.O.Afrika Kibwezi Huebner S."; six females at BMNH labeled "Brit. E. Africa Kibwezi H.C.Hopton 1907-38."; one male and two females at MNHB labeled "Brit.-Ost Afrika Kibwezi No.17 11.07 Scheffler S.V."; one male and one female at MNHB labeled "Brit.-Ost-Afrika Kibwezi No.22 Scheffler J.No.54.06"; three females at MNHB labeled "Brit.O.Afrika Kibwezi (Nr.8) Huebner S.V."; one male and two females at BMNH labeled "Kibwezi Kenia Br. E. Africa // Collector R. A. Dummer XII-23-1921"; one female at BMNH labeled "Kibwezi Kenia Br. E. Africa // El. 3000 ft Jan 1922 R. Dummer"; one male at BMNH labeled "McArthur Makindu Dec.1933". Tharaka-Nithi: one male and three females at MHNG labeled "KENYA—Meru Dist. Gatunga—IV/V 1987 M.Marini Legit". UGANDA. Kayunga: two females at MNHN labeled "Mulang Uganda"; three males and two females at MHNG labeled "Mulange Br. O. Afr.". ETHIOPIA. Oromīya:

three males and five females at RMCA labeled "Sidamo Prov.: Yavello to Mega + Arero Rd. Junct., 1600 m 11-V-1975//Coll. Mus. Tervuren Ethiopie R.O.S. Clarke".

3.10.4. Description

Male, holotype (Figure 5H,K–N).

Body length 10.5 mm. Color dark brown, head and pronotum slightly lighter.

Clypeus wide, with convex anterior margin, slightly rounded laterally, finely crenulate. Genae small, not protruding past eyes. Frontal suture indistinct. Clypeus with a short, tubercle-shaped horn. Dorsal surface of head finely and sparsely punctate. Labrum deeply sinuate in the middle, distinctly protruding past clypeus.

Pronotum with rounded sides, about 1.7 times wider than long, with deep excavation anteriorly in middle, conical lateral processes aside excavation. Anterior angles acute; posterior angles rounded. Pronotum bordered on anterior margin and base. Lateral margins with long, sparse, brown setae. Sides irregularly punctate with semicircular punctures separated.

Scutellum subtriangular, narrowly rounded apically, about 1/10 length of elytra.

Elytra about 1.2 times longer than wide, widest in middle, with distinct humeral humps, lateral margins slightly rounded in basal half. First (sutural) stria distinct in apical 2/3 as feebly impressed groove with row of punctures. Other stria before humeral humps as irregular rows of round punctures, separated by less than their diameter except for base of elytra. Elytral intervals covered with minute punctures.

Macropterous.

Legs. Protibiae with three outer teeth. Lateral margin basad of outer teeth not crenulate. Apical spur of protibia absent. Left protarsus absent. Middle and hind legs similar in shape; metafemora and metatibiae about 1/8 longer than the mesofemora and mesotibiae. Mesotibiae and metatibiae somewhat triangular with two apical spurs, inner margin almost straight, with one transverse keel. Upper spur of tibiae as long as two basal tarsomeres. Claws 1/3 length of apical tarsomere. Femora almost impunctate.

Abdomen ventrally irregularly punctate, pubescent, with sparse, long setae. Abdominal sternite 8 medially as long as sternites 4–7 combined. Pygidium invisible from above, with slightly truncate apex in caudal view. Plectrum triangular with rounded apex, wider than long.

Aedeagus. Parameres long (slightly shorter than phallobase), curved downwards (Figure 5L,M). In lateral view, apices of parameres curved upwards; in dorsal view, apices are distinctly separated by lateral notches. Endophallus without large spinules, with a few fields of minute spinules (Figure 5N).

Female. Female (Figure 5J) differs from the male in having a relatively smaller pronotum without armature, frontoclypeus without process, and short but distinct prothoracic spur.

3.10.5. Paratypes and Variability

The body length of the examined specimens varies from 9.0–11.8 (males) and from 10.0–13.0 (females). Head and pronotal armature in males varies from well-developed with a rather long clypeal horn and protoracic ridges to a frontoclypeal tubercle and smaller pronotal ridges, rectangular in lateral view (Figure 5I).

3.10.6. Distribution

The species is known from a few rather distant localities in Kenya, Ethiopia, and Uganda, mostly from the Acacia-Commiphora bushlands and thickets ecoregions (Figure 5G).

3.10.7. Remarks

It is evident from the description, listed material, and illustrations provided by Paulian [3] that he treated this species as *O. galla* Gestro, 1895. However, he apparently did not have an opportunity to study the type of the latter. We have examined the type of *O. galla*,

deposited in Museo Civico di Storia Naturale di Genova, Genoa, Italy, which agrees with the original description [10], and found that it differs from *O. tanaensis* sp. nov. in a number of taxonomically important characters including the parameres with longer apices evenly curved downward in the lateral view.

3.11. Orphnus (Phornus) compactus Petrovitz (Figure 6A–F)

Orphnus compactus Petrovitz, 1971 [2].

3.11.1. Differential Diagnosis

This species differs from other Kenyan species of *Orphnus* in a rather poor sexual dimorphism with males and females having similar short conical frontoclypeal tubercles (Figure 6A,B). Males do not have protoracic ridges or tubercles but instead may have a more or less depressed anterior part of the pronotal disc. Parameres are slender and subparallel in the apical half (Figure 6E).

3.11.2. Material Examined

Kwale: Kilindini, 27.V-3.VI.1955, L.F. Brown leg., one female, BMNH. **Taita/Taveta**: Ziwani, IV.1933, McArthur leg., one male and six females, BMNH.

3.11.3. Distribution

Orphnus compactus was described from Mto-ja-Kifaru, southern Kenya. Here we report two additional localities from the same region (Figure 6C).

3.12. Orphnus (Orphnus) compactilis Quedenfeldt (Figure 6G–L)

Orphnus compactilis Quedenfeldt, 1884 [3,11].

3.12.1. Differential Diagnosis

Orphnus compactilis differs from other species occurring in the region in having an endophallus without spinules or large sclerites (Figure 6L), evenly rounded and tapering apices of the parameres (Figure 6J,K), and long, unimodal pronotal processes in males (Figure 6G). From *O. compactus* it differs also in females having no traces of frontoclypeus (Figure 6H).

3.12.2. Material Examined

Laikipia: Il Ngwesi Ranch, 18-19.XI.2020, A. Frolov & L. Akhmetova leg., seven males and seven females, ZIN. **Makueni**: Kibwezi, G.Scheffler leg., 11 males and 5 females, MNHB, XI.1907, G.Scheffler leg., four males and three females, MNHB.

3.12.3. Distribution

Orphnus compactilis was described from Angola and is recorded from Eastern Africa for the first time. In Kenya, it is known from two localities in the central and southern parts of the country (Figure 6I).

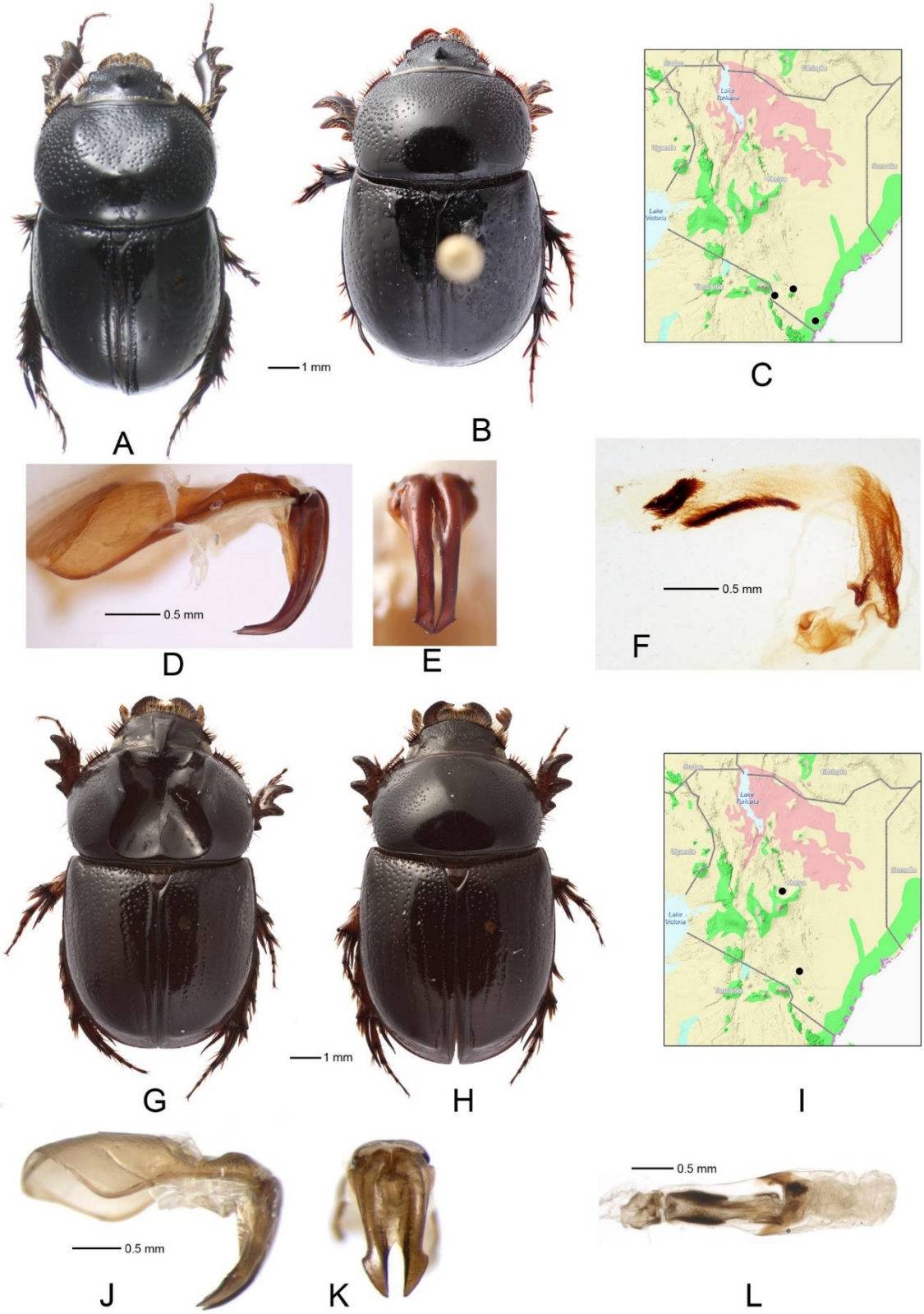

Figure 6. *Orphnus compactus* Petrovitz, 1971 (**A**–**F**) and *O. compactilis* Quedenfeldt, 1884 (**G**–**L**). (**A**,**G**) male, habitus; (**B**,**H**) female, habitus; (**D**,**J**) aedeagus in lateral view; (**E**,**K**) parameres in dorsal view; (**F**,**L**) endophallus; (**C**,**I**) distributional record map.

Key to Orphnus species from Kenya (males)

1. Sides of pronotum with long setae (Figure 1A,B) ..... *Orphnus rufithorax*
– Sides of pronotum without setae, only margins setose 2
2. Endophallus with a number of long, robust, separate spinules (Figures 1L, 2F,M and 3F,L) 3
– Endophallus without distinct spinules or with smaller, clustered spinules (Figures 4F, 5F,N and 6F,L) 7
3. Pronotum with more or less developed posterio-medial bulge (Figure 1H) .... *Orphnus thoracicus*
– Pronotum without posterio-medial bulge (Figures 2A,G and 3A,G) 4
4. Tarsomeres of anterior legs widened, somewhat moniliform (Figure 2B) ..... *Orphnus macleaya*
– Tarsomeres of anterior legs slender, cylindrical (Figure 2H) 5
5. Prothoracic lateral ridges bimodal (Figure 2G) ..... *Orphnus kenyensis* sp. nov.
– Prothoracic lateral ridges unimodal (Figure 3A,G) 6
6. Apices of parameres slenderer, more tapering apically (Figure 3D,E); pronotal ridges relatively feebly separated; lateral margins of pronotum rounded, not sinuate posteriorly (Figure 3A) ..... *Orphnus mombasaensis*
– Apices of parameres wider, less tapering apically (Figure 3J,K); pronotal ridges widely separated; lateral margins of pronotum slightly sinuate posteriorly (Figure 3G) ..... *Orphnus tristis*
7. Endophallus with a long curved sclerite, without distinct clusters or fields of spinules (Figure 4F) ..... *Orphnus jeanneli*
– Endophallus with clusters or fields of small to minute spinules, without large sclerites (Figures 5F,N and 6F,L) 8
8. Apices of parameres curved upward (Figure 5D,L) 9
– Apices of parameres evenly curved downward (Figure 6D,J) 10
9. Parameres slightly angulate medially in lateral view (Figure 5D); clusters of microspinules on endophallus more developed (Figure 5F); prothoracic ridges normally curved medially (Figure 5A) ..... *Orphnus sansibaricus*
– Parameres evenly rounded medially in lateral view (Figure 5L); clusters of microspinules on endophallus less developed (Figure 5N); prothoracic ridges not curved medially (Figure 5H) ..... *Orphnus tanaensis* sp. nov
10. Pronotum with depressed anterior part of disc, without protoracic ridges or tubercles (Figure 6A); parameres slender and subparallel in apical half (Figure 6E) ..... *Orphnus compactus*
– Pronotum with protoracic ridges or tubercles (Figure 6G); parameres wider, somewhat lanciform, not subparallel in apical half (Figure 6K) ..... *Orphnus compactilis*

4. Discussion

Our results show that the fauna of the orphnines of Kenya is rather rich and specific. Only one genus, *Orphnus*, occurs in the country but it is represented by 12 species. Half of these species are known only from Kenya and only three have wider ranges also outside the country. Most of the available records are from the central and southeastern regions of the country; few records are available from western, northern, and northeastern parts. However, the records might be biased because more collecting was apparently done near major populated places and along major roads, specifically along the road Nairobi–Mombasa. More sampling is needed from the northern and northwestern regions, which will most probably yield new species records for Kenyan fauna as well as allow clarification of the status of *O. chappuisi* and the population of *O. thoracicus* from Kulal Mountain.

The trophic associations of *Orphnus* species remain unknown; however, it can be assumed that they are litter dwellers and generalist saprophages [12]. In East Africa, orphnines occur in the savannah biotopes and, within Kenya, the records are mostly

limited to the Northern Acacia-Commiphora bushlands and thickets ecoregion. No species were recorded from the mountain forests or high-altitude moorlands.

Author Contributions: Conceptualization, L.A.A.; methodology, A.V.F. and L.A.A.; software, A.V.F.; validation, L.A.A. and A.V.F.; formal analysis, L.A.A. and A.V.F.; investigation, L.A.A. and A.V.F.; resources, L.A.A. and A.V.F.; data curation, L.A.A. and A.V.F.; writing—original draft preparation, L.A.A.; writing—review and editing, A.V.F.; supervision, A.V.F.; project administration, A.V.F. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the authors.

Acknowledgments: We thank all curators and private collectors listed in the Materials and Methods section for providing access to the specimens. Anonymous reviewers provided comments that improved the draft manuscript. The study was performed in the framework of the Russian State research project 122031100272-3.

Conflicts of Interest: The authors declare no conflict of interest.

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