



A New Species of the Sub-Genus *Afromorgus* (Trogidae: Scarabaeoidea) from Cholistan Desert, Pakistan

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ABSTRACT

The sub-genus *Omorgus* (*Afromorgus*) includes 54 described species, with 8 species identified in Pakistan. These species are *Omorgus* (*Afromorgus*) *frater* Pittino, 2005, *O.* (*Afromorgus*) *granulatus* (Herbst, 1783), *O.* (*Afromorgus*) *haagi* (Harold, 1872), *O.* (*Afromorgus*) *italicus* (Reiche, 1853), *O.* (*Afromorgus*) *maidroni* Pittino, 2005, *O.* (*Afromorgus*) *procerus* (Harold, 1872), *O.* (*Afromorgus*) *testudo* (Arrow, 1927), and the newly described *Omorgus* (*Afromorgus*) *riffati* from Cholistan. The distribution of this sub-genus globally has also been documented.

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Conceptualization, RS. Methodology and field surveys, MW and SK. Analysis and drafting. All authors have read and agreed to the published version of the manuscript.

Key words

Afromorgus, sub-genus, sp. nov., Cholistan, Distribution

INTRODUCTION

The Trogidae family consists of small beetles known as hide beetles and is considered cosmopolitan (Scholtz, 1986). The family was named Trogidae by Macleay in 1819. It comprises three genera: *Omorgus* Erichson, *Trox* Fabricius, and *Polynoncus* Burmeister. *Omorgus* has three subgenera: *Afromorgus* Scholtz, which occurs in the Oriental and Afrotropical regions and includes 54 species found in Asia and Africa (Zidek, 2013); *Omorgus* s. str., which inhabits the Nearctic, Neotropical, and Australasian regions; and *Harlodomorgus* Scholtz, found in South America. *Trox* Fabricius is found in the Holarctic and Afrotropical regions, and it also has a subgenus called *Phoberus* MacLeay. *Polynoncus* is found only in South America (Scholtz, 1993). The Trogidae family consists of around 300 species that are necrophagous and feed on keratinous matter. They are commonly found in arid regions and feed on locust eggs, fly maggots, guava bats in

caves (Scholtz, 1986), and eggs of *Lepidochelys olivacea*, a sea turtle, which poses a threat to the turtles (Baena *et al.*, 2015; Plotkin *et al.*, 1997). Some species of Trogidae are endemic to predatory birds' nests, such as owls, and they are also observed in carnivores' burrows (Scholtz, 1986). Trogidae beetles are the only members of the Scarabaeoidea superfamily known for their keratinophagous feeding strategy (Verdugo, 2014). They lay their eggs in the soil at varying depths and go through three instars with a total duration of four weeks. The family is considered monophyletic (Scholtz, 1986). Trogidae beetles also have significance in forensic science as they are used to estimate post-mortem intervals during legal investigations (Tabor *et al.*, 2004). A study conducted in India identified 13 species of Trogidae beetles, with seven of them found in Pakistan (Kalawate and Patole, 2018). Therefore, the aim of this study was to explore the Trogidae fauna in the Cholistan desert, which is known for its hot and arid conditions and is considered the hottest and driest desert in Pakistan (Malik *et al.*, 2017). No previous research has been conducted on the Trogidae family in Pakistan, making this study on the Cholistan desert fauna essential.

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MATERIALS AND METHODS

Sampling site

The sampling for this study was conducted in the Bahawalpur district, specifically in the Cholistan desert area. Two sites, labeled as site A (71°42.32'E, 29°20.27'N)

and site B (71°42.50'E, 29°20.08'N), were visited. Three samples were collected from site A, located south of Bahawalpur city, and one insect was found near the semen collection center (71°35.37'E, 29°14.98'N) (Figs. 1 and 2A). The Cholistan desert is a vast desert that extends through the Nara and Thar deserts of the Sindh province. It is located between 27°42'N and 29°45'N latitude and 69°52'E and 75°24'E longitude, with an altitude of approximately 112 meters above sea level (Khan, 2009). The Cholistan desert is approximately 480 km long, with its width ranging from 32 to 192 km. It can be divided into two geomorphic regions based on differences in topography, parent material, soil, and vegetation. The northern region, known as Lesser Cholistan, covers the canal-irrigated areas and spans an area of about 7,770 km². It consists of saline alluvial flats, locally referred to as “dahars,” alternating with low sandy ridges. The southern region, or Greater Cholistan, is a wind-resorted sandy desert that encompasses an area of 18,130 km². It is characterized by river terraces, large dunes, ridges, and depressions. Desert dunes, which make up only 5% of the Earth's surface, are home to many endemic plants and animals. In dry landscapes, beetles are predominant among insect groups (Akbar *et al.*, 1996).

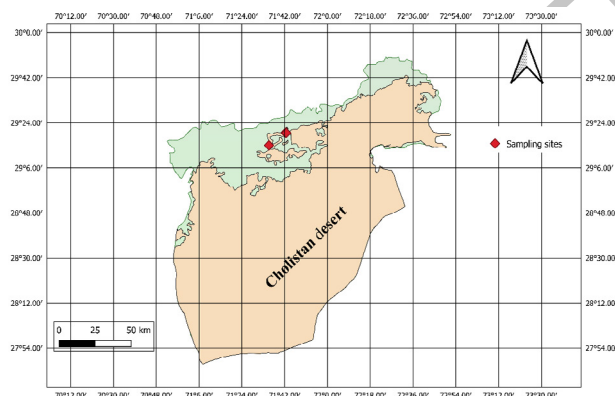


Fig. 1. Bahawalpur district with sampling sites.

Killing, preservation and identification

The specimens were euthanized with Chloroform (CHCl₃), pinned and labelled according to the routine procedures. The specimens were carefully observed under an Olympus CX23 microscope and identified according to Scholtz (1986, 1990). The measurements of various body parts were done in mm using a microscope with an ocular lens. To create a locality map, we utilized the open-source and freely accessible software called QGIS.

These preserved specimens were then stored in the

Museum of Entomology, Department of Zoology, CUVAS Bahawalpur, Punjab-Pakistan.

Abbreviations used in the text are as follows: BL, Body length from the apex of head to the apex of elytra; HL, Head length from apex of head to the anterior margin of pronotum; PL, Pronotum length from base of head to the anterior margin of elytra; EL, Elytra length from anterior margin to the apex of elytra; LL, Legs length from end of the Trochanter to the posterior margin of each part (Femur, tibia, tarsus).



Fig. 2. *Omorgus (Afromorgus) riffati* nov. sp; A, at location; B, C, D, Dorsal, Ventral and side view of male; E, female; F, pronotum; G, elytra; H, antennae; I, fore legs tibia and tarsus.

Omorgus (Afromorgus) riffati sp. nov. (Fig. 2)

Diagnosis

This species is recognized by the following characteristics *i.e.*, Elytra have smaller bumps than other species which are irregular in appearance, elytra striations are much closer than other observed species and there are deep smaller cavities are present on elytra along striations.

General account

Head brownish in color. Clypeus cover the eyes through extended apex of the head. Antennae and mandibles are also inside the head most of the time. Eyes small only

Table I. Species of Sub genus *Afromorgus* reported from Asia (Zidek, 2013, 2017).

Country	Species
1. China	1. <i>Omorgus (Afromorgus) chinensis</i> (Boheman, 1858) 2. <i>O.A. inclusus</i> (Walker, 1858) 3. <i>O.A. italicus</i> (Reiche, 1853) 4. <i>O.A. pauliani</i> (Haaf, 1954)
2. India	1. <i>O.A. frater</i> Pittino, 2005. 2. <i>O.A. granulatus</i> (Herbst, 1783). 3. <i>O.A. haagi</i> (Harold, 1872) 4. <i>O.A. inclusus</i> (Walker, 1858). 5. <i>O.A. indicus</i> (Harold, 1872) 6. <i>O.A. inermis</i> Pittino, 2005 7. <i>O.A. italicus</i> (Reiche, 1853) 8. <i>O.A. omacanthus</i> (Harold, 1872) 9. <i>O.A. pauliani</i> (Haaf, 1954) 10. <i>O.A. procerus</i> (Harold, 1872) 11. <i>O.A. rimulosus</i> (Haaf, 1957) 12. <i>O.A. testudo</i> (Arrow, 1927)
3. Indonesia	1. <i>O.A. chinensis</i> (Boheman, 1858) 2. <i>O.A. pauliani</i> (Haaf, 1954)
4. Pakistan	1. <i>O.A. frater</i> Pittino, 2005 2. <i>O.A. granulatus</i> (Herbst, 1783) 3. <i>O.A. haagi</i> (Harold, 1872) 4. <i>O.A. italicus</i> (Reiche, 1853) 5. <i>O.A. maindroni</i> Pittino, 2005 6. <i>O.A. procerus</i> (Harold, 1872) 7. <i>O.A. testudo</i> (Arrow, 1927)
5. Japan	1. <i>O.A. chinensis</i> (Boheman, 1858)
6. Vietnam	1. <i>O.A. inermis</i> Pittino, 2005 2. <i>O.A. pauliani</i> (Haaf, 1954)
7. Iran	1. <i>O.A. procerus</i> (Harold, 1872) 2. <i>O.A. verrucosus</i> (Reiche, 1856)
8. Thailand	1. <i>O.A. lobicollis</i> (Arrow, 1927)
9. Myanmar	1. <i>O.A. lobicollis</i> (Arrow, 1927)
10. Iraq	1. <i>O.A. verrucosus</i> (Reiche, 1856)
11. Afghanistan	1. <i>O.A. granulatus</i> (Herbst, 1783)
12. Nepal	1. <i>O.A. pauliani</i> (Haaf, 1954)
13. Sri Lanka	1. <i>O.A. frater</i> Pittino, 2005 2. <i>O.A. inermis</i> Pittino, 2005 3. <i>O.A. pauliani</i> (Haaf, 1954)
14. Cambodia	1. <i>O.A. pauliani</i> (Haaf, 1954)
15. Taiwan	1. <i>O.A. chinensis</i> (Boheman, 1858)

1mm in length. Head is protrusible. Head have numerous bristles near the eyes and antennae. Antennae of the insect is small and is lamellate type. Having a lamella with 5 segments. Lamella have numerous spines like bristles. The first segment of the antennae is long while other segments are short, at the end of last segment it has three leaves of lamella.

Table II. Various species of *Afromorgus* with Coordinates in (Asia) (Zidek, 2013, 2017).

S. No.	Species	Country	Coordinates
1	<i>Omorgus (Afromorgus) chinensis</i> (Boheman, 1858)	China Indonesia Japan Taiwan	35.8617° N, 104.1954° E 0.7893° S, 113.9213° E 36.0250° N, 138.9404° E 23.6978° N, 120.9605° E
2	<i>O.A. inclusus</i> (Walker, 1858)	China India	35.8617° N, 104.1954° E 20.5937° N, 78.9629° E
3	<i>O.A. italicus</i> (Reiche, 1853)	China Pakistan India	35.8617° N, 104.1954° E 30.3753° N, 69.3451° E 20.99130N, 74.31880E
4	<i>O.A. frater</i> Pittino, 2005	Pakistan India Srilanka	30.3753° N, 69.3451° E 20.99130N, 74.31880E 7.8731° N, 80.7718° E
5	<i>O.A. granulatus</i> (Herbst, 1783).	India Pakistan Afghanistan	20.99130N, 74.31880E 30.3753° N, 69.3451° E 33.9391° N, 67.7100° E
6	<i>O.A. haagi</i> (Harold, 1872)	India Pakistan	22.9868° N, 87.8550° E 30.3753° N, 69.3451° E
7	<i>O.A. indicus</i> (Harold, 1872)	India	20.99130N, 74.31880E
8	<i>O.A. inermis</i> Pittino, 2005	India Vietnam Sri Lanka	20.99130N, 74.31880E 14.0583° N, 108.2772° E 7.8731° N, 80.7718° E
9	<i>O.A. omacanthus</i> (Harold, 1872)	India	20.99130N, 74.31880E
10	<i>O.A. pauliani</i> (Haaf, 1954)	India Indonesia Vietnam Nepal Sri Lanka	20.99130N, 74.31880E 0.7893° S, 113.9213° E 14.0583° N, 108.2772° E 28.3949° N, 84.1240° E 7.8731° N, 80.7718° E
11	<i>O.A. procerus</i> (Harold, 1872)	China India Pakistan Iran	35.8617° N, 104.1954° E 20.99130N, 74.31880E 30.3753° N, 69.3451° E 32.4279° N, 53.6880° E
12	<i>O.A. rimulosus</i> (Haaf, 1957)	India	11.1271° N, 78.6569° E
13	<i>O.A. testudo</i> (Arrow, 1927)	Pakistan India	30.3753° N, 69.3451° E 11.1271° N, 78.6569° E
14	<i>O.A. maindroni</i> Pittino, 2005	Pakistan	30.3753° N, 69.3451° E
15	<i>O.A. verrucosus</i> (Reiche, 1856)	Iran Iraq	32.4279° N, 53.6880° E 33.2232° N, 43.6793° E
16	<i>O.A. lobicollis</i> (Arrow, 1927)	Thailand Myanmar	15.8700° N, 100.9925° E 21.9162° N, 95.9560° E

Table III. *Afromorgus* species from African countries (Zidek, 2013, 2017).

1. Ethiopia	1. <i>O. Omorgus (Afromorgus) ponderosus</i> (Péringuey, 1901) 2. <i>O.A. procerus</i> (Harold, 1872) 3. <i>O.A. tuberosus</i> (Klug, 1855) 4. <i>O.A. denticulatus</i> (Olivier, 1789) 5. <i>O.A. gemmatus</i> (Olivier, 1789) 6. <i>O.A. melancholicus</i> (Fähræus, 1857) 7. <i>O.A. mutabilis</i> (Haaf, 1954), 8. <i>O.A. niloticus niloticus</i> (Harold, 1872) 9. <i>O.A. obesus</i> (Scholtz, 1980)
2. Mozambique	1. <i>O.A. ponderosus</i> (Péringuey, 1901) 2. <i>O.A. tuberosus</i> (Klug, 1855) 3. <i>O.A. unguicularis</i> (Haaf, 1954) 4. <i>O.A. melancholicus</i> (Fähræus, 1857) 5. <i>O.A. mutabilis</i> (Haaf, 1954)
3. RSA	1. <i>O.A. ponderosus</i> (Péringuey, 1901) 2. <i>O.A. radula</i> (Erichson, 1843) 3. <i>O.A. rusticus</i> (Fähræus, 1857) 4. <i>O.A. tuberosus</i> (Klug, 1855) 5. <i>O.A. unguicularis</i> (Haaf, 1954) 6. <i>O.A. zumpti</i> (Haaf, 1957) 7. <i>O.A. asperulatus</i> (Harold, 1872) 8. <i>O.A. freyi</i> (Haaf, 1954) 9. <i>O.A. lindemanna</i> (Petrovitz, 1975) 10. <i>O.A. melancholicus</i> (Fähræus, 1857) 11. <i>O.A. mutabilis</i> (Haaf, 1954)
4. Tanzania	1. <i>O.A. ponderosus</i> (Péringuey, 1901) 2. <i>O.A. radula</i> (Erichson, 1843) 3. <i>O.A. tuberosus</i> (Klug, 1855) 4. <i>O.A. wittei</i> (Haaf, 1955) 5. <i>O.A. acinus</i> (Scholtz, 1980) 6. <i>O.A. baccatus</i> (Gerstaecker, 1866) 7. <i>O.A. denticulatus</i> (Olivier, 1789) 8. <i>O.A. discedens</i> (Haaf, 1954) 9. <i>O.A. glaber</i> (Scholtz, 1980) 10. <i>O.A. lindemanna</i> (Petrovitz, 1975) 11. <i>O.A. lugubris</i> (Haaf, 1954) 12. <i>O.A. melancholicus</i> (Fähræus, 1857) 13. <i>O.A. mutabilis</i> (Haaf, 1954), 14. <i>O.A. niloticus niloticus</i> (Harold, 1872) 15. <i>O.A. obesus</i> (Scholtz, 1980)
5. Zimbabwe	1. <i>O.A. ponderosus</i> (Péringuey, 1901) 2. <i>O.A. radula</i> (Erichson, 1843) 3. <i>O.A. rusticus</i> (Fähræus, 1857) 4. <i>O.A. unguicularis</i> (Haaf, 1954) 5. <i>O.A. wittei</i> (Haaf, 1955) 6. <i>O.A. zumpti</i> (Haaf, 1957) 7. <i>O.A. melancholicus</i> (Fähræus, 1857)
6. Cameroon	1. <i>O.A. principalis</i> (Haaf, 1954) 2. <i>O.A. melancholicus</i> (Fähræus, 1857)

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7. Chad	1. <i>O.A. principalis</i> (Haaf, 1954) 2. <i>O.A. procerus</i> (Harold, 1872), 3. <i>O.A. borgognoi</i> (Marchand, 1902) 4. <i>O.A. gemmatus</i> (Olivier, 1789) 5. <i>O.A. melancholicus</i> (Fähræus, 1857)
8. Nigeria	1. <i>O.A. principalis</i> (Haaf, 1954) 2. <i>O.A. procerus</i> (Harold, 1872), 3. <i>O.A. gemmatus</i> (Olivier, 1789) 4. <i>O.A. guttalis</i> (Haaf, 1954) 5. <i>O.A. melancholicus</i> (Fähræus, 1857)
9. Sudan	1. <i>O.A. principalis</i> (Haaf, 1954) 2. <i>O.A. procerus</i> (Harold, 1872), 3. <i>O.A. denticulatus</i> (Olivier, 1789) 4. <i>O.A. gemmatus</i> (Olivier, 1789) 5. <i>O.A. melancholicus</i> (Fähræus, 1857) 6. <i>O.A. niloticus niloticus</i> (Harold, 1872)
10. Senegal	1. <i>O.A. procerus</i> (Harold, 1872), 2. <i>O.A. senegalensis</i> (Scholtz, 1983) 3. <i>O.A. gemmatus</i> (Olivier, 1789) 4. <i>O.A. guttalis</i> (Haaf, 1954) 5. <i>O.A. melancholicus</i> (Fähræus, 1857)
11. Somalia	1. <i>O.A. procerus</i> (Harold, 1872), 2. <i>O.A. denticulatus</i> (Olivier, 1789) 3. <i>O.A. discedens</i> (Haaf, 1954) 4. <i>O.A. expansus</i> (Arrow, 1900) 5. <i>O.A. gemmatus</i> (Olivier, 1789) 6. <i>O.A. niloticus niloticus</i> (Harold, 1872)
12. Arabia	1. <i>O.A. procerus</i> (Harold, 1872)
13. Burkina Faso	1. <i>O.A. procerus</i> (Harold, 1872)
14. Egypt	1. <i>O.A. procerus</i> (Harold, 1872), 2. <i>O.A. verrucosus</i> (Reiche, 1856) 3. <i>O.A. gemmatus</i> (Olivier, 1789)
15. Mali	1. <i>O.A. procerus</i> (Harold, 1872), 2. <i>O.A. borgognoi</i> (Marchand, 1902) 3. <i>O.A. gemmatus</i> (Olivier, 1789) 4. <i>O.A. guttalis</i> (Haaf, 1954) 5. <i>O.A. melancholicus</i> (Fähræus, 1857)
16. Niger	1. <i>O.A. procerus</i> (Harold, 1872), 2. <i>O.A. gemmatus</i> (Olivier, 1789)
17. Angola	1. <i>O.A. radula</i> (Erichson, 1843) 2. <i>O.A. varicosus</i> (Erichson, 1843) 3. <i>O.A. wittei</i> (Haaf, 1955) 4. <i>O.A. endroedyi</i> (Scholtz, 1979) 5. <i>O.A. insignis</i> (Scholtz, 1979) 6. <i>O.A. melancholicus</i> (Fähræus, 1857)
18. Botswana	1. <i>O.A. radula</i> (Erichson, 1843) 2. <i>O.A. tuberosus</i> (Klug, 1855) 3. <i>O.A. zumpti</i> (Haaf, 1957) 4. <i>O.A. asperulatus</i> (Harold, 1872) 5. <i>O.A. melancholicus</i> (Fähræus, 1857) 6. <i>O.A. mutabilis</i> (Haaf, 1954)

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19. Kenya	1. <i>O.A. radula</i> (Erichson, 1843) 2. <i>O.A. tuberosus</i> (Klug, 1855) 3. <i>O.A. zumpti</i> (Haaf, 1957) 4. <i>O.A. amitinus</i> (Kolbe, 1904) 5. <i>O.A. baccatus</i> (Gerstaecker, 1866) 6. <i>O.A. denticulatus</i> (Olivier, 1789) 7. <i>O.A. discedens</i> (Haaf, 1954) 8. <i>O.A. lugubris</i> (Haaf, 1954) 9. <i>O.A. melancholicus</i> (Fähræus, 1857) 10. <i>O.A. mutabilis</i> (Haaf, 1954), 11. <i>O.A. niloticus niloticus</i> (Harold, 1872) 11. <i>O.A. obesus</i> (Scholtz, 1980)	34. Eriteria	1. <i>O.A. gemmatus</i> (Olivier, 1789) 2. <i>O.A. melancholicus</i> (Fähræus, 1857)
20. Mozambique	1. <i>O.A. radula</i> (Erichson, 1843)	35. Gambia	1. <i>O.A. gemmatus</i> (Olivier, 1789) 2. <i>O.A. melancholicus</i> (Fähræus, 1857)
21. Namibia	1. <i>O.A. radula</i> (Erichson, 1843) 2. <i>O.A. rusticus</i> (Fähræus, 1857) 3. <i>O.A. wittei</i> (Haaf, 1955) 4. <i>O.A. zumpti</i> (Haaf, 1957) 5. <i>O.A. asperulatus</i> (Harold, 1872) 6. <i>O.A. endroedyi</i> (Scholtz, 1979) 7. <i>O.A. foveolatus</i> (Boheman, 1860) 8. <i>O.A. freyi</i> (Haaf, 1954) 9. <i>O.A. insignis</i> (Scholtz, 1979) 10. <i>O.A. melancholicus</i> (Fähræus, 1857)	36. Ghana	1. <i>O.A. gemmatus</i> (Olivier, 1789) 2. <i>O.A. guttalis</i> (Haaf, 1954) 3. <i>O.A. melancholicus</i> (Fähræus, 1857)
22. Socotra	1. <i>O.A. reiterorum</i>	37. Guinea	1. <i>O.A. gemmatus</i> (Olivier, 1789) 2. <i>O.A. melancholicus</i> (Fähræus, 1857)
23. RSA (Cape)	1. <i>O.A. satorui</i> Kawai, 2006	38. Burkina Faso	1. <i>O.A. genieri</i> Scholtz, 1991
24. Ivory Coast	1. <i>O.A. satorui</i> Kawai, 2006, 2. <i>O.A. melancholicus</i> (Fähræus, 1857)	39. Sikkim	1. <i>O.A. italicus</i> (Reiche, 1853)
25. Madagascar	1. <i>O.A. squalidus</i> (Olivier, 1789) 2. <i>O.A. melancholicus</i> (Fähræus, 1857) 3. <i>O.A. niloticus niloticus</i> (Harold, 1872)	40. Italy	1. <i>O.A. italicus</i> (Reiche, 1853)
26. Uganda	1. <i>O.A. tuberosus</i> (Klug, 1855) 2. <i>O.A. denticulatus</i> (Olivier, 1789) 3. <i>O.A. melancholicus</i> (Fähræus, 1857) 4. <i>O.A. mutabilis</i> (Haaf, 1954), 5. <i>O.A. niloticus niloticus</i> (Harold, 1872) 6. <i>O.A. obesus</i> (Scholtz, 1980)	41. CAR	1. <i>O.A. melancholicus</i> (Fähræus, 1857)
27. Zaira	1. <i>O.A. tuberosus</i> (Klug, 1855) 2. <i>O.A. wittei</i> (Haaf, 1955) 3. <i>O.A. melancholicus</i> (Fähræus, 1857) 4. <i>O.A. mutabilis</i> (Haaf, 1954)	42. Comoros	1. <i>O.A. melancholicus</i> (Fähræus, 1857)
28. Arabian peninsula	1. <i>O.A. verrucosus</i> (Reiche, 1856)	43. Malawi	1. <i>O.A. melancholicus</i> (Fähræus, 1857) 2. <i>O.A. mutabilis</i> (Haaf, 1954)
29. Zambia	1. <i>O.A. wittei</i> (Haaf, 1955) 2. <i>O.A. melancholicus</i> (Fähræus, 1857)	44. Rwanda	1. <i>O.A. melancholicus</i> (Fähræus, 1857)
30. Mauritania	1. <i>O.A. borgognoi</i> (Marchand, 1902) 2. <i>O.A. gemmatus</i> (Olivier, 1789)	45. Sierra Leone	1. <i>O.A. melancholicus</i> (Fähræus, 1857)
31. Djibouti	1. <i>O.A. denticulatus</i> (Olivier, 1789) 2. <i>O.A. gemmatus</i> (Olivier, 1789) 3. <i>O.A. niloticus niloticus</i> (Harold, 1872) 4. <i>O.A. obesus</i> (Scholtz, 1980),	46. Togo	1. <i>O.A. melancholicus</i> (Fähræus, 1857)
32. Africa	1. <i>O.A. funestus</i> (Lansberge, 1886)	47. Annam	1. <i>O.A. pauliani</i> (Haaf, 1954)
33. Arabia	1. <i>O.A. gemmatus</i> (Olivier, 1789)		

Table continued on next column.....

Dark brownish in color. The leaves are wider at the base and become pointed at the apex. Leaves of lamella have small few bristles (Fig. 2H). Pronotum is punctate and have raised disc. Pronotum is also brownish in color same as the color of head. Pronotum disc is convex and have two outgrowth lines in the mid of the pronotum. Edges of the pronotum is extended and have about 4 teeth. Two eyes like tubercles are also present on both sides of the pronotum giving eyes like appearance on the pronotum (Fig. 2F). Elytra have black colored bumps which are not even scutellum is hastate type which is a characteristic feature of its identification. Elytra suture is visible and have thickened margins. Base make convex shape with the pronotum but it is round in front of the scutellum. Elytra is extended over the abdomen from all sides and epipleura have thickened margins which becomes narrow at the apical end (Fig. 2G). Fore legs femur of the fore legs is much wider than the femur of the mid and hind legs. two tibial spurs are present. tibia have two visible teeth. Tarsus of the fore leg is small and have small tarsomeres (Fig. 2I). Mid legs Femur is slightly larger than the femur of fore legs. Femur of the mid leg width is in between the width of femur of fore and hind leg. Tibia with two tibial spurs. Tibia have more than 3 rows of tibial spines and 6 tibial spines in a row. Tarsus with 5 tarsomeres and two claws. Hind legs femur is wider than the mid legs femur. Have rows of tibial spines with 8-10 tibial spines in a row at the end have two tibial spurs. With 5 tarsomeres and two claws. Abdomen is totally covered in the elytra. oval shaped. 4 sternites are present after the hind legs.

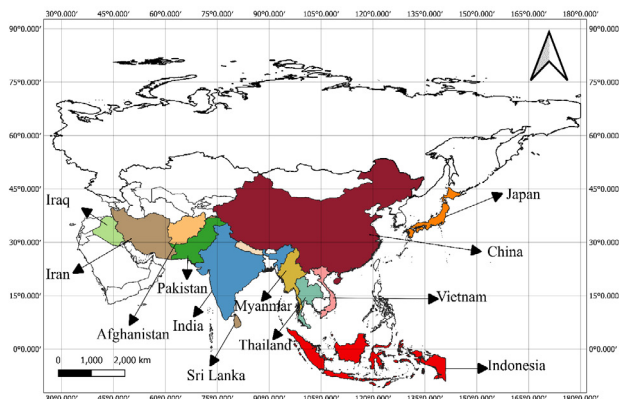


Fig. 3. Distribution of *Afromorgus* fauna in Asian Countries (Zidek, 2013, 2017).

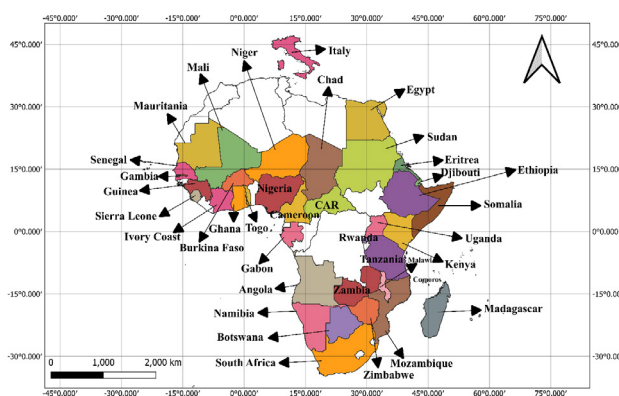


Fig. 4. Distribution of *Afromorgus* fauna in Africa with exception of species from Italy (Zidek, 2013, 2017).

Different views of the insect are given in Figure 2C, D. Measurement of holotype, allotype and paratype is given in Table IV.

Material examined

Pakistan, Punjab Prov., 1 ♂; 3 ♀♀ Waseem and Kumar; 2 Jun 2022; Bahawalpur; Cholistan Desert, 71°42.50'E, 29°20.08'N.

Habitat

Both sampling areas in the Cholistan desert exhibit a combination of desert and semi-desert patches, providing a diverse range of vegetation. This vegetation serves as important habitat for beetles and other insects, offering shelter and breeding sites. Following rainfall, the burrows of insects become filled with water. This phenomenon prompts insects, including hide beetles, to emerge from their burrows and spend some time on the surface. Therefore, collecting specimens after rainfall is an

opportune time, as it increases the likelihood of finding insects outside of their burrows. The distribution of various species of *Afromorgus* in Asian and African countries is shown in Tables I-III and Figures 3-4.

Table IV. Morphometry of various body parts of *Omorgus (Afromorgus) riffati* nov. sp.

Body parameter	Holotype (n=1)	Allotype (n=1)	Paratype (n=2)
Head	3 mm	3.1 mm	3.07 mm
Antennae	2 mm	2.07 mm	2.5 mm
Pronotum	4.9 mm	5 mm	6.1 mm
Elytra	12 mm	11.5 mm	11.3 mm
Abdomen	10.5 mm	9.5 mm	9.1 mm
Total body length	18.5 mm	18.6 mm	18.2 mm
Fore leg			
Femur	4.3 mm	4 mm	4.09 mm
Tibia	3 mm	3 mm	3.2 mm
Tarsus	2 mm	1.5 mm	1.7 mm
Mid leg			
Femur	5 mm	4.5 mm	4.2 mm
Tibia	4.5 mm	4.1 mm	3.3 mm
Tarsus	3.1 mm	3 mm	2.76 mm
Hind leg			
Femur	5.1 mm	5 mm	5.07 mm
Tibia	5 mm	5 mm	4.15 mm
Tarsus	3.9 mm	3.01 mm	3.24 mm

Derivatio nominis

This species is specifically named in honor of Dr. Riffat Sultana, as a tribute to her significant contributions to the field of Entomology in Pakistan.

Remarks

These beetles construct burrows in the soil. Additionally, the Cholistan desert is home to various floral communities that possess medicinal value and serve as shelter for these beetles. The sub-genus *Afromorgus* is distributed in the Afro-Oriental region and exhibits a color range from grey and brown to black.

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IRB approval

IRB approval was obtained ensuring ethical compliance for the present study.

Ethics statement

This study, which does not involve any endangered species, upholds ethical standards through responsible research practices and respectful consideration of the local environment.

Statement of conflict of interest

The authors have declared no conflict of interest.

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