



Revision of the assassin bug genus *Neopirates* (Heteroptera: Reduviidae: Peiratinae), with descriptions of two new species from Namibia

YINGQI LIU¹, ZHUO CHEN¹, MICHAEL D. WEBB² and WANZHI CAI^{1,*}

¹ Department of Entomology and MOA Key Lab of Pest Monitoring and Green Management, China Agricultural University, Yuanmingyuan West Road, Beijing 100193, China; e-mails: yingqiliu0720@163.com; insectchen625@126.com; caiwz@cau.edu.cn

² Department of Life Sciences (Insects), The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.; e-mail: m.webb@nhm.ac.uk

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Abstract. The African assassin bug genus *Neopirates* Miller, 1952, is revised. The type species, *N. nyassae* Miller, 1952, is redescribed and illustrated; two new species from Namibia, *N. bicolor* Liu & Cai sp. n. and *N. xanthothorax* Liu & Cai sp. n. are described and a key is provided to separate the three species of this genus. *Sphodrembas fumipennis* Swanson, 2019, the type species of *Sphodrembas* Swanson, 2019, is placed as a junior synonym of *N. nyassae*, resulting in *Sphodrembas* becoming a junior synonym of *Neopirates*. Morphological differences between *Neopirates* and similar genera and the distribution of *Neopirates* are briefly discussed.

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INTRODUCTION

As one of the largest assassin bug subfamilies, Peiratinae (Reduviidae) is a diverse taxon comprising 34 genera and over 300 species distributed worldwide (Maldonado-Capriles, 1990; Chłond, 2007; Zhang & Weirauch, 2011; Melo, 2012; Weirauch et al., 2014; Swanson, 2019). The following combination of characters makes Peiratinae a unique group within Reduviidae: anterior pronotal lobe longer than posterior lobe, elongate forecoxa, prominent fossula spongiosa on the fore and mid tibiae, and asymmetrical male genitalia (Weirauch et al., 2014). Up to now, there have been 18 peiratine genera recorded in the Afrotropical Region but only a few of them have been well reviewed (Coscarón, 1995, 1997, 1999, 2002; Coscarón & Morrone, 1995; Zhang & Weirauch, 2011; Chłond, 2018). Moreover, many Afrotropical peiratine genera are monotypic, not only reflecting the morphological diversity of this group but also indicating that the true species diversity will be revealed through more detailed studies.

Neopirates was established by Miller (1952) based on a single species, *Neopirates nyassae* Miller, 1952, from

Nyasaland (now Malawi); after nearly 70 years, *Neopirates* remains monotypic. Recently, Swanson (2019) proposed another monotypic peiratine genus *Sphodrembas* (type species: *Sphodrembas fumipennis* Swanson, 2019), based on specimens from Tanzania and Kenya, with a very detailed description. However, after examining the holotype of *N. nyassae* and comparing it with the figures and original description of *S. fumipennis*, we found that they should be the same species. We therefore propose *S. fumipennis* as a junior synonym of *N. nyassae*, syn. n., and thus *Sphodrembas* as a junior synonym of *Neopirates*, syn. n. Besides, during our examination of museum specimens, two new *Neopirates* species from Namibia were identified. In the present study, the genus *Neopirates* is reviewed and a modified generic diagnosis given. A redescription of the type species and descriptions of the two new species are provided together with a key for their separation. Morphological differences between *Neopirates* and its similar genera, together with distribution and habitat of *Neopirates* are also briefly discussed.

* Corresponding author; e-mail: caiwz@cau.edu.cn

MATERIAL AND METHODS

This study is based on specimens deposited in the Natural History Museum, London, UK (NHMUK) and the Natural History Museum of Los Angeles County, California, USA (LACM). Label data are copied verbatim in quotation marks (“ ”) with different labels separated by a double slash (“//”). Male genitalia were soaked in hot 20% lactic acid solution for approximately ten minutes to remove soft tissue, rinsed in distilled water and dissected under a dissecting microscope. Dissected genitalia were placed in vials with glycerin and pinned under the corresponding specimens after examination. Images were taken using a Canon 7D Mark II digital camera with Canon EF 100 mm micro lens or 65 mm micro lens and an Olympus E-M1 II digital camera with Olympus M. ZUIKO digital ED 60 mm micro lens. Helicon Focus version 5.3 was used for image stacking. Measurements were obtained using a calibrated micrometer. Body length represents the distance between the apex of the head and the tip of the abdomen in resting condition. The distribution map was built using the online version of SimpleMapper (Shorthouse, 2010). The distribution data are based on our examination of museum specimens, supplemented by data from Miller (1952) and Swanson (2019). Morphological terminology mainly follows Lent & Wygodzinsky (1979), Cai & Taylor (2006) and Swanson (2019).

TAXONOMY

Genus *Neopirates* Miller, 1952

(Figs 1–61)

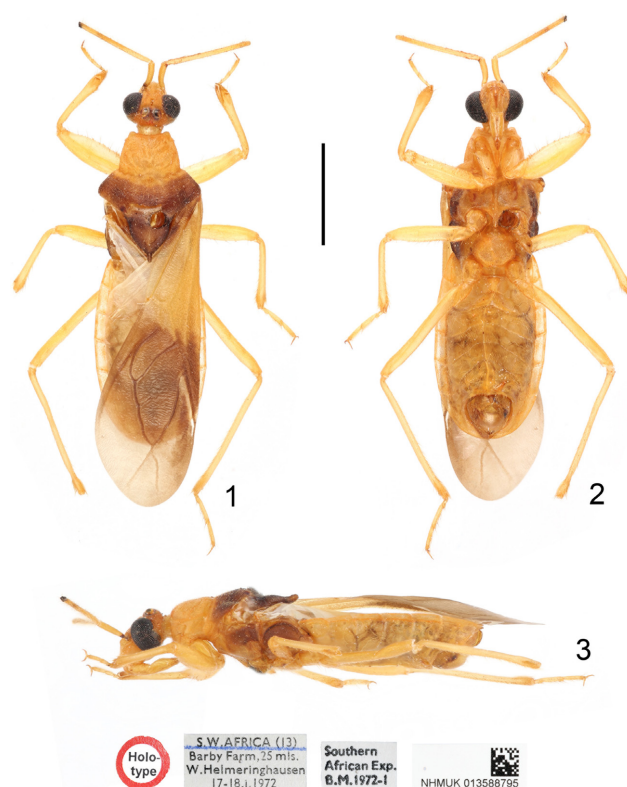
Neopirates Miller, 1952: 551–552; Maldonado-Capriles, 1990: 362. Type species: *Neopirates nyassae* Miller, 1952, by monotypy.

Sphodrembas Swanson, 2019: 210–211. Type species: *Sphodrembas fumipennis* Swanson, 2019, by original designation. New synonymy.

Diagnosis. Male macropterous (Figs 1–3, 21–23, 41–43), female unknown; head moderately elongate with postocular part somewhat abruptly narrowed (Figs 4, 24, 44); transverse width of eye in dorsal view subequal to width of interocular space (Figs 4, 24, 44); anterior lobe of pronotum subquadrate; pronotal transverse sulcus obsolete (Figs 24, 44) or slight (Fig. 4); metapleural sulcus curved and unicarinate (Figs 5, 25, 45); fore tibia with fossula spongiosa occupying about 1/3 (Figs 27, 47) or 1/4 (Fig. 7) of tibial length, mid tibia with fossula spongiosa occupying only apex of ventral surface (Figs 8, 28, 48); hind coxae separated from each other by width of one coxa (Figs 6, 26, 46); hemelytron and hind wing both extending beyond tip of abdomen (Figs 10, 30, 50); male genitalia with median pygophore process nearly straight, oblique to right side in caudal view, ventral surface of median pygophore process with a longitudinal ridge (Figs 13, 14, 33, 34, 53, 54); base of left lateral phallosomal sclerite with a slender, strongly sclerotized sclerite, extending to venter of phallosoma, venter of phallosoma with another slender sclerite, shorter than lateral one and nearly connected to it (Figs 18, 19, 38, 39, 58, 59).

Redescription. Macropterous male (Figs 1–3, 21–23, 41–43), female unknown.

Coloration. Yellow and brown in large part, sometimes with intraspecific variation in color of head, pleura, sterna



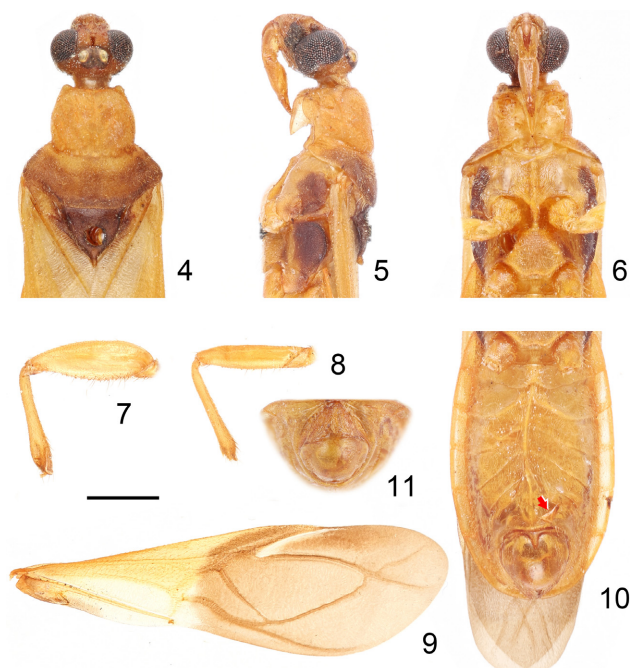
Figs 1–3. *Neopirates bicolor* sp. n., holotype male, habitus. 1 – dorsal view; 2 – ventral view; 3 – lateral view. Scale bar = 3.00 mm.

and abdomen (Figs 1–3, 21–23, 41–43). Head with irregular blackish mark around ocelli (Figs 4, 24, 44); legs entirely yellow (Figs 1–3, 21–23, 41–43).

Structure. Small to medium sized. Body surface and costal area of corium densely covered with yellow, procumbent, short pubescence; first and second antennal segments with yellowish brown, suberect, short setae; ventral surface of femora, ventral and lateral surfaces (especially apex) of tibiae and ventral surface of tarsi covered with yellow to brown, suberect or erect, thick setae of varying lengths (Figs 1–3, 21–23, 41–43).

Head moderately elongate with anteocular part longer than postocular, postocular part somewhat ellipsoidal; interocular space with a median, short, deep sulcus connecting to frontoclypeal sulcus (Figs 4, 24, 44). Eye large, width of eye subequal to width of interocular space in dorsal view (Figs 4, 24, 44), reniform in lateral view, reaching dorsal margin and nearly reaching ventral margin of head (Figs 5, 25, 45). Ocelli located on small tubercles (Figs 5, 25, 45), width of interocellar space one to two times width of ocellus (Figs 4, 24, 44). First antennal segment thickest and shortest, second segment slender and longest, third and fourth segments gracile. First and second visible rostral segments thick, second segment longest and slightly swollen, third segment tapered (Figs 5, 6, 25, 26, 45, 46). Neck with 1+1 weakly developed tubercles (Figs 4, 24, 44).

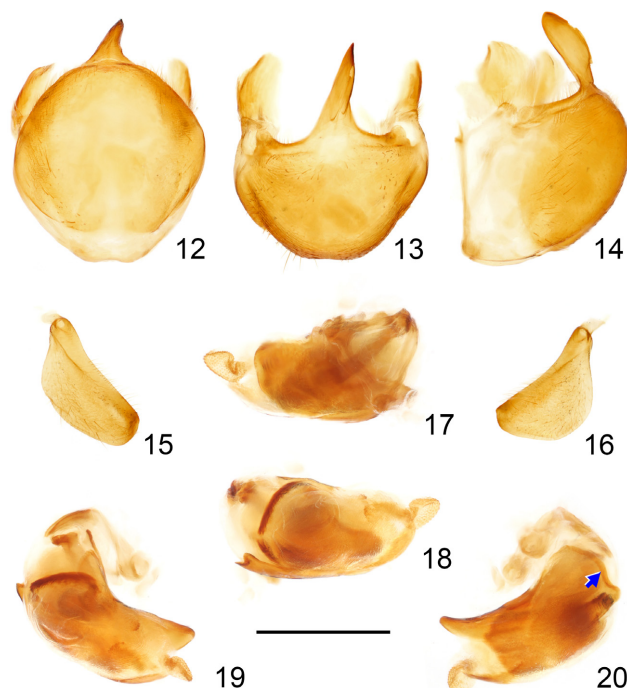
Pronotum with collar process developed; anterior lobe of pronotum longer and narrower than posterior lobe; anterior lobe of pronotum subquadrate with a median, longitudinal, shallow sulcus on posterior portion, sculpture not clear;



Figs 4–11. *Neopirates bicolor* sp. n., paratype male. 4–6 – anterior part of body with antennae and legs removed; 7 – left fore leg without tarsus; 8 – right mid leg without tarsus; 9 – right hemelytron; 10, 11 – abdomen. 4, 9 – dorsal view; 5 – lateral view; 6–8, 10 – ventral view; 11 – caudal view. Arrow indicates the extragenital process. Scale bar = 1.50 mm.

pronotal transverse sulcus obsolete or slight (*N. bicolor* sp. n.); surface of posterior lobe of pronotum coarse, lateral pronotal angle round, posterior margin of pronotum nearly straight in middle but slightly concave bilaterally (Figs 4, 24, 44). Scutellum subtriangular (Figs 4, 24, 44), Y-shaped ridges thick with apex of scutellum rounded (Figs 24, 44) or Y-shaped ridges slender with apex of scutellum prolonged as a small process (Fig. 4). Stridulitrum fairly long to long with total-striate type of sculpture (Figs 6, 26, 46). Surfaces of pleura and sterna finely wrinkled (Figs 5, 6, 25, 26, 45, 46); metapleural sulcus represented only by single curved carina (Figs 5, 25, 45); mesosternum with a median longitudinal ridge (Figs 6, 26, 46). Fore femur slightly thickened (Figs 7, 27, 47), thicker than mid and hind femora; fore tibia clavate, gradually thickened to apex, apex of inner surface with a tibial comb, fossula spongiosa occupying about 1/3 or 1/4 of tibial length (Figs 7, 27, 47); mid tibia with fossula spongiosa occupying only apex of ventral surface (Figs 8, 28, 48); hind coxae separated from each other by width of one coxa (Figs 6, 26, 46). Hemelytron distinctly extending beyond tip of abdomen, hind wing also extending beyond tip of abdomen (Figs 10, 30, 50).

Abdomen oval; connexivum slightly dilated laterally; venter of abdomen slightly carinate in middle (Figs 30, 50) or with a median ridge running from anterior of second abdominal sternite to posterior of seventh abdominal sternite and slightly curved to right side of body (Fig. 10); left side of seventh abdominal sternite sometimes with an extragenital process (Figs 10, 50).



Figs 12–20. Male genitalia of *Neopirates bicolor* sp. n., paratype. 12–14 – pygophore; 15 – left paramere; 16 – right paramere; 17–20 – phallus. 12, 18 – ventral view; 13 – caudal view; 14, 19, 20 – lateral view; 15, 16 – outer ventrolateral view; 17 – dorsal view. Blue arrow indicates the basal margin of the right lateral phallothecal sclerite. Scale bar = 1.00 mm.

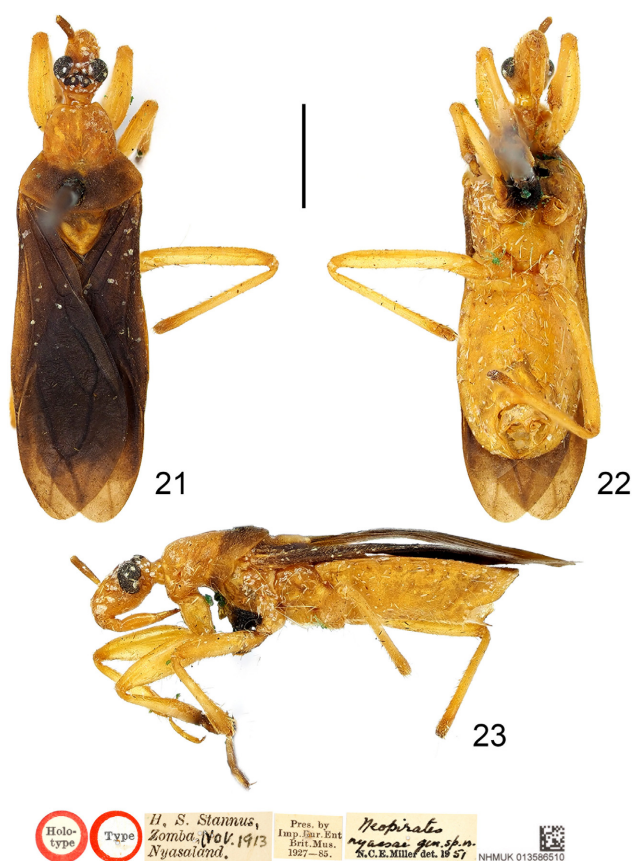
Male genitalia asymmetric (Figs 11–20, 31–40, 51–60). Pygophore oval in ventral view (Figs 12, 32, 52); median pygophore process nearly straight, oblique to right side in caudal view, ventral surface with a longitudinal ridge (Figs 13, 33, 53). Left paramere (Figs 15, 35, 55) slightly longer and slenderer than right paramere (Figs 16, 36, 56). Phallus with phallobase weakly sclerotized, length of basal plate bridge subequal to basal plate (Figs 17, 37, 57); pedicel slightly curved and shorter than basal plate (Figs 19, 39, 59). Dorsal phallothecal sclerite strongly sclerotized, broad and bent inward with apex bluntly rounded (Figs 17, 37, 57); Base of left lateral phallothecal sclerite with a slender, strongly sclerotized sclerite, extending to venter of phallosoma, venter of phallosoma with another slender sclerite, shorter than lateral one and nearly connecting to it (Figs 18, 19, 38, 39, 58, 59).

Distribution. Afrotropical Region (Fig. 61).

Remarks. See discussion for details on generic synonymy.

Key to species of *Neopirates* Miller

- 1 Scutellum with Y-shaped ridges slender, apex of scutellum prolonged as a small process (Fig. 4); hemelytron with basal half yellow and apical half brown (Fig. 9); venter of male abdomen with a curved, median ridge running from anterior of second abdominal sternite to posterior of seventh abdominal sternite (Fig. 10) *N. bicolor* Liu & Cai sp. n.
- Scutellum with Y-shaped ridges thick, apex of scutellum rounded (Figs 24, 44); hemelytron brown (Figs 29, 49); venter of male abdomen slightly carinate in middle (Figs 30, 50) 2



Figs 21–23. *Neopirates nyassae*, holotype male, habitus. 21 – dorsal view; 22 – ventral view; 23 – lateral view. Scale bar = 3.00 mm.

- 2 Body length over 10 mm; pronotum with anterior lobe yellow and posterior lobe brown (Fig. 24); seventh abdominal sternite without extragenital process (Fig. 30) *N. nyassae* Miller, 1952
- Body length less than 10 mm; pronotum entirely yellow (Fig. 44); left side of seventh abdominal sternite with a small fusiform extragenital process (Fig. 50) *N. xanthothorax* Liu & Cai sp. n.

***Neopirates bicolor* Liu & Cai sp. n.**

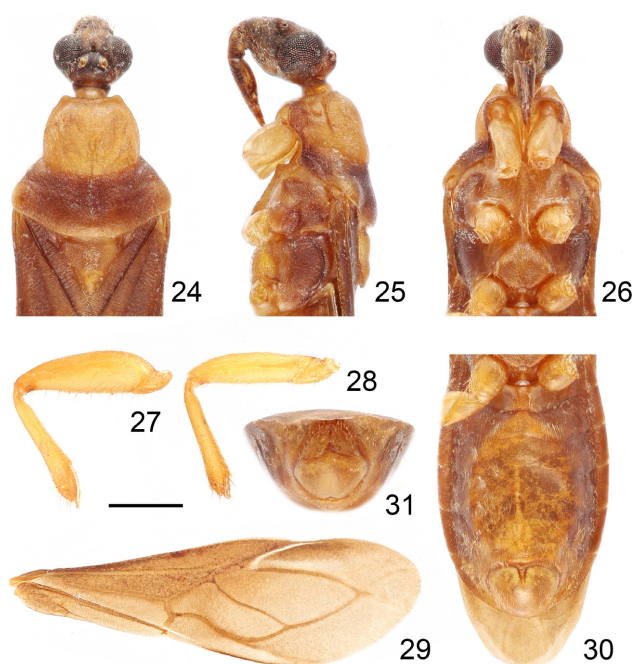
(Figs 1–20, 61)

ZooBank taxon LSID:

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Diagnosis. Body length 9.87–9.93 mm; anterior lobe of pronotum yellow, posterior lobe brown with basal margin yellow; hemelytron bicolored, basal half yellow, apical half brown with lateral margin darker; pronotal transverse sulcus slight; scutellum with Y-shaped ridges slender, apex of scutellum prolonged as a small process; fore tibia with fossula spongiosa occupying about 1/4 of tibial length; venter of abdomen with a median ridge slightly curved to right side of body and a triangular extragenital process; left paramere paddle-shaped, right paramere nearly trapeziform; apex of median pygophore process rounded in lateral view; basal margin of right lateral phallosclerite smooth.

Description. Male macropterous (Figs 1–3), female unknown. **Coloration.** Yellow. First antennal segment yellow, second segment yellow with apical portion brownish,

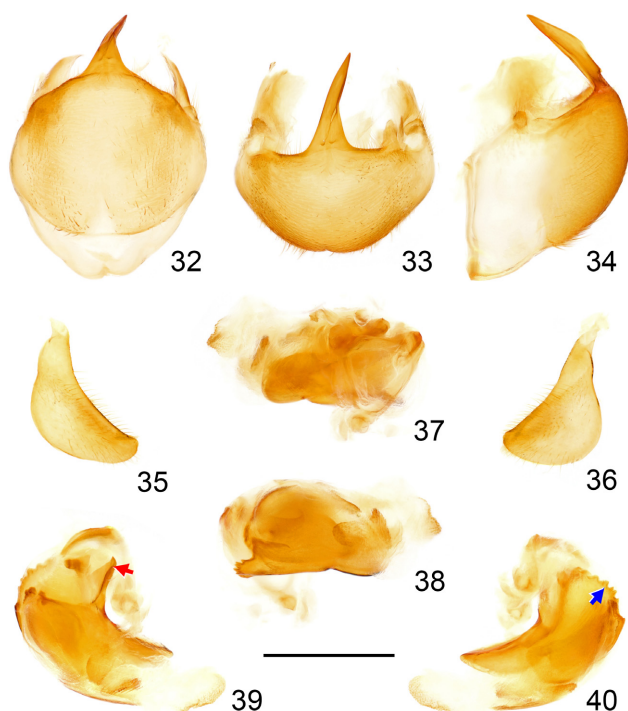


Figs 24–31. *Neopirates nyassae*, male (Lesotho). 24–26 – anterior part of body with antennae and legs removed; 27 – left fore leg without tarsus; 28 – right mid leg without tarsus; 29 – right hemelytron; 30, 31 – abdomen. 24, 29 – dorsal view; 25 – lateral view; 26–28, 30 – ventral view; 31 – caudal view. Scale bar = 1.50 mm.

third segment brown with apex yellow, fourth segment unknown; head dark yellow to yellowish brown with irregular blackish mark around ocelli (Fig. 4) and sometimes with blackish spot in front of eye on lateral surface of head (Fig. 5); anterior lobe of pronotum yellow, posterior lobe brown with basal margin yellow (Fig. 4); scutellum brown (Fig. 4); pleura brown with margin diffused yellow (Fig. 5); basal half of hemelytron yellow, apical half of hemelytron brown with lateral margin darker, membrane with a whitish stripe along inner side of R (Fig. 9); abdomen yellow, sometimes with some diffuse brown markings laterally (Fig. 10).

Structure: Small sized. Head length 1.13–1.21 times as long as its width; width of interocellar space subequal to width of ocellus (Fig. 4); second antennal segment about three times as long as first segment. Pronotum with apex of collar process rounded; anterior lobe of pronotum 1.27–1.30 times longer than posterior lobe; posterior lobe of pronotum about 1.65–1.71 times wider than anterior lobe; pronotal transverse sulcus slight (Fig. 4). Scutellum with Y-shaped ridges slender, apex of scutellum prolonged as a small process (Fig. 4). Stridulitrum fairly long with total-striate type of sculpture (Fig. 6). Fore tibia with fossula spongiosa occupying about 1/4 of tibial length (Fig. 7). Venter of abdomen with a median ridge running from anterior of second abdominal sternite to posterior of seventh abdominal sternite, slightly curved to right side of body and with a triangular extragenital process on left side of seventh abdominal sternite (Fig. 10).

Male genitalia: Median pygophore process relatively broad with apex rounded in lateral view (Fig. 14); left paramere paddle-shaped (Fig. 15), right paramere nearly tra-



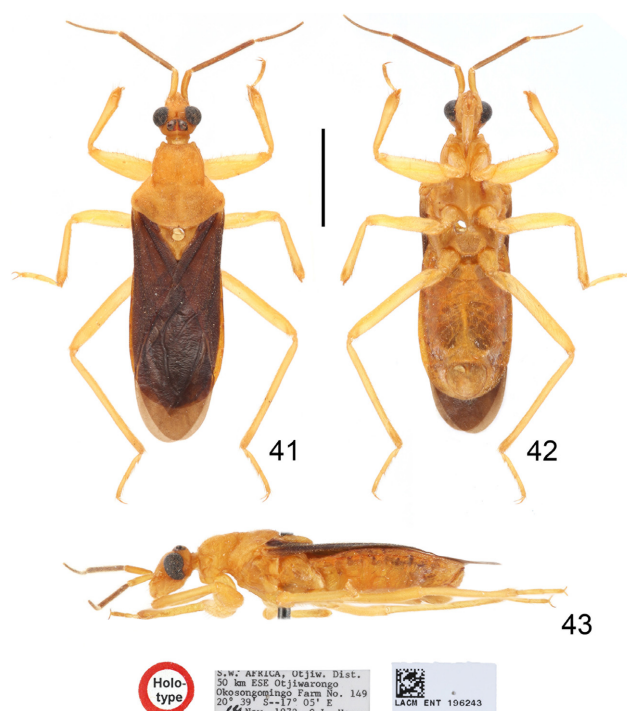
Figs 32–40. Male genitalia of *Neopirates nyassae*. 32–34 – pygophore; 35 – left paramere; 36 – right paramere; 37–40 – phallus. 32, 38 – ventral view; 33 – caudal view; 34, 39, 40 – lateral view; 35, 36 – outer ventrolateral view; 37 – dorsal view. Red arrow indicates the upturned basal portion of the dorsal phallosclerite and blue arrow indicates the basal margin of the right lateral phallosclerite. Scale bar = 1.00 mm.

peziform (Fig. 16); left lateral phallosclerite nearly membranous, with basal slender sclerite extremely sclerotized (Fig. 19); right lateral phallosclerite moderately sclerotized, basal margin smooth with lower 1/3 concave inward (Fig. 20); apex of endosoma with a small sacciform process, of which surface densely covered with tiny tubercles (Figs 17–20).

Measurements [in mm, ♂ (n = 2)]. Body length 9.87–9.93; maximum width of abdomen 3.09–3.19; head length 1.80–1.92; length of anteocular part 0.70–0.73; length of postocular part 0.38–0.40; head width 1.59–1.59; eye width in dorsal view 0.52–0.50; width of interocular space 0.54–0.58; width of interocular space 0.20–0.21; lengths of rostral segments I : II : III = 0.56–0.65 : 0.76–0.76 : 0.48–0.50; lengths of antennal segments I : II : III : IV = 0.80–? : 2.39–? : ?–? : ?–?; length of anterior pronotal lobe 1.35–1.40; length of posterior pronotal lobe 1.04–1.10; width of anterior pronotal lobe 1.64–1.64; width of posterior pronotal lobe 2.80–2.71; scutellum length 1.36–1.17; maximum width of scutellum 1.44–1.60; hemelytron length 8.90–8.51.

Type material. **Namibia:** **Holotype** ♂: red-margined “Holotype” disc // “S. W. AFRICA (13) Barby Farm, 25 mls. W. Helmeringhausen 17–18. I. 1972” // “Southern African Exp. B.M.1972-1” // “NHMUK 013588795” (NHMUK); **Paratype** 1♂: yellow-margined “Paratype” disc // “S.W. AFRICA: Sissekab. 14.XI.1933. K. Jordan.” // “Brit. Mus. 1934-110.” // “NHMUK 013588796” (NHMUK).

Other material examined. **Namibia:** 1? (without abdomen): “S.W. AFRICA: Otjikata Lake [= Otjikoto Lake]. 16.xi.1933. K. Jordan.” // “Brit. Mus. 1934-110.” // “NHMUK 013588797” (NHMUK).



Figs 41–43. *Neopirates xanthothorax* sp. n., holotype male, habitus: 41 – dorsal view; 42 – ventral view; 43 – lateral view. Scale bar = 3.00 mm.

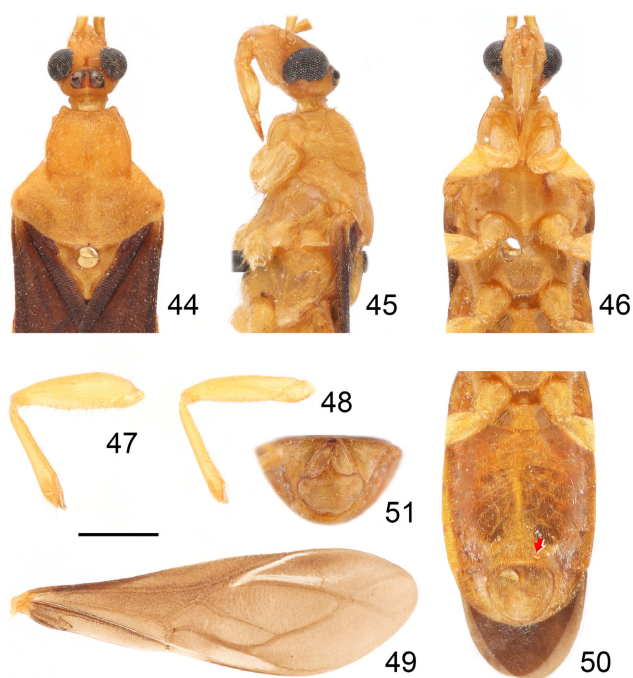
Type locality. Namibia, Karas Region, Berseba, Barby Farm, 25°51'S, 16°33'E.

Etymology. The specific epithet is derived from Latin *bicolor* (meaning “of two colors”), referring to the conspicuously bicolored hemelytron of this new species.

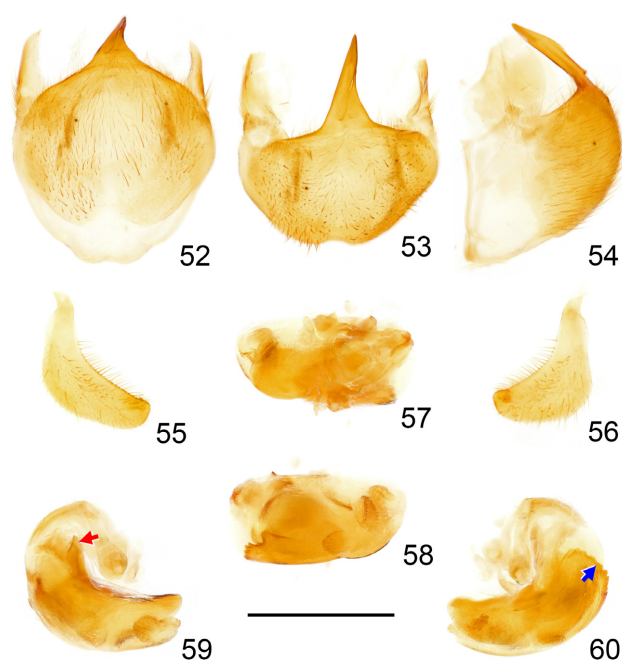
Distribution. Namibia.

Remarks. Of the three specimens of this new species found in NHMUK one is missing the abdomen, so we exclude it from the type series. The intraspecific color variation of this new species is mainly in the head and abdomen: the head of the holotype is dark yellow (Figs 1–3) but the head of the paratype is yellowish brown with a blackish spot in front of the eye on the lateral surface (Figs 4–6) and the abdomen of the paratype (Fig. 10) with more diffuse brownish markings laterally than that of the holotype (Fig. 2).

This new species can be easily distinguished from its congeners due to its bicolored hemelytron, the pronotal transverse sulcus slight and the apex of the scutellum prolonged as a small process instead of rounded. Besides these features, the most special character is the distinct triangular extragenital process on the left side of the seventh abdominal sternite. This kind of extragenital process was first studied by Ghauri (1964) who found that they always occur on the left-hand side of the body and their function could be related to mating behavior. Such extragenital process cannot be included in the generic diagnosis because this structure may only be present in some species of the same genus, such as species in *Peirates* Serville, 1831, and *Phalantus* Stål, 1863. In *Neopirates*, the extragenital process is only present in this new species and *N. xanthothorax* sp. n. and their shapes are totally different (smaller and



Figs 44–51. *Neopirates xanthothorax* sp. n., holotype male. 44–46 – anterior part of body with antennae and legs removed; 47 – left fore leg without tarsus; 48 – right mid leg without tarsus; 49 – right hemelytron; 50, 51 – abdomen. 44, 48 – dorsal view; 45 – lateral view; 46–48, 50 – ventral view; 51 – caudal view. Arrow indicates the extragenital process. Scale bar = 1.50 mm.



Figs 52–60. Male genitalia of *Neopirates xanthothorax* sp. n., holotype. 52–54 – pygophore; 55 – left paramere; 56 – right paramere; 57–60 – phallus. 52, 58 – ventral view; 53 – caudal view; 54, 59, 60 – lateral view; 55, 56 – outer ventrolateral view; 57 – dorsal view. Red arrow indicates the upturned basal portion of the dorsal phallosclerite and blue arrow indicates the basal margin of the right lateral phallosclerite. Scale bar = 1.00 mm.

fusiform in *N. xanthothorax* sp. n.). The male genitalia of this new species differ from those of other *Neopirates* species in the apex of the median pygophore process rounded instead of sharp in the lateral view and the basal margin of the right lateral phallosclerite smooth instead of serrate.

***Neopirates nyassae* Miller, 1952**

(Figs 21–40, 61)

Neopirates nyassae Miller 1952: 552, fig. 10; Maldonado-Capriles, 1990: 362 (catalogue).

Sphodrembas fumipennis Swanson, 2019: 211–214, figs 11–14. New synonymy.

Diagnosis. Body length 10.11–14.5 mm; anterior lobe of pronotum dark yellow, posterior lobe brown; hemelytron brown; anterior lobe of pronotum about 1.30–1.50 times longer than posterior lobe, pronotal transverse sulcus obsolete; scutellum with Y-shaped ridges thick, apex of scutellum rounded; fore tibia with fossula spongiosa occupying slightly longer than 1/3 of tibial length; venter of abdomen only slightly carinate in middle, without extragenital process; parameres subtriangular; apex of median pygophore process sharp in lateral view; basal portion of dorsal phallosclerite distinctly upturned; basal margin of right lateral phallosclerite serrate.

Redescription. Male macropterous (Figs 21–23), female unknown. **Coloration.** Yellow, color of head, pleura, sterna and abdomen varies from yellow to brown among conspecific individuals. Antenna dark yellow; head yellow

(Fig. 21) to brown (Fig. 24) with irregular blackish mark around ocelli (Figs 21, 24); anterior lobe of pronotum dark yellow, posterior lobe brown (Fig. 24); pleura, sterna and abdomen yellow (Figs 22, 23) to yellowish brown (Figs 25, 26, 30), sometimes with diffuse brown markings (Figs 25, 26, 30); hemelytron brown with a whitish thin stripe along R on membrane (Fig. 29).

Structure. Medium sized. Head length 1.30 times as long as width; width of interocellar space slightly longer than width of ocellus (Fig. 24); second antennal segment about twice as long as first segment. Pronotum with apex of collar process rounded; anterior lobe of pronotum about 1.30–1.50 times longer than posterior lobe; posterior lobe of pronotum 1.65 times wider than anterior lobe; pronotal transverse sulcus obsolete (Fig. 24). Scutellum with Y-shaped ridges thick, apex of scutellum rounded (Fig. 24); Stridulitrum long with total-striate type of sculpture (Fig. 26). Fore tibia with fossula spongiosa occupying slightly longer than 1/3 of tibial length (Fig. 27). Venter of abdomen only slightly carinate in middle, without extragenital process (Fig. 30).

Male genitalia: Median pygophore process slender, apex sharp, base with a small spine in lateral view (Fig. 34); parameres subtriangular (Figs 35, 36); basal portion of dorsal phallosclerite distinctly upturned (Fig. 39); left lateral phallosclerite moderately sclerotized (Fig. 39); right lateral phallosclerite moderately sclerotized, basal margin serrate (Fig. 40); endosoma somewhat capsule-shaped, apical surface densely covered with tiny tubercles (Figs 39, 40).

Measurements [in mm, ♂ (n = 3)]. Body length 10.11–12.19; maximum width of abdomen 3.21–3.55; head length 1.92–1.96; length of anteocular part 0.79–0.90; length of postocular part 0.40–0.34; head width 1.49–1.50; eye width in dorsal view 0.50–0.50; width of interocular space 0.49–0.50; width of interocellar space 0.21–0.28; lengths of rostral segments I : II : III = 0.51–0.79 : 1.10–1.17 : 0.43–0.81; lengths of antennal segments I : II : III : IV = 1.00–1.19 : ?–? : ?–? : ?–?; length of anterior pronotal lobe 1.48–1.85; length of posterior pronotal lobe 1.12–1.24; width of anterior pronotal lobe 1.81–2.06; width of posterior pronotal lobe 3.00–3.40; scutellum length 1.10–1.12; maximum width of scutellum 1.48–1.67; hemelytron length 7.78–9.50.

Type material. **Malawi:** Holotype ♂: red-margined “Holotype” disc // red-margined “Type” disc // “H. S. Stannus, Zomba, Nov. 1913 Nyasaland.” // “Pres. by Imp. Bur. Ent. Brit. Mus. 1927-85.” // “*Neopirates nyassae* gen. sp. n. N.C.E. Miller det. 1951” // “NHMUK 013586510” (NHMUK).

Other material examined. **Kenya:** 1♂: “Managya Funde B.E. Africa. C.S. Betton. 98-12. Taru Desert” // “NHMUK 013588799” (NHMUK); **Lesotho:** 1♂: “A. Turner Sekoke. July. 1932” // “NHMUK 013588798” (NHMUK).

Distribution. Malawi, Tanzania, Kenya, Lesotho (new record).

Remarks. The body color varies from yellow to brown among individuals in this species. The color of the head, the thorax (except the pronotum) and the abdomen of the holotype (Figs 21–23) is yellow in large part while it's different shades of brown or with some brownish markings in the other examined specimens. Other structural characters and the colors of the pronotum (the anterior lobe dark yellow while the posterior lobe brown), the legs (entirely yellow) as well as the irregular blackish mark around the ocelli are stable among all the examined specimens. We therefore conclude that the color variation mentioned above is an intraspecific difference.

The new junior synonym of this species, *Sphodrembas fumipennis*, was described based on the holotype male from Tanzania and four paratypes from Tanzania and Kenya (deposited in the American Museum of Natural History and the University of Michigan Museum of Zoology). Based on the original description, the color of these specimens is also variable, and the hemelytra are surrounding fuscous in Kenyan specimens but concolorously fuscous in Tanzanian specimens. See discussion for details on synonymy.

***Neopirates xanthothorax* Liu & Cai sp. n.**

(Figs 41–61)

ZooBank taxon LSID:

B6B3FDB5-90DF-4C1B-AB58-C744B9F3AD9D

Diagnosis. Body length 9.15 mm; pronotum entirely yellow; hemelytron dark brown; anterior lobe of pronotum about 1.10 times longer than posterior lobe, pronotal transverse sulcus obsolete; scutellum with Y-shaped ridges thick, apex of scutellum rounded; fore tibia with fossula spongiosa occupying about 1/3 of tibial length; venter of abdomen only slightly carinate in middle, with a small fusiform extragenital process; left paramere sickle-shaped, right paramere subtriangular; apex of median pygophore process sharp in lateral view; basal portion of dorsal phal-

lotheal sclerite slightly upturned; basal margin of right lateral phallosclerite serrate.

Description. Male macropterous (Figs 41–43), female unknown. **Coloration.** Yellow. First antennal segment yellow, second and third segments brown, fourth segment unknown; head yellow with irregular blackish mark around ocelli (Fig. 44); hemelytron dark brown with forked whitish stripe along outer side of M and inner side of R on membrane (Fig. 49); abdomen yellow with some diffuse brown markings laterally (Figs 43, 50).

Structure. Small sized. Head length 1.16 times as long as width; width of interocellar space about twice width of ocellus (Fig. 44); second antennal segment about twice as long as first segment. Pronotum with apex of collar process prominent; anterior lobe of pronotum about 1.10 times longer than posterior lobe; posterior lobe of pronotum about 1.80 times wider than anterior lobe; pronotal transverse sulcus obsolete (Fig. 44). Scutellum with Y-shaped ridges thick, apex of scutellum rounded (Fig. 44). Stridultrum long with total-striate type of sculpture (Fig. 46). Fore tibia with fossula spongiosa occupying about 1/3 of tibial length (Fig. 47). Venter of abdomen slightly carinate in middle, left side of seventh abdominal sternite with a small fusiform extragenital process (Fig. 50).

Male genitalia: Median pygophore process slender, apex sharp, base with a small spine in lateral view (Fig. 54); left paramere sickle-shaped (Fig. 55), right paramere subtriangular (Fig. 56); basal portion of dorsal phallosclerite slightly upturned (Fig. 59); left lateral phallosclerite moderately sclerotized (Fig. 59); right lateral phallosclerite moderately sclerotized, basal margin serrate (Fig. 60).

Measurements [in mm, ♂ (n = 1)]. Body length 9.15; maximum width of abdomen 2.76; head length 1.65; length of anteocular part 0.69; length of postocular part 0.30; head width 1.42; eye width in dorsal view 0.47; width of interocular space 0.50; width of interocellar space 0.30; lengths of rostral segments I : II : III = 0.69 : 0.93 : 0.44; lengths of antennal segments I : II : III : IV = 0.98 : 2.02 : 1.66 : ?; length of anterior pronotal lobe 1.26; length of posterior pronotal lobe 1.15; width of anterior pronotal lobe 1.50; width of posterior pronotal lobe 2.71; scutellum length 1.00; maximum width of scutellum 1.33; hemelytron length 7.14.

Type material. **Namibia:** Holotype ♂: red-margined “Holotype” disc // “S.W. AFRICA, Otjiw. Dist. 50 km ESE Otjiwarongo Okosongomongo Farm No. 149 20° 39' S – 17° 05' E 14 Nov. 1972, C.L. Hogue” // “LACM ENT 196243” (LACM).

Type locality. Namibia, Otjiwarongo District, Okosongomongo Farm No. 149, 20°39'S, 17°05'E.

Etymology. The specific epithet is derived from Greek *xanthos* (ξανθός, meaning “yellow”) and *thōrax* (θώραξ, meaning “breastplate”), referring to the entirely yellow pronotum of this new species.

Distribution. Namibia.

Remarks. This new species is also distributed in Namibia like *N. bicolor* sp. n., and is more similar to *N. nyassae* at first sight. It can be distinguished from the latter species by following characters: body length less than 10 mm (vs. body length over 10 mm in *N. nyassae*); antenna with the first segment yellow, the second and the third brown (vs.

the antenna unicolored in *N. nyassae*); pronotum entirely yellow (vs. the anterior lobe of the pronotum dark yellow with the posterior lobe brown in *N. nyassae*) and the left side of the seventh abdominal sternite with a small fusiform extragenital process (vs. the venter of the abdomen without an extragenital process in *N. nyassae*). The male genitalia of this new species differ from the male genitalia of *N. nyassae* in having the left paramere sickle-shaped (vs. the left paramere subtriangular in *N. nyassae*) and the basal portion of the dorsal phallothecal sclerite slightly upturned (vs. the basal portion of the dorsal phallothecal sclerite distinctly upturned in *N. nyassae*).

DISCUSSION

Synonymy

Swanson (2019) established his new genus *Sphodrembas* with detailed description and illustrations of its type species, *S. fumipennis*. He recorded the generic diagnosis of *Sphodrembas* as “Easily separated from all other peiratine genera by the unicarinate metapleuron, apically rounded scutellum, and widely separated metacoxae. The taxon also is distinctive in the thickened pedicel and the testaceous coloration.” We examined the holotype of *N. nyassae* deposited in NHMUK and found that this holotype looks similar to the holotype of *S. fumipennis* and the shape of the parameres and median pygophore process, figured in the original description, also match those of *S. fumipennis*.

Swanson (2019) noted that in his new genus *Sphodrembas*, the unicarinate metapleuron is a condition unknown to him in any other peiratine genus, but also, he had not been able to assess this condition in many of the less speciose genera. Probably Swanson did not examine the holotype of *N. nyassae*, and the special character of the metapleural sulcus, not mentioned by Miller (1952) when he established *Neopirates*, was probably therefore overlooked. Another unique character that separates *Neopirates* from other peiratine genera is the indistinct transverse sulcus of the pronotum, recorded by Miller (1952) as “transverse sulcus not entire”. Swanson did not include this character in the diagnosis of *Sphodrembas* but it can be noticed from his close-up view of the pronotum of *S. fumipennis*.

Swanson (2019) also provided a key to the genera of Peiratinae of the Old World, the characters listed in the key to distinguish *Neopirates* from some other genera (including *Sphodrembas*) are “Transverse sulcus of pronotum incomplete medially; scutellum regularly triangular, not produced apically; venation of hemelytral membrane with inner cell narrow, of similar width throughout length (reduviine type); known from Malawi”. Most of these characters are also shared with *Sphodrembas* and the recorded distribution of *S. fumipennis* (Tanzania and Kenya) and the type locality of *N. nyassae* (Malawi) are not far from each other.

As discussed above, we concluded that *S. fumipennis* should be regarded as a junior synonym of *N. nyassae* and therefore the genus *Sphodrembas* becomes a junior synonym of *Neopirates*.

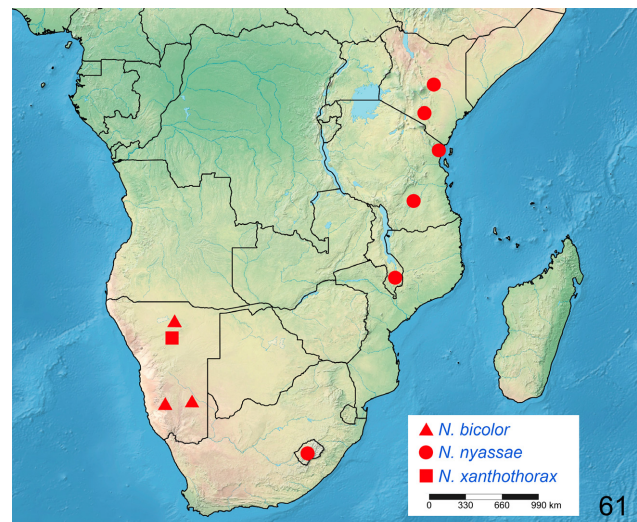


Fig. 61. Known distribution of *Neopirates* species.

Diagnostic characters and relationships of *Neopirates*

The revised diagnosis of *Neopirates* is given above based on the three included species. This set of characters separates this genus from all other genera of Peiratinae, especially the obsolete or slight pronotal transverse sulcus and the unicarinate metapleural sulcus. Typically, in other peiratinae genera, the metapleural sulcus is created by two closely situated ridges and the pronotal transverse sulcus is distinct or indistinct only in the middle portion.

In the Afrotropical Region, *Neopirates* is most similar to *Peirates*, *Phalantus* and *Rapites* Villiers, 1948, with a similar body shape and coloration. Besides the two unique characters mentioned above, *Neopirates* can also be distinguished from *Peirates* by the anterior lobe of the pronotum subquadrate and the hind coxae separated from each other by the width of one coxa in *Neopirates* (vs. the anterior lobe of the pronotum rounded and the hind coxae separated from each other less than the width of one coxa in *Peirates*), and from *Phalantus* by the fore femur slightly thickened with the ventral surface unarmed and the fore tibia clavate with the fossula spongiosa occupying 1/3 or 1/4 of the tibial length in *Neopirates* (vs. the fore femur strongly compressed with denticles on the ventral surface and the fore tibia curved with the fossula spongiosa occupying only the apex of the tibia in *Phalantus*). *Rapites* differs from *Neopirates* in the smaller body size, deeper median depression on the anterior lobe of the pronotum and the fossula spongiosa reduced to a brush of hairs.

Distribution and habitat

Neopirates is distributed in Eastern and Southern Africa (Fig. 61). *Neopirates nyassae* occurs along the eastern side of the Great Rift Valley and east of the South African plateau in Lesotho. *Neopirates bicolor* sp. n. and *N. xanthothorax* sp. n. are both distributed in Namibia's central plateau. The habitats of this genus are mainly savanna regions where the natural vegetation consists of tall grass and short

deciduous trees. Peiratinae species are primarily ground-dwelling and nocturnal (Weirauch et al., 2014). It can be speculated that *Neopirates* species usually hide in some cryptic microhabitats such as in dead wood or in cracks of rocks in the day time to avoid the high temperature and become active at night.

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