

Two new species of Tersilochinae from Madagascar (Hymenoptera: Ichneumonidae: Tersilochinae)

Два новых вида терзилохин (Hymenoptera: Ichneumonidae: Tersilochinae) с Мадагаскара

A.I. Khalaim
А.И. Халаим

Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia. E-mail: akhalaim@gmail.com
Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия.
Facultad de Ingeniería y Ciencias, Universidad Autónoma de Tamaulipas, Cd. Victoria, Tamaulipas, Mexico.

KEY WORDS: parasitoids, *Diaparsis*, Afrotropical region, Madagascar, new species, taxonomy.

КЛЮЧЕВЫЕ СЛОВА: паразитоиды, *Diaparsis*, Афротропики, Мадагаскар, новые виды, систематика.

ABSTRACT. Two species of Tersilochinae are described from Madagascar: *Diaparsis demeter* sp.n. and *D.heterocoloides* sp.n. These species are immediately distinguished from their Afrotropical congeners by exceptionally long ovipositor which is longer than the body, very long second tergite (4.0–5.0 times as long as anteriorly broad), and long and strongly compressed laterally metasoma. *Diaparsis mostovskii* Khalaim, 2013 is recorded from Madagascar for the first time. Partial identification key to the species of *Diaparsis* occurring in Madagascar is given.

РЕЗЮМЕ. Два новых вида терзилохин (Tersilochinae) описаны с Мадагаскара: *Diaparsis demeter* sp.n. и *D. heterocoloides* sp.n. Эти виды легко отличаются от других афротропических видов рода наличием исключительно длинного яйцеклада, превышающего длину тела, длинным вторым тергитом (в 4.0–5.0 раз длиннее, чем ширина спереди), а также длинной и сильно сжатой с боков метасомой. Впервые отмечен с Мадагаскара *D. mostovskii* Khalaim, 2013. Дан частичный определительный ключ видов *Diaparsis*, обитающих на Мадагаскаре.

Introduction

Diaparsis Förster, 1869 is a large genus of Tersilochinae (Hymenoptera: Ichneumonidae) that comprises over 110 described and many undescribed species in all regions of the world excepting the Neotropical region and Antarctica [Yu et al., 2016; Khalaim, unpublished data]. Nineteen species of *Diaparsis* (all belong to the subgenus *Diaparsis* s. str.) are known from the Afrotropical region at present day: one species from Reunion [Rousse, Villemant, 2012], one species

from Seychelles, 15 species from continental Africa [Khalaim, 2013a, b, 2019; Khalaim, et al., 2014], and two species were recently described from Madagascar [Khalaim, 2021]. Nothing is known about host preferences of any Afrotropical species of the genus.

The aim of this work is to describe two new species of *Diaparsis* from Madagascar, provide new record *D. mostovskii* Khalaim, 2013 from this country and give a partial identification key that allows the recognition of new species.

Material and Methods

Material of Madagascar Tersilochinae from the Muséum National d’Histoire Naturelle, Paris, France (further MNHN) and California Academy of Sciences, San Francisco, California, USA (further CAS) was examined. Several specimens are preserved in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (further ZISP).

Photographs were taken with an Olympus OM-D E-M1 digital camera attached to an Olympus SZX10 stereomicroscope; partially focused images were combined using Helicon Focus Pro (ver. 7.6.6) software; all photographs were taken in ZISP.

Taxonomy and results

PARTIAL KEY TO SPECIES OF *DIAPARSIS* OCCURRING IN MADAGASCAR

1. Metasoma very long and strongly compressed laterally posterior to second tergite (Fig. 1). Second tergite 4.0–5.0 times as long as anteriorly broad. Ovipositor exceptionally long, longer than the body (Fig. 1) 2

- Metasoma unspecialized, more or less cylindrical, sometimes weakly compressed laterally. Second tergite shorter. Ovipositor short to moderately long, always clearly shorter than the body other species of *Diaparsis*
2. Mesoscutum reddish orange, propodeum black (Fig. 5). Notaulus virtually absent (Figs 3, 5). Foveate groove shallow, situated more or less in centre of mesopleuron and not reaching the epicnemial carina, with inconspicuous transverse wrinkles (Fig. 5). Mandible with upper tooth twice as long as the lower tooth
..... *D. heterocoloides* sp.n.
- Mesoscutum black, propodeum reddish orange (sometimes propodeum narrowly darkened anteriorly). Notaulus anterolaterally with distinct longitudinal wrinkle or irregular wrinkles. Foveate groove rather deep, situated in anterior 0.7 of mesopleuron, with distinct transverse wrinkles reaching the epicnemial carina. Mandible with upper tooth 2.5 times as long as the lower tooth *D. demeter* sp.n.

Diaparsis (Diaparsis) demeter Khalaim, sp.n.

MATERIAL EXAMINED. Holotype: ♀ (MNHN), Madagascar, Anamalanga Reg., Rogez [Andekaleka], Forêt cote Est, XII.1932, coll. A. Seyrig, "*Telocrypta telescopica* Srg. TYPE".

Paratypes. Madagascar, Anamalanga Reg., Rogez [Andekaleka], Forêt cote Est, 1935, coll. A. Seyrig. Same locality and collector, X.1936, 1 ♀ (ZISP). Same locality and collector, X.1936, 1 female (MNHN). Perinet, Forêt cote Est, III.1932, coll. A. Seyrig, "*Telocrypta telescopica perinetisana* Srg. TYPE", 1 female (MNHN). ?Betsiboka Reg., "An ... [hand-written illegible text]" (Andriba? [Andrioa]), XI.1933, coll. A. Seyrig, 1 ♀ (MNHN).

Non-type material. Madagascar, Anamalanga Reg., Rogez [Andekaleka], Forêt cote Est, XII.1932, coll. A. Seyrig, 1 ♀ (MNHN).

COMPARISON. *Diaparsis demeter* sp.n. is very similar to *D. heterocoloides* sp.n. but differs from this species by the colour pattern of mesosoma, distinct notaulus, deep and broad foveate groove of mesopleuron with distinct transverse wrinkles reaching the epicnemial carina anteriorly, and mandible with upper tooth almost 2.5 times longer than the basal mandibular width.

DESCRIPTION. **Female.** Body length 10.5 mm. Fore wing length about 5.7 mm.

Head with gena roundly constricted posterior to eyes; gena in dorsal view about 0.65 times as long as eye width. Clypeus large, lenticular, smooth, with fine or distinct punctures in upper 0.7, separated from face by weak and broad impression. Mandible moderately slender, weakly constricted in basal half, with lower tooth about 2.5 times as long as the upper tooth. Malar space 0.4–1.0 times (almost 1.0 times in holotype) as long as basal mandibular width. Flagellum in all specimens with complete antennae with 27 flagellomeres, distinctly tapered towards apex; subbasal flagellomeres 1.3–1.6 times as long as broad, subapical flagellomeres 1.3 times as long as broad (in holotype) to square; flagellomeres 2 or 3 to 7 bearing subapical finger-shaped structures on outer surface. Face with weak median swelling. Face and frons with dense punctures, smooth or very shallowly granulate between punctures. Vertex and gena with fine and moderately dense punctures; vertex subpolished and gena polished between punctures. Occipital carina complete, evenly convex mediodorsally.

Mesoscutum densely punctate, shallowly granulate or polished between punctures. Notaulus weakly impressed, with distinct longitudinal wrinkle or irregular wrinkles on anterolateral side. Scutellum with lateral longitudinal carinae present at its anterior 0.2–0.3. Upper end of epicnemial carina abruptly curved to reach front margin of mesopleuron at level of lower 0.3 of pronotum. Foveate groove of

mesopleuron moderately deep, broad, oblique, situated in anterior 0.6 of mesopleuron, with distinct transverse wrinkles usually reaching epicnemial carina anteriorly. Mesopleuron densely punctate on smooth or weakly granulate background, with impunctate area in centre (above foveate groove). Propodeal spiracle separated from pleural carina by 1.0–2.0 times diameter of spiracle. Propodeum with dorsolateral areas punctate on smooth or weakly granulate background; basal keel 0.2–0.3 times as long as apical area. Apical area flat or weakly impressed along midline, more or less pointed anteriorly, uneven, weakly shining; apical longitudinal carinae strong, complete, reaching transverse carina anteriorly.

Fore wing with second recurrent vein (2m-cu) postfurcal. First abscissa of radius (Rs+2r) straight, much longer than width of pterostigma. First and second sections of radius (Rs+2r and Rs) meeting at slightly acute angle. Intercubitus (2rs-m) slightly thickened, longer than abscissa of cubitus between intercubitus and second recurrent vein (abscissa of M between 2rs-m and 2m-cu). Metacarpus (R1) almost reaching tip of the wing. Hind wing with nervellus (cu1&cu-a) weakly reclivous. Legs slender, tarsal claws not pectinate.

Metasoma unusually long, posterior to second tergite strongly compressed laterally. First tergite very slender, about 6.2 times as long as posteriorly broad, trapeziform to almost round in central cross-section, smooth, sometimes with fine longitudinal striae laterally before glymma; glymma small (sometimes indistinct), situated slightly behind centre of tergite; in dorsal view, petiole with lateral margins subparallel, postpetiole widened anteriorly and distinctly broader than petiole; upper margin of first tergite, in lateral view, nearly straight in anterior 0.7 and weakly arcuate in posterior 0.3. Second tergite 4.0–5.0 times (almost 5.0 times in holotype) as long as anteriorly broad. Thyridial depression very long, over 5.0 times as long as broad, with posterior end rounded or pointed. Ovipositor slender and exceptionally long (longer than body), evenly bent upwards, with a slight dorsal subapical swelling.

Head black; clypeus yellowish brown in lower 0.4–0.5 and dark reddish black in upper part to almost entirely reddish brown. Mouthparts and mandibles (teeth dark red) brownish yellow to yellow-brown. Antenna entirely dark brown to brownish black; in holotype flagellum yellow-brown, probably due to discolouration. Mesosoma reddish brown with upper part of pronotum darkened, and mesoscutum, scutellum and postscutellum black; propodeum sometimes narrowly darkened anteriorly. Tegula yellow-brown or brown. Pterostigma brown. All legs rather uniformly brownish yellow; hind leg sometimes slightly darkened with brown. Metasoma entirely pale brown to brown, sometimes first tergite entirely or only its postpetiole dark brown.

Male. Unknown.

VARIATION. One non-type female differs from typical specimens by its relatively short ovipositor which is about as long as the body, mandible with rounded ridge along its lower margin centrally, upper tooth of mandible much broader and almost 3.0 times longer than the lower tooth, mesopleuron with narrow and sharp foveate groove in its centre (foveate groove does not reach the epicnemial carina anteriorly), and mesosoma less black marked (mesoscutum with only black mark on anterior half of central lobe; scutellum, postscutellum and front margin of propodeum weakly darkened).

ETYMOLOGY. The species name derives from Demeter (noun), the Olympian goddess of the harvest and agriculture in ancient Greek mythology.

DISTRIBUTION. Madagascar.

Diaparsis (Diaparsis) heterocoloides Khalaim, **sp.n.**
Figs 1–9.

MATERIAL EXAMINED. Holotype: ♀ (MNHN), Madagascar, [Vakinankaratra Reg.] Ankaratra [Volcano Range], 1800 m, XII.1937, coll. A. Seyrig, “28”, “*Teleocrypta telescopica ankaratrana* Srg. TYPE” (Fig. 2).

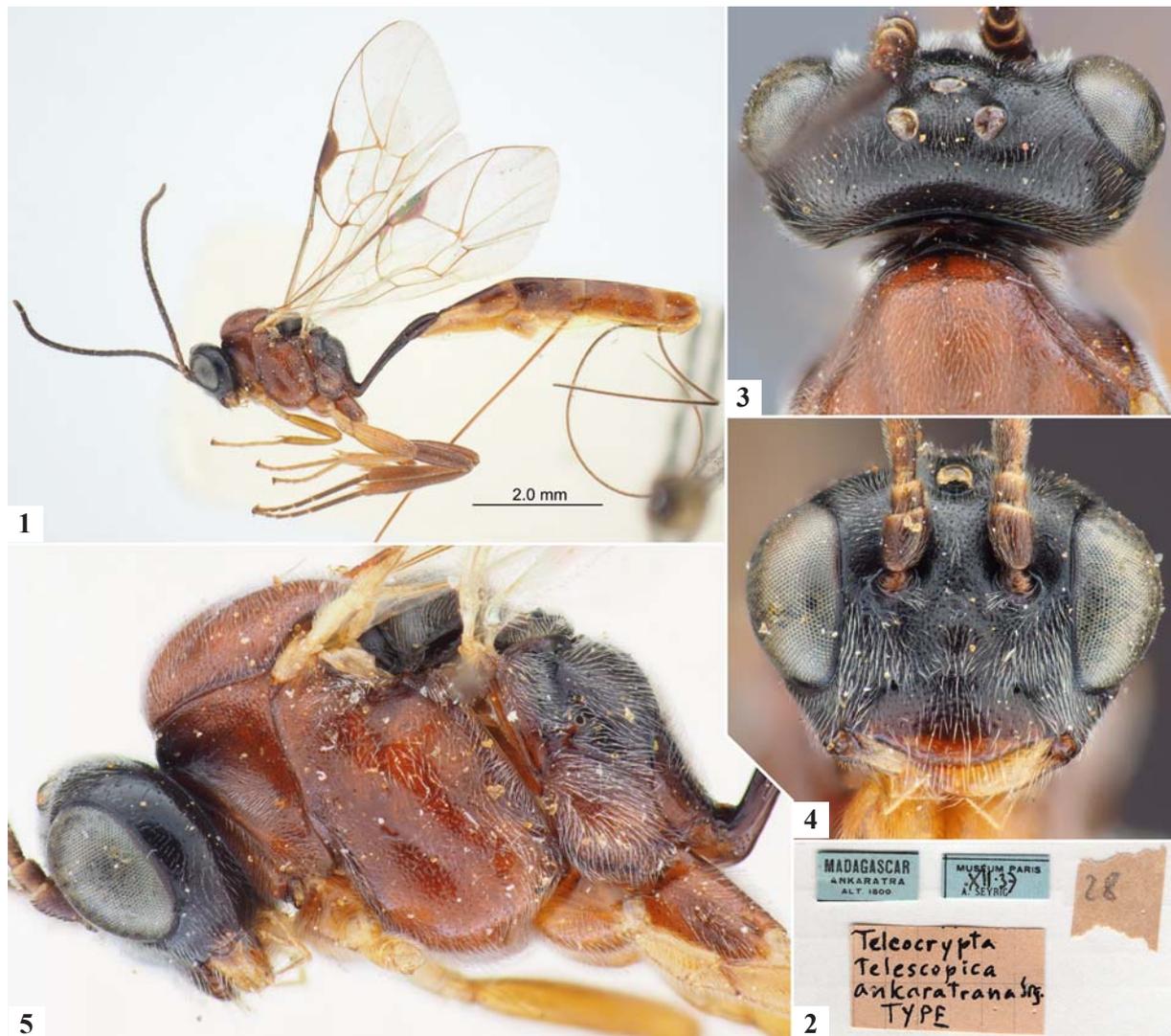
COMPARISON. *Diaparsis heterocoloides* **sp.n.** is very similar to *D. demeter* **sp.n.** but differs from this species by the colour pattern of mesosoma (Fig. 5), virtually absent notaulus (Figs 3, 5), shallow and not reaching the epicnemial carina anteriorly foveate groove of mesopleuron (Fig. 5), and mandible with upper tooth about twice as long as the lower tooth.

DESCRIPTION. Female. Body length 8.4 mm. Fore wing length 5.3 mm.

Head with gena roundly constricted posterior to eyes (Fig. 3); gena in dorsal view 0.65 times as long as eye width. Clypeus (Fig. 4) large, lenticular, 2.4 times as broad as long, smooth, with fine and rather dense punctures in upper 0.7, separated from face by weak and broad impression. Mandible

moderately slender, weakly constricted in basal half, with lower tooth twice as long as the upper tooth. Malar space about 0.9 times as long as basal mandibular width. Flagellum with 28 flagellomeres, slightly tapered towards apex (Fig. 6); subbasal flagellomeres about 1.5 times, median flagellomeres 1.3 times as long as broad, and subapical flagellomeres slightly elongate to square; flagellomeres 3 to 7 bearing subapical finger-shaped structures on outer surface. Face with weak median swelling. Face and frons with fine dense punctures on finely granulate and dull background; punctures indistinct peripherally because of granulation. Vertex subpolished, weakly shining, with very fine dense punctures. Gena with fine and sparse punctures on smooth background. Occipital carina complete, evenly convex mediodorsally.

Mesoscutum shallowly granulate to subpolished, weakly shining, finely and densely punctate. Notaulus with weak impression distant from anterolateral margin and very weak (vestigial) wrinkles (or single longitudinal wrinkle) in this impression (Fig. 5). Scutellum with lateral longitudinal cari-



Figs 1–5. *Diaparsis heterocoloides* **sp.n.**, female, holotype: 1 — habitus (without apex of ovipositor); 2 — holotype labels; 3–4 — head; 5 — head and mesosoma; 1, 5 — lateral view; 3 — dorsal view; 4 — front view.

Рис. 1–5. *Diaparsis heterocoloides* **sp.n.**, самка, голотип: 1 — габитус (без вершины яйцеклада); 2 — этикетки голотипа; 3–4 — голова; 5 — голова и мезосома; 1, 5 — сбоку; 3 — сверху; 4 — спереди.

nae present at its anterior 0.2. Upper end of epicnemial carina abruptly curved to reach front margin of mesopleuron at level of lower 0.3 of pronotum (Fig. 5). Foveate groove of mesopleuron shallow, broad, situated in centre of mesopleuron, with weak transverse wrinkles (Fig. 5). Mesopleuron densely punctate on smooth background, peripherally finely granulate or scabrous, with large impunctate area in centre (above foveate groove) (Fig. 5). Propodeal spiracle separated from pleural carina by 2.0 times diameter of spiracle (Fig. 5). Propodeum with dorsolateral areas finely punctate on nearly smooth background; basal keel 0.3 times as long as apical area (Fig. 7). Apical area flat, uneven, weakly shining; apical longitudinal carinae strong, complete, reaching transverse carina anteriorly (Fig. 7).

Fore wing with second recurrent vein (2m-cu) postfurcal. First abscissa of radius (Rs+2r) straight, much longer than width of pterostigma. First and second sections of radius (Rs+2r and Rs) meeting at slightly acute angle. Intercubitus (2rs-m) thickened, longer than abscissa of cubitus between intercubitus and second recurrent vein (abscissa of M between 2rs-m and 2m-cu). Metacarpus (R1) almost reaching tip of the wing. Hind wing with nervellus (cu1&cu-a) weakly reclivous. Legs slender, tarsal claws not pectinate.

Metasoma unusually long, posterior to second tergite strongly compressed laterally (Fig. 1). First tergite very slen-

der, about 5.6 times as long as posteriorly broad, round in central cross-section, smooth dorsally and with fine longitudinal striae laterally before glymma (Fig. 8); glymma small, situated at posterior 0.55 of tergite (Fig. 8); in dorsal view, petiole with lateral margins subparallel, postpetiole widened anteriorly and distinctly broader than petiole; upper margin of first tergite, in lateral view, nearly straight in anterior 0.7 and weakly arcuate in posterior 0.3 (Fig. 8). Second tergite about 4.0 times as long as anteriorly broad. Thyridial depression very long, reaching almost 0.5 of second tergite, with posterior end pointed. Ovipositor slender and exceptionally long (longer than body), evenly bent upwards, with a slight dorsal subapical swelling (Fig. 9).

Head black, lower 1/3 of clypeus yellowish brown. Mouthparts and mandibles (teeth dark red) brownish yellow. Antenna brownish black; flagellum slightly paler basally; scape and pedicel with apical margins yellowish (Fig. 6). Mesosoma reddish orange with upper part of pronotum darkened, and scutellum, postscutellum and propodeum black (Fig. 5). Tegula yellow. Pterostigma pale brown with basal and apical pale spots. Fore and mid legs brownish yellow, mid coxa and distal end of mid femur darkened with reddish orange. Hind leg predominantly reddish orange to brown (tarsus infuscate), with trochanter, trochantellus and base of femur brownish yellow (Fig. 1). First metasomal tergite dark reddish black. Metasoma posterior to



Figs 6–9. *Diaparsis heterocoloides* sp.n., female, holotype: 6 — antenna; 7 — propodeum; 8 — base of metasoma; 9 — apex of ovipositor; 6 — front view; 7 — dorsolateral view; 8–9 — lateral view.

Рис. 6–9. *Diaparsis heterocoloides* sp.n., самка, голотип: 6 — антенна; 7 — пропodeум; 8 — основание метасомы; 9 — верхина яйцеклада; 6 — спереди; 7 — сверху и сбоку; 8–9 — сбоку.

first tergite predominantly orange-brown to brown, yellowish ventrally; tergites 2 and 3 dorsally brown to dark brown, posteriorly with transverse brownish yellow band (Fig. 1).

Male. Unknown.

ETYMOLOGY. The new species is named after its similarity to the tersilochine genus *Heterocola* Förster, 1869.

DISTRIBUTION. Madagascar.

Diaparsis (Diaparsis) mostovskii Khalaim, 2013

REFERENCES. Khalaim, 2013a: 146. Khalaim, 2019: 272 (distribution).

MATERIAL EXAMINED. Madagascar. **Diana Reg.**, “Antsirananana” [former province], Sakalava Beach, 12°15′46″S, 49°23′51″E, 10 m, dwarf littoral forest, Malaise trap — across sandy trail, 22–27.IV.2001, coll. M. Irwin & R. Harin’Hala, MA-01-04B-07, 1 ♀ (CAS). “Antananarivo” [former province], Kalambati- tra, “II.33” (?) [handwritten illegible date], coll. A. Seyrig, 1 ♀ (MNHN). **Anamalanga Reg.**, Rogez [Andekaleka], Forêt cote Est, coll. A. Seyrig: VI.1932, 1 male (MNHN); XII.1932, 1 ♂ (MNHN); “1935”, 1 ♂ (MNHN). Perinet, Forêt cote Est, “1935”, coll. A. Seyrig, 1 ♀ (MNHN). **Vakinankaratra Reg.**, Ankaratra [Volcano Range], III.1940, coll. A. Seyrig, 1 ♂ (MNHN). Same locality and collector, 1800 m: II.1932, 1 male (MNHN), III.1932, 1 ♂, 1 ♀ (MNHN); II.1938, 1 ♀ (MNHN), “FEVRIER”, 1 ♀ (MNHN). Vaki- nankaratra Reg., Tsinjoarivo, II.1932, coll. A. Seyrig, 1 ♂ (MNHN). **Amoron’i Mania Reg.**, “Fianarantsoa” [former province], 40 km S of Ambositra, Miandrissara Forest, 20°47.56′S, 47°10.54′E, 825 m, low altitude rainforest, Malaise trap, 24–31.I.2007, coll. M. Irwin & R. Harin’Hala, 1 ♀ (CAS). **Haute Matsiatra Reg.**, “Fianarantsoa” [former province], Plateau Central, coll. A. Seyrig: V.1936, 1 ♀ (MNHN); XI.1936, 8 ♀♀, 7 ♂♂ (7 ♀♀, 6 ♂♂ in MNHN; 1 ♀, 1 ♂ in ZISP). **Androy Reg.**, “Rég. Sud de l’Ile”, Bekily, coll. A. Seyrig: III.1930, 1 ♀ (MNHN); XII.1936, 1 ♀ (MNHN); II.1937, 1 male (MNHN); IV.1938, 1 ♂ (MNHN); IX.1938, 1 ♀ (MNHN); V.1939, 1 ♂ (MNHN); IV.1942, 1 ♀ (MNHN).

DISTRIBUTION. Cameroon, Ethiopia, Kenya, Mada-

gascar, Mozambique, Namibia, Niger, Nigeria, South Africa, Tanzania, Uganda, Zambia. **New record for Madagascar.**

Acknowledgements. I am thankful to Claire Villemant (MNHN) and Robert Zuparko (CAS) for loaning valuable material. This work was supported by the State Research Project no. 122031100272-3.

References

- Khalaim A.I. 2013a. Afrotropical species of *Diaparsis* Förster, 1869 (Hymenoptera: Ichneumonidae: Tersilochinae) // African Invertebrates. Vol.54. No.1. P.127–159.
- Khalaim A.I. 2013b. New data on the Afrotropical Tersilochinae (Hymenoptera, Ichneumonidae) // Proceedings of the Russian Entomological Society. Vol.84. No.2. P.129–136.
- Khalaim A.I. 2019. New records of Afrotropical Tersilochinae (Hymenoptera: Ichneumonidae) // Zoosystematica Rossica. Vol.28. No.2. P.267–276. <https://doi.org/10.31610/zsr/2019.28.2.267>.
- Khalaim A.I. 2021. *Diaparsis phobos* sp. nov. and *D. deimos* sp. nov., two amazing new species of Tersilochinae (Hymenoptera: Ichneumonidae) from Madagascar // Zootaxa. Vol.4985. No.1. P.118–124. <https://doi.org/10.11646/zootaxa.4985.1.8>.
- Khalaim A.I., Sääksjärvi I.E., Roininen H. 2014. Three new Afrotropical species of Tersilochinae (Hymenoptera: Ichneumonidae) from the Kibale National Park, Uganda // Zootaxa. Vol.3794. No.4. P.536–544. <https://doi.org/10.11646/zootaxa.3794.4.4>.
- Rousse P., Villemant C. 2012. Ichneumons in Reunion Island: a catalogue of the local Ichneumonidae (Hymenoptera) species, including 15 new taxa and a key to species // Zootaxa. Vol.3278. P.1–57. <https://doi.org/10.11646/zootaxa.3278.1.1>.
- Yu D.S.K., Achterberg C. van, Horstmann K. 2016. Taxapad 2016, Ichneumonoidea 2015. Database on flash-drive. Nepean, Ontario, Canada.