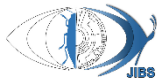


Original Article 

# Additional data on morphology of *Lipoptena paradoxa* Newstead, 1907 (Diptera, Hippoboscidae) with the new key for the genus

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**ABSTRACT.** The flies from the family Hippoboscidae (Diptera) are specialized hematophagous ectoparasites and transmit many dangerous diseases. The genus *Lipoptena* Nitzsch, 1818 is a group of keds, parasitic mainly on Bovidae and Cervidae. It includes 27 species and is divided into two groups. The main difference between them is the degree of pulvilli reduction. At present, the classification of morphological groups within *Lipoptena* requires clarification. One of the *Lipoptena* species – *L. paradoxa* Newstead, 1907 – is a common parasite of a number of antelopes and is widely spread over Africa south of the Sahara. Despite the widespread study of this species, the classical description of its morphology, allowing its identification and comparison with modern studies, remains insufficient. Identification is also complicated by the lack of complete drawings. Our results demonstrate that the previously identified "capreoli" group has proven to be a composite. Accordingly, the species *L. annalizenae* Visagie, 1992, *L. binocula* (Speiser, 1908), *L. iniqua* Maa, 1969, *L. paradoxa*, and *L. sepiacea* Speiser, 1905 can be separated from it into a species group "echestypus" based on the fact that, unlike other species of the genus, their ocelli are absent, and their antennae are extremely small. Discrepancies with literature data on *L. paradoxa* morphology have been clarified.

**KEYWORDS:** Africa, Keds, Lipopteninae, species group, *Tragelaphus strepsiceros*

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## INTRODUCTION

The louse flies from the family Hippoboscidae Samouelle, 1819 are specialized hematophagous ectoparasites, living in fur and feathers of their hosts. The genus *Lipoptena* Nitzsch, 1818 belongs to the subfamily Lipopteninae, tribe Lipoptenini – the largest group of mammalian parasites. Their hosts are mainly from Bovidae Gray, 1821, and Cervidae Goldfuss, 1820 (Doszhanov 1980, 2003). These keds transmit many dangerous diseases such as *Anaplasma* spp., *Babesia* spp., *Bartonella* spp., *Borellia* spp., *Coxiella* spp., *Rickettsia* spp., and *Theileria* spp. (Doszhanov 1980, 2003; Ganey et al. 2002; Farajollahi et al. 2005; Hornok et al. 2011; de Bruin et al. 2015; Buss et al. 2016; Foley et al. 2016; Lee et al. 2016; Skvarla & Machtinger 2019; Reeves & Lloyd 2019; Werszko et al. 2020; Gałęcki et al. 2021; ElHamdi et al. 2022; Tiawsirisup et al. 2023; Peña-Espinoza et al. 2023).

The genus *Lipoptena* includes almost 30 species (Visagie 1992; González et al. 2024; Yatsuk et al. 2024a) and is divided into two groups – "ceroi" and "capreoli". The main difference between these groups is the degree of pulvilli reduction (Yatsuk et al. 2024a). Among them, three species – *L. binocula* (Speiser, 1908), *L. paradoxa* Newstead, 1907, *L. sepiacea* Speiser, 1905 – once constituted a separate

genus *Echestypus* Speiser, 1907, which was then included in *Lipoptena* as a separate group of species (Maa 1963). Later, *L. iniqua* Maa, 1969 was added to this group (Maa 1969a). At present, the classification of morphological groups within *Lipoptena* requires clarification.

Most species of the former genus *Echestypus* have been described from Africa. One of them is *L. paradoxa*. This species is easily distinguished from others by the vestigial palpus (Maa 1963, 1969a; Yatsuk et al. 2024a). *L. paradoxa* is a common parasite of a number of antelopes and is widely spread over Africa south of the Sahara (Maa 1968). Despite its wide distribution and frequent study of this species (Maa 1963, 1965, 1968, 1969a; Visagie et al. 1992), the classical description of its morphology, allowing its identification and comparison with modern studies, remains insufficient. Identification is also complicated by the lack of complete drawings.

The aim of the present study is to clarify and redescribe the morphological features of *L. paradoxa* and to specify the morphological groups within *Lipoptena*.

## MATERIAL AND METHODS

The material (two individuals: female and male) was collected from greater Kudu (*Tragelaphus strepsiceros* Pallas, 1766) in South Africa. The material was fixed in 96% ethanol. Specimens of this species were transferred by an unknown collector to late G.V. Farafonova, were kept in her collection, and were recently given to us. Unfortunately, there was no information on the label about the exact location, year, or other data of the material collection.

Morphological terminology follows Maa (1969a), Doszhanov (2003), and Thanwiset et al. (2024). For illustration purposes, images were taken with Canon® EOS 90D and Canon® EOS M6 Mark II cameras with a Canon® EF 100 mm/2L Macro lens, stitched and processed using Helicon Focus 7 software. Morphological analysis was carried out according to the works of Bequaert (1942a, 1942b), Maa (1963, 1965, 1969a), Doszhanov (1980, 1997, 2003), Skvarla and Machtinger (2019), Thanwiset et al. (2024), Visagie (1992, 1993), and Visagie et al. (1992). Since Newstead does not describe the morphology of the species in detail, in this paper, we use the data of Maa and Visagie. Abbreviation: BNHM – The Natural History Museum, London, United Kingdom; ZISP – Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia.

## RESULTS

**Class Insecta Linnaeus, 1758**

**Order Diptera Linnaeus, 1758**

**Family Hippoboscidae Samouelle, 1819**

**Subfamily Lipopteninae Nitzsch, 1818**

**Genus *Lipoptena* Nitzsch, 1818**

**Type species.** *Pediculus cervi* Linnaeus, 1758.

**The species groups.** A detailed analysis of the morphology of representatives of the "*cervi*" and "*capreoli*" groups revealed the following results:

The main differences between species within the "*cervi*" group are the presence and extent of mesonotum sutures, body length, shape of pleurites 1 and 2, and tergite 1, and the number of mesonotum setae. At the same time, the range of species features within "*capreoli*" was wider: absence of ocelli, palpi length, number of reduced pulvilli, body length, body color, number of mesonotum setae, shape of pleurites 1 and 2, and sternite 1. Such features as the absence of ocelli and vestigial palpi are characteristic of a number of species – *L. annalizeae* Visagie, 1992, *L. binocula*, *L. iniqua*, *L. paradoxa*, *L. sepiacea*. Analysis of known data on *L. paradoxa* morphology showed that the descriptions by Maa (1963, 1965, 1969a), Visagie (1992, 1993), and Visagie et al. (1992) do not fully coincide. Some important

features, such as the width of the tergites and the number of setae on the thorax, require clarification in accordance with modern keys. We have combined all known data on the morphology of this species and supplemented it.

### *Lipoptena paradoxa* Newstead, 1907

*Lipoptena paradoxa* Newstead, 1907:91. Holotype ♀ (BNHM).— Congo.

#### Fig 1.

**Material examined.** 1 ♀ 1 ♂ (ZISP), South Africa, from greater kudu, *Tragelaphus strepsiceros* Pallas, 1766.

**Redescription** (♀♂). — Head and thorax length combined 1.7–2.1 mm in female and 1.65–1.8 mm in male.

**Head.** Dorsal and ventral head sides light. Head width 1.0–1.1 mm, extended behind eyes. The width of the mediavertex approximately equal to length (0.18–0.30 mm to 0.15–0.22 mm). Mediavertex as long as frontoclypeus and slightly longer than postvertex (0.12–0.20 mm). Pretilinal area distinct but short. Inner orbit (0.15–0.20 mm) distinctly narrower than eye (0.28–0.32 mm), with 1 long vertical seta. Two short orbital and 5 fine, very short orbital setae in inner curved row. Anterior margin of frontoclypeus, between longitudinal furrow and apex of antennal pit, bearing 6 small setae, 5 short setae and 1 long ventrally, next to palpi. Two long and 4 short setae below eye. Clypeus fused with frons, median longitudinal furrow rather short, ending in circular pit. Eyes relatively large, narrow towards the back, not reach edges of head on sides. Outer margin of eye bears series of fine spines and few scattered short fine setae are present on the postgena. Few setae on the gula at the concave margin of prosternal lobes. Postvertex short and very wide, flattened semi-elliptically, not or hardly shorter than mediovertex. Ocelli absent. Antennae short, sub-globular and recessed in antennal pits, which are surrounded by continuous rim. Rudimentary or vestigial palpi not or barely visible from above, hardly protruding beyond anterior margin of frons, hardly longer than wide.

**Thorax.** Light, only with longitudinal suture. No intrascutal grooves. Transversal mesonotal suture broadly interrupted medially. Posthumeral suture well-demarcated. Large mesothoracic spiracle at posterolateral edge of humeral callosity. Pronotum ribbon-like, with anterior margin gently concave and posterior margin angularly convex. Mesonotum setae: 3 humeral, 4–7 acrostichal, 2 laterocentral, 4 strong and 5 small notopleural in 2 rows, 3–4 postalar, 1 prescutellar, 3–6 scutellar with very long inner pair. Ventral side of thorax light. Prosternal lobes widely separated from each other, wider than long, anteriorly acute, with 2–3 ventral setae and 1 seta on anterior inner margin. Mesosternal setae fairly regularly arranged in 4–5 rows, and except those of first row, all setae practically uniform in length and robustness, and, in addition, pair of long posterolateral setae. Metabasissternal setae in 2 regular rows and all similar in length and robustness as in 3 posterior rows of mesosternum.

**Legs.** Light. Anterior coxa enlarged bearing oblique marginal row of setae dorsally, 1 of these very long, ventroposteriorly with row of 4 long setae. Femora 1–3 with 3, 3, 5 major dorsal setae. Femora 1 and 3 each with singular anterior setae. Tibiae 1–3 with 1, 2, 3 apical setae respectively. Tibia 3 with 3 major ventral setae (plus few minor ones) which are slightly longer but less robust than longest apical seta. Posterior surface of tibia 3 with 1 apical seta. Tarsi 1–2 without ventral setae on segments 1–3, with 1 major and 2 very small ventral setae on each of segments 4 and 5. Tarsus 3 with 2, 1 and 1 small anterior setae under segments 1–3 respectively, with 2 major and 1 minor ventral setae under each of segments 4–5. Claws slightly asymmetrical. Anterior pulvilli all vestigial, posterior pulvillus fully developed.

**Wing.** length: 2.96 mm. Wing venation similar to that of *L. cervi* Linnaeus, 1758. Microtrichia cover basal cell and apical angle of 2nd marginal cell between C and R<sub>4+5</sub>, cells 3r, 1m, 2m and axillary cell. Alula rudimentary. No closed anal cell. Haltere well-developed.

**Abdomen.** Edges covered with short setae. Intersegmental foldings of tergites and pleurites distinct on ventral and dorsal sides. Pleurite 1 large, pentagonal in shape, with straight sides and with a marginal row of long setae and angular row of shorter setae on disc. Parts of its posterior edge form almost right angle, with longer part facing inwards. Posterior edge with row of 4 long, strong setae. Pleurite 2 short,

with exterior and posterior edges forming almost right angle. Pleurites 3–5 well demarcated and lightly sclerotized with a few uniformly spaced setae. Median tergal plates all hardly differentiated from surrounding areas. In female tergites 1–5 narrow. Tergite 1 approximately 10 times narrower than width of abdomen. Tergite 2 approximately 5 times narrower than width of abdomen. Tergite 3 approximately 2.5 times narrower than width of abdomen. Tergite 4 approximately 2 times narrower than width of abdomen. Tergite 5 approximately 3 times narrower than width of abdomen. Tergite 6 divided into 2 small sclerites. In male only four tergites from 1 to 4. Tergite 1 approximately 3 times narrower than width of abdomen. Tergite 2 approximately 2 times narrower than width of abdomen. Tergites 3, 4 – approximately 1.5 times narrower than width of abdomen. Each tergite bearing 4 setae on hind margin or 2 setae on edges. Abdominal spiracles small, more or less sclerotized, with fairly uniformly spaced setae arising from thickened bases. Sternite 1 with median length approximately equal to that of its posterior lobe. Many strong setae along hind margin and a few on disc. Two long setae near tip of each lobe. Pleurites on ventral side well-demarcated.

Female median pregenital plate elongate, weakly sclerotized, not less than 2 times as large as basal papilla of neighboring seta. There are 3–5 setae in a transverse series on posterior margin, outer pair usually longer and more robust. Lateral pregenital plate entirely wanting. Supra-anal plate with very fine and rather robust small setae. Infra-anal plate posteriorly with rather dense setae which are about as long as those on supra-anal plate and about as stout as on disc of abdominal venter.

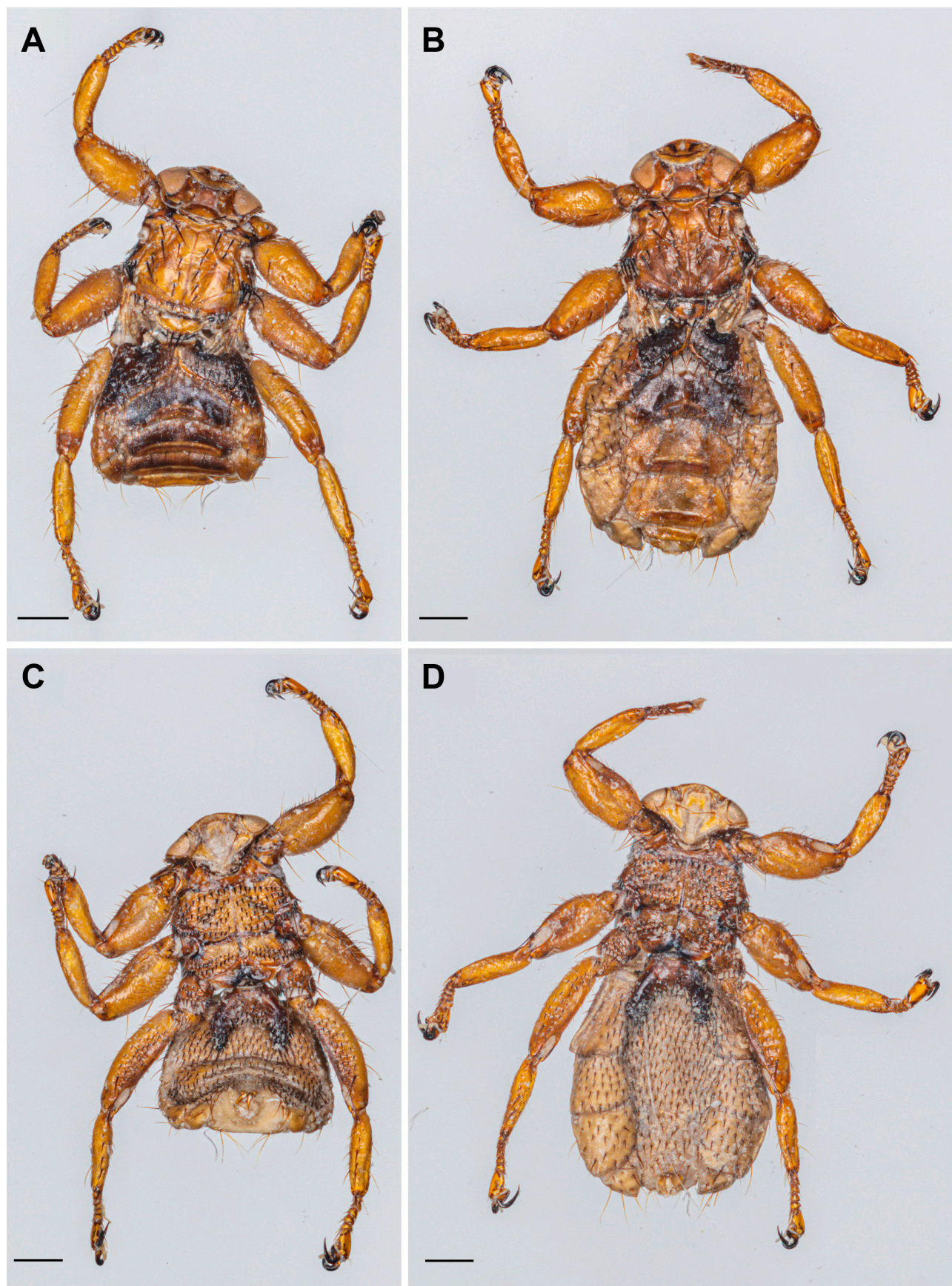
Male post-genital plate narrow with slightly broader anterior end. Parameres long, slender, straight, sharply pointed and punctate. Aedeagus narrow, sharply pointed cone of which the dorsolateral surfaces are covered with small setae.

## DISCUSSION

An important limitation of the earlier descriptions of *L. paradoxa* (Maa 1963, 1965, 1969a; Visagie 1992, 1993; Visagie et al. 1992) was the lack of drawings or photographs depicting the fly in its entirety. Some new key features could be reflected in them even if the authors did not indicate them in the text. The presented photographs of *L. paradoxa* can help future researchers create illustrated identification keys.

Currently, the division of many genera of louse flies into groups is artificial, but it facilitates species identification (Maa 1969a, 1969b). However, as modern studies demonstrate, division into groups can reflect evolution if based on morphofunctional features and consistent with fly biology (Yatsuk et al. 2025). Such features include parts of the attachment apparatus, wings (Yatsuk et al. 2024b), and abdominal morphology (Yatsuk et al. 2025). The presence or absence of ocelli and antennal morphology are also important features used to distinguish not only species but sometimes even genera in louse flies (Maa 1963; Doszhanov 2003).

As this study has shown, the previously identified "*capreoli*" group (Yatsuk et al. 2024a) has proven to be a composite. Accordingly, the species *L. annalizeae*, *L. binocula*, *L. iniqua*, *L. paradoxa*, and *L. sepiacea* can be separated from it into a species group "*echestypus*" based on the fact that, unlike other species of the genus, their ocelli are absent, and their antennae are extremely small. Thus, the *Lipoptena* species group "*cervi*" includes 16 species: *L. andaluciensis* Gonzalez, 2024, *L. arianae* Maa, 1969, *L. indica* Maa 1965 (= *L. axis* Maa, 1969), *L. cervi*, *L. doszhanovi* Grunin, 1974, *L. efovea* Speiser, 1905, *L. fortisetosa* Maa, 1965, *L. hopkinsi* Bequaert, 1942, *L. japonica* Bequaert, 1942, *L. niroana* Maa, 1969, *L. pauciseta* Edwards, 1919, *L. rusaecola* Bequaert, 1942, *L. saepes* Maa, 1969, *L. sigma* Maa, 1965, *L. sikae* Mogi, 1975, *L. timida* Maa, 1969; the species group "*capreoli*" – 6 species: *L. capreoli* Rondani, 1878, *L. chalcomleana* Speiser, 1904, *L. couturieri* Séguy, 1935, *L. grahami* Bequaert, 1942, *L. saltatrix* Maa, 1969, *L. weidneri* Maa, 1969; the species group "*echestypus*" – 5 species: *L. annalizeae* Visagie, 1992, *L. binocula* (Speiser, 1908), *L. iniqua* Maa, 1969, *L. paradoxa* Newstead, 1907, *L. sepiacea* Speiser, 1905. The species *L. pteropi* Denny, 1843, *L. depressa depressa* (Say, 1823), *L. depressa pacifica* Maa, 1969, *L. guimaraesi* Bequaert, 1957, *L. mazamae* Rondani, 1878, *L. pudui* Peterson & Maa, 1970, previously included in the genus *Lipoptena* (Maa 1969a; Dick 2018), were transferred to a separate genus *Lipoptenella* Bequaert, 1942 (Yatsuk et al. 2024a).



**Figure 1.** *Lipoptena paradoxa* Newstead, 1907. **A.** Habitus, dorsal view of male; **B.** Habitus, dorsal view of female; **C.** Habitus, ventral view of male; **D.** Habitus, ventral view of female. Scale bars: 0.5 mm.

### The updated identification key for species groups of the genus *Lipoptena* Nitzsch, 1818

[based on Yatsuk et al. (2024a)]

- 1 Pulvilli normally developed. .... **species group "cervi"**
- One or two pulvilli reduced or vestigial. ....2
- 2 Ocelli present. Palpi distinctly protruding beyond anterior margin of frons.... **species group "capreoli"**
- Ocelli absent. Rudimentary or vestigial palpi. .... **species group "echestypus"**

### The improved identification key for species from the group "cervi"

[based on Yatsuk et al. (2024a), Maa (1969a), and Thanwiset et al. (2024)].

- 1 Few mesonotum setae (like 3 humeral, 7 acrostichal, 4 laterocentral, 3 postalar, 2 prescutellar, 6–7 mesopleural, 6 scutellar or less). .... 2
- Larger number of mesonotum setae. ....11
- 2 Only longitudinal suture on the mesoscutum. .... 7
- Prescutellar and longitudinal sutures or grooves on mesoscutum. ....3
- 3 Longitudinal and transversal sutures of mesonotum sutures ending at same level, both not reaching scutellar suture. .... 4
- Longitudinal and transversal sutures of the mesonotum almost reaching scutellar suture. ....5
- 4 7 acrostichal setae. .... *Lipoptena timida* Maa, 1969
- 3–5 acrostichal setae. .... *Lipoptena indica* Maa 1965 (= *L. axis* Maa, 1969)
- 5 6 scutellar setae. .... *Lipoptena efovea* Speiser, 1905
- 4 scutellar setae. ....6
- 6 All four tergites are normally developed. Body length 1.6–2.2 mm. .. *Lipoptena hopkinsi* Bequaert, 1942
- Tergite 1 is represented by row of strong setae. Body length 1.3–1.6 mm..... *Lipoptena rusaecola* Bequaert, 1942
- 7 Acrostichal setae absent. .... *Lipoptena andaluciensis* Gonzalez, 2024
- Acrostichal setae present. ....8
- 8 Body length less than 2 mm. .... 9
- Body length 2 mm or more. ....10
- 9 Posterior (inner) margin of pleurite 2 distinctly concavely curved. .... *Lipoptena fortisetosa* Maa, 1965
- Posterior margin of pleurite 2 straight. .... *Lipoptena pauciseta* Edwards, 1919
- 10 7–8 acrostichal setae. Pleurite 1 kidney-shaped with 8–11 long setae. .... *Lipoptena nirvana* Maa, 1969
- 5–6 acrostichal setae. S-shaped posterior margin of female pleurite 2. .... *Lipoptena sigma* Maa, 1965
- 11 Prescutellar and longitudinal sutures on mesoscutum. .... *Lipoptena cervi* (Linnaeus, 1758)
- Only longitudinal suture on mesoscutum. ....12
- 12 Body length less than 2 mm. .... *Lipoptena sikae* Mogi, 1975
- Body length 2 mm or more. ....13
- 13 12 scutellar setae. Pleurite I without clear edges. Pleurite 2 big and round. .... *Lipoptena doszhanovi* Grunin, 1974
- 6–8 scutellar setae. Other features. ....14
- 14 more than 40 laterocentral mesonotum setae. .... *Lipoptena arianae* Maa, 1969
- less laterocentral mesonotum setae. ....15
- 15 9–14 laterocentral mesonotum setae. .... *Lipoptena saepes* Maa, 1969
- 28 laterocentral mesonotum setae. .... *Lipoptena japonica* Bequaert, 1942

### The updated identification key for species from the group “*capreoli*”

[based on Yatsuk et al. (2024a), and Maa (1969a)]

- 1 All pulvilli reduced. .... *Lipoptena chalcomleae* Speiser, 1904
- Not all pulvilli reduced. ....2
- 2 Body length more than 2.4 mm. ....3
- Body length 2.4 mm or less. ....5
- 3 Extremely hairy body and legs. 8–13 humerals setae. Lateral setae of mesonotum forming continuous patch with acrostichals between humeral callus and scutoscutellar suture. 8–10 (in 4–5 pairs) scutellar setae. .... *Lipoptena couturieri* Séguéy, 1935
- Body less hairy. Less humerals setae. Lateral setae arranged differently. 8 or less scutellar setae. ....4
- 4 Body moderately dark. .... *Lipoptena saltatrix* Maa, 1969
- Pale body and legs. ....*Lipoptena capreoli* Rondani, 1878
- 5 Body moderately dark. Mesonotum setae: 5–7 humerals, 7–9 acrostichals, 9–13 laterocentrals (in 2 series), 3–6 postalar (about 1/2 of them are small), 2–3 prescutellars (1 large and 1–2 small), 9–12 mesopleurals, 4–8 scutellars (in 2–4 pairs. .... *Lipoptena saltatrix* Maa, 1969
- Other features. ....6
- 6 Mesonotum setae: 3–4 humerals, 5–8 acrostichals, 3–4 laterocentrals (in single series), 3–5 postalar, 1 major with 0–2 minor prescutellars, 7–8 mesopleurals, 4–5 scutellars (in 3 pairs). Legs are not densely hairy. .... *Lipoptena weidneri* Maa, 1969
- Mesonotum setae: 7–8 acrostichals, 7–10 laterocentrals (in 2 series), 4 postalar, 2 prescutellars, 6 scutellars (2 very long). Densely hairy legs. .... *Lipoptena grahami* Bequaert, 1942

### The improved identification key for species from the group “*echestypus*”

[based on Yatsuk et al. (2024a), Maa (1969a), Visagie et al. (1992), and Visagie (1992, 1993)]

- 1 2 scutellar setae. .... *Lipoptena binocula* (Speiser, 1908)
- 4–6 scutellar setae. ....2
- 2 Pulvilli not differ between pairs of legs. .... 3
- Anterior pulvilli of front and middle legs vestigial, pulvilli of leg 3 both vestigial. ....4
- 3 All pulvilli vestigial (knob-like). .... *Lipoptena annalizeae* Visagie, 1992
- Only anterior pulvilli of all legs reduced or vestigial. ....*Lipoptena paradoxa* Newstead, 1907
- 4 Male: median length of sternite 1 markedly exceeding that of its lateroposterior lobe. Inner and outer margins of that lobe straight or very nearly straight. Apex of dorsum of pleurite 2 acute, apex of pleurite 1 angulate. Female: posterior margin of pleurite 1 distinctly shorter than inner posterior margin of pleurite 2. .... *Lipoptena sepiacea* Speiser, 1905
- Male: median length of sternite 1 hardly less than that of its lateroposterior lobe. Inner and outer margin of that lobe distinctly though weakly curved. Apices of pleurites 1–2 in dorsal view rounded. Female: posterior margin of pleurite 1 subequal in length to inner posterior margin of pleurite 2. ....*Lipoptena iniqua* Maa, 1969

#### AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: A.A. Yatsuk: Writing – original draft, Material analysis. A.V. Matyukhin: Writing – review & editing, Material analysis. E.P. Nartshuk: Writing – review & editing, Material analysis. The authors read and approved the final version of the manuscript.

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#### AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the collection of Zoological Institute of the Russian Academy of Sciences (Saint Petersburg, Russia) and are available from the curator upon request.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. This research was not conducted on vertebrates. Furthermore, hippoboscids are not a protected species. No human participants were involved in any studies conducted by the authors for this article.

## CONSENT FOR PUBLICATION

Not applicable.

## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

## GENERATIVE AI STATEMENT

The authors must declare any use of generative AI tools in the preparation of this manuscript. Please note that these tools should not be used for content generation or data analysis.

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## اطلاعات تکمیلی از ریخت‌شناسی مگس (*Diptera*, ) *Lipoptena paradoxa* Newstead, 1907 (Hippoboscidae) و کلید شناسایی جدید برای جنس

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**چکیده:** مگس‌های خانوادهٔ Hippoboscidae Samouelle, 1819 (Diptera) انگل‌های خونخوار خارجی تخصصی هستند و بسیاری از بیماری‌های خطرناک را منتقل می‌کنند. جنس *Lipoptena* Nitzsch, 1818 شامل گروهی از گونه‌ها است که عمدتاً انگل گاوها و گوزن‌ها هستند. این جنس شامل ۲۷ گونه است و به دو گروه تقسیم می‌شود. تفاوت اصلی بین این دو گروه در درجه تحلیل بالشک‌ها است. در حال حاضر، طبقه‌بندی گروه‌های مورفولوژیک متعلق به جنس *Lipoptena* نیاز به بازنگری دارد. یکی از گونه‌ها، به نام *L. paradoxa* Newstead, 1907 انگل رایج تعدادی از آنتلوپ‌ها است و به طور گسترده در آفریقای جنوبی، صحرای بزرگ آفریقا انتشار دارد. با وجود مطالعه گسترده این گونه، توصیف کلاسیک ریخت‌شناسی آن که اجازه شناسایی و مقایسه با مطالعات جدید را می‌دهد، ناکافی باقی مانده است. همچنین، شناسایی به دلیل کمبود ترسیم‌های کامل، دشوار است. نتایج ما نشان می‌دهد که گروه *capreoli* که قبلاً شناسایی شده بود، یک گروه ترکیبی است. بر این اساس، گونه‌های *L. annalizeae* Visagie, 1992، *L. binocula* (Speiser, 1908)، *L. iniqua* Maa، *L. paradoxa*، 1969 و *L. sepiacea* Speiser, 1905 می‌توانند بر اساس این واقعیت که برخلاف سایر گونه‌های جنس، اوسل‌های آن‌ها غایب است و آنتن‌های آن‌ها بسیار کوچک است، از آن جدا شوند و به گروه گونه‌ای *echestypus* منتقل شوند. ناهماهنگی‌ها با داده‌های ادبیات در مورد مورفولوژی *L. paradoxa* روشن شده است.

ویراستار علمی  
ابراهیم گیلاسیان

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**واژگان کلیدی:** آفریقا، سگ‌مگس، Lipopteninae، گروه‌گونه، *Tragelaphus strepsiceros*