Updates on the *Neoserica vulpes* group (Coleoptera, Scarabaeidae, Melolonthinae, Sericini): new species and records

Dirk AHRENS

Zoologisches Forschungsmuseum A. Koenig, Leibniz Institute for the Analysis of Biodiversity Change (LIB), Adenauerallee 127, 53113 Bonn, Germany. ahrens.dirk_col@gmx.de; d.ahrens@leibniz-lib.de

Abstract. Here, I describe four new species of the *Neoserica vulpes* species group: *Neoserica daxue* sp. nov., *N. mianningana* sp. nov., *N. myanmarensis* sp. nov., and *N. yanyuan* sp. nov. Genitalia and habitus of the new species are illustrated. Additional records of species from the group are given and the key to species of the *Neoserica vulpes* species group is updated.

Keywords. Beetles, chafer, *Neoserica*, China, Myanmar, new species.


Introduction

The genus *Neoserica* Brenske, 1894 was recently revised in a series of publications in which many new taxa were established for the fauna of China and adjacent areas (Ahrens *et al.* 2014a, 2014b, 2014c; Liu *et al.* 2014a, 2014b, 2014c, 2015a, 2016, 2019; Bohacz & Ahrens 2020; Ahrens 2021, 2022; Ahrens & Pham 2021; Ahrens & Lukic 2022). *Neoserica* (sensu lato) comprises a polyphyletic mix of larger species with multilamellate antenna (Ahrens 2003, 2004; Liu *et al.* 2015b; Ahrens & Fabrizi 2016; Eberle *et al.* 2017). As previously mentioned, they need a revision of their generic systematics and nomenclature, but this is only possible when their taxonomy, morphology, and phylogeny are better understood. The treatment of species of uncertain systematic assignment remains particularly complicated as the relationships to other groups of species remain obscure and would benefit from future investigations, especially once the neighbouring faunas of Asia are better known. In the current paper we describe four further new species of the *Neoserica vulpes* group (Ahrens *et al.* 2014c) that were received from diverse collectors and institutions.

Material and methods

The terminology and methods used for measurements, specimen dissection and genital preparation follow Ahrens (2004). Data from specimens examined are cited in the text with original label contents given in quotation marks, multiple labels are separated by a ‘/’. Descriptions and illustrations of new taxa are based on the holotype or lectotype specimen if not otherwise stated, while the variation of specimens is given separately under ‘variation’. Male genitalia were glued to a small, pointed card and
photographed in both lateral and dorsal view using a Leica M125 with a Leica DC420C digital camera. In the Automontage software as implemented in Leica Application Suite (ver. 3.3.0) single focused images were combined to an entirely focused image. The resulting images were subsequently digitally edited.

Abbreviations used in the text for collection depositories are as follows:

CP = collection P. Pacholátko, Brno, Czech Republic
ZFMK = Zoologisches Forschungsmuseum A. Koenig, Bonn, Germany

Results

Description of new species

Class Insecta Linnaeus, 1758
Subclass Pterygota Lang, 1888
Superfamily Scarabaeoidea Latreille, 1802
Family Scarabaeidae Latreille, 1802
Subfamily Melolonthinae Leach, 1819
Tribe Sericini Kirby, 1837
Genus Neoserica Brenske, 1894

Neoserica mianningana sp. nov.

Diagnosis

Neoserica mianningana sp. nov. differs from N. nykli Ahrens, Liu & Fabrizi 2014 by the shape of the ventral phallobasal process, which is well curved and has a less pronounced ventral distal tooth (compared to that of N. nykli) as well as by the shape of both parameres which are longer and more strongly curved.

Etymology

The new species is named (name: adjective in the nominative case singular) for its occurrence close to the city of Mianning, China.

Type material examined

Holotype
CHINA • ♂; “China, Daxue Shan Mts., Sichuan, 40 km W Mianning, 7-8.vi.1999, 2750m, 28°34’N, 102°00’E, V. Siniaev & A. Plutenko lgt. / 1152 Sericini: Asia spec.”; CP.

Paratype
CHINA • 1 ♂; “China, Daxue Shan Mts., Sichuan, 40 km W Mianning, 7-8.vi.1999, 2750m, 28°34’N, 102°00’E, V. Siniaev & A. Plutenko lgt.”; ZFMK.

Description

Measurements. Length: 8.8 mm, length of elytra: 6.2 mm, width: 4.6 mm.

Habitus and coloration (Fig. 1E). Body oblong, reddish brown, ventral surface and antenna yellow, dorsal surface dull and almost glabrous.
HEAD. Labroclypeus subtrapezoidal, widest at base, lateral margins weakly convex and convergent to moderately rounded anterior angles, lateral border and ocular canthus producing a distinct, blunt angle, margins weakly reflexed, anterior margin distinctly sinuate medially; surface flat and shiny, finely and densely punctate, with a few long, erect setae in coarser punctures; frontoclypeal suture feebly incised and medially curved; smooth area in front of eye approximately 1.5 times as wide as long; ocular canthus moderately long and slender, very finely and sparsely punctate, with a fine terminal seta. Frons dull, with fine and moderately dense punctures and with a few long setae beside eyes and behind frontoclypeal suture. Eyes small, ratio of diameter/interocular width: 0.55. Antenna with ten antennomeres; club with four antennomeres, nearly 1.2 times as long as remaining antennomeres combined. Mentum convexly elevated anteriorly.

PRONOTUM. Short and wide, widest shortly before base, lateral margins evenly curved and narrowed anteriorly and posteriorly, anterior angles moderately produced and blunt, posterior angles blunt and slightly rounded at tip; anterior margin convexly produced medially, broad marginal line widely missing; basal margin without marginal line; surface with moderately dense and fine punctures, with minute setae, otherwise glabrous; anterior and lateral borders sparsely setose; hypomeron distinctly carinate at base. Scutellum narrow and long, sharp at apex, with fine and moderately dense punctures and minute setae.

ELYTRA. Oblong, widest in posterior third, striae finely impressed, finely and densely punctate, intervals flat, finely and sparsely punctate, on odd intervals with a few long erect setae, otherwise with minute setae; epipleural edge robust, ending at strongly curved external apical angle of elytra, epipleura densely setose, apical border membranous, with short microtrichomes.

VENTRAL SURFACE. Dull, with large and dense punctures, sparsely and shortly setose, setae partly adpressed; metacoxa glabrous, with fine setae laterally, apical margin convex and external apical angle rounded; each abdominal sternite with a distinct transversal row of coarse punctures each bearing a short seta between fine and moderately dense punctuation. Mesosternum between mesocoxae nearly half as wide as mesofemur, with irregularly scattered, fine setae. Ratio of length of metepisternum/metacoxa: 1/1.5. Pygidium strongly convex, finely and densely punctate, without smooth midline, with short setae along apical margin.

LEGS. Slender; femora with two longitudinal rows of setae, finely and moderately densely punctate; metafemur ventrally dull, anterior margin sharply carinate, without a submarginal serrated line, posterior margin moderately convex, with a few strong setae medially, only weakly widened externally in apical half and not serrated ventrally in distal half, finely serrated dorsally, with dense, short setae. Metatibia slender and long, widest at apex, ratio width/length: 1/3.6, dorsal margin sharply carinate, with two groups of spines, basal group shortly before middle, apical one at about three quarters of metatibial length, basally with a few single, fine spines; external face longitudinally convex, with coarse, sparse punctures, glabrous; ventral margin finely serrated, with four fine, equidistant spines; medial face impunctate, apex concavely truncate interiorly near tarsal articulation. Tarsomeres dorsally impunctate, with sparse, short setae ventrally; metatarsomeres glabrous dorsally, with a strongly serrated ridge ventrally, and with a fine longitudinal carina immediately beside it; first metatarsomere little longer than following two tarsomeres combined and distinctly longer than dorsal tibial spur. Protibia long, bidentate, protarsal claws symmetrical, basal tooth of inner protarsal claw bluntly truncate apically.

Aedeagus. Fig. 1A–D.

Variation
Length: 8.8–9.1 mm, length of elytra: 6.2–6.4 mm, width: 4.6–4.8 mm.
Female
Unknown.

_Neoserica myanmarensis_ sp. nov.
Fig. 1F–I

**Diagnosis**

_Neoserica myanmarensis_ sp. nov. differs from _N. baoshana_ Ahrens, Liu & Fabrizi, 2014 by the shape of the ventral phallobasal process: its distal hook is shorter and only weakly bent towards the right side (dorsal view).

**Fig. 1.** A–E. _Neoserica mianningana_ sp. nov., holotype, ♂ (CP). F–I. _N. myanmarensis_ sp. nov., holotype, ♂ (ZFMK). A, F. Aedeagus, left side lateral view. B. Distal phallobase, dorsal view. C, G. Parameres, dorsal view. D, H. Aedeagus, right side lateral view. E, I. Habitus (not to scale). Scale bars = 0.5 mm.
Etymology
The new species is named (name: adjective in the nominative case singular) for its occurrence in Myanmar.

Type material examined

Holotype
MYANMAR • ♂; “Myanmar: Danasho 2800 m, Minshia vi-2004 leg. Yin et al. / Phil #11-2004:4. / 1137 Sericini: Asia spec.”; ZFMK.

Paratypes
CHINA • 1 ♂; “X-DA6902/ X-DA6902 China Yunnan NE Kunming 25°08’35”’N, 102°53’49”’E 2320m leg. M. Schülke & V. Assing (CH14-6) 13.08.2021 Neoserica spTigerThai215”; ZFMK • 1 ♂; “X-DA6905/ X-DA6905 China Yunnan mountain WNW Wuding 25°38’45”’N, 102°06’55”’E 2390m leg. M. Schülke & V. Assing (CH14-12a) 01.09.2014 Neoserica spTigerThai215”; ZFMK.

Description

Measurements. Length: 8.5 mm, length of elytra: 6.2 mm, width: 5.0 mm.

Habitus and coloration (Fig. 11). Body oblong, dark brown, ventral surface and antenna yellow, dorsal surface dull and with numerous shorter and long, erect setae.

Head. Labroclypeus subtrapezoidal, widest at base, lateral margins weakly convex and convergent to moderately rounded anterior angles, lateral border and ocular canthus producing a blunt angle, margins weakly reflexed, anterior margin distinctly sinuate medially; surface convex and moderately shiny, finely and densely, irregularly punctate, with numerous long erect setae in coarser punctures; frontoclypeal suture feebly incised and medially curved; smooth area in front of eye approximately 1.5 times as wide as long; ocular canthus moderately long and slender, very finely and sparsely punctate, with a fine terminal seta. Frons dull, with fine and moderately dense punctures and with long, erect setae. Eyes small, ratio of diameter/interocular width: 0.55. Antenna with ten antennomeres; club with four antennomeres, nearly 1.2 times as long as remaining antennomeres combined. Mentum convexly elevated anteriorly.

Pronotum. Moderately wide, widest at base, lateral margins in basal half subparallel and almost straight, in anterior half evenly curved and narrowed anteriorly, anterior angles distinctly produced and sharp, posterior angles blunt and slightly rounded at tip; anterior margin convexly produced medially, broad marginal line widely missing; basal margin without marginal line; surface with moderately dense and fine punctures, with minute setae and dense, long, erect setae; anterior and lateral borders sparsely setose; hypomeron distinctly carinate at base. Scutellum narrow and long, sharp at apex, with fine and moderately dense punctures and minute setae, a few longer ones.

Elytra. Oblong, widest in posterior third, striae distinctly impressed, finely and densely punctate, intervals weakly convex and not densely punctate, with small and larger punctures, with numerous fine adpressed and long erect setae, small punctures with minute setae; epipleural edge robust, ending at strongly curved external apical angle of elytra, epipleura densely setose, apical border membranous, with short microtrichomes.

Ventral surface. Dull, with large and dense punctures, sparsely and short setose, setae partly adpressed; metacoxa glabrous, with fine setae laterally, apical margin convex and external apical angle rounded; each abdominal sternite with a distinct transversal row of coarse punctures each bearing a short seta between fine and moderately dense punctuation. Mesosternum between mesocoxae nearly half as wide as mesofemur, with irregularly scattered, fine setae. Ratio of length of metepisternum/metacoxa:
1/1.5. Pygidium strongly convex, finely and densely punctate, with narrow smooth midline, with moderately dense, long setae on apical half.

LEGS. Slender; femora with two longitudinal rows of setae, finely and moderately densely punctate; metafemur ventrally dull, anterior margin sharply carinate, without a submarginal serrated line, posterior margin moderately convex, with a few strong setae medially, only weakly widened externally in apical half and not serrated ventrally in distal half, finely serrated dorsally, with dense, short setae. Metatibia slender and long, widest at apex, ratio width/length: 1/3.9, dorsal margin sharply carinate, with two groups of spines, basal group of spines at half of metatibial length, apical one at about three quarters of metatibial length, basally with a few single, fine spines; external face longitudinally convex, with fine, sparse punctures, sparsely minutely setose; ventral margin finely serrated, with four fine, equidistant spines; medial face impunctate, apex concavely truncate interiorly near tarsal articulation. Tarsomeres dorsally impunctate, with sparse, short setae ventrally; metatarsomeres glabrous dorsally, with a strongly serrated ridge ventrally, and with a fine longitudinal carina immediately beside it; first metatarsomere little longer than following two tarsomeres combined and distinctly longer than dorsal tibial spur. Protibia long, bidentate, protarsal claws symmetrical, basal tooth of inner protarsal claw bluntly truncate apically.

AEDEAGUS. Fig. 1F–H.

Variation
Length: 8.4–8.6 mm, length of elytra: 6.1–6.2 mm, width: 4.9–5.0 mm.

Female
Unknown.

Neoserica daxue sp. nov.
urn:lsid:zoobank.org:act:5141D981-8C74-4916-AC62-CE039C5EBF60
Fig. 2A–E

Diagnosis
Neoserica daxue sp. nov. differs from N. xiaguanensis Ahrens, Liu & Fabrizi, 2014 by the shape of the ventral phallobasal process, which is much wider, by the dorsal phallobasal process (dorsal view), which is not widened at apex, as well as by the shape of both parameres being slightly more robust but similar in shape.

Etymology
The new species is named (name: noun in apposition) for its occurrence in the Daxue Shan, China.

Type material examined
Holotype
CHINA • ♂; “China, Daxue Shan Mts., Sichuan, Mianning, 1850 m, 6.vi.1999, 28°33’N, 102°10’E, V. Siniaev & A. Plutenko lgt. / 1153 Sericini: Asia spec.”; CP.

Description
MEASUREMENTS. Length: 8.4 mm, length of elytra: 5.6 mm, width: 4.6 mm.

HABITUS AND COLORATION (Fig. 2E). Body oblong, reddish brown, ventral surface and antenna yellow, dorsal surface dull and almost glabrous.
Labroclypeus subtrapezoidal, widest at base, lateral margins weakly convex and convergent to moderately rounded anterior angles, lateral border and ocular canthus producing a distinct, blunt angle, margins weakly reflexed, anterior margin distinctly sinuate medially; surface flat and shiny, coarsely and densely punctate, with a few long, erect setae; frontoclypeal suture feebly incised and medially curved; smooth area in front of eye approximately 1.2 times as wide as long; ocular canthus moderately long and slender, very finely and sparsely punctate, with a fine terminal seta. Frons dull, with fine and moderately dense punctures and with a few long setae beside eyes and behind frontoclypeal suture. Eyes moderately large, ratio of diameter/interocular width: 0.65. Antenna with ten antennomeres; club with four antennomeres, nearly 1.3 times as long as remaining antennomeres combined. Mentum convexly elevated anteriorly.

Pronotum. Moderately wide, widest shortly before base, lateral margins evenly curved and narrowed anteriorly and posteriorly, anterior angles well produced and sharp, posterior angles blunt; anterior margin convexly produced medially, broad marginal line widely missing; basal margin without marginal line; surface with moderately dense and fine punctures, with minute setae, otherwise glabrous; anterior and lateral borders sparsely setose; hypomeron distinctly carinate at base. Scutellum narrow and long, sharp at apex, smooth on basal midline, with minute setae in punctures only.

Elytra. Oblong, widest in posterior third, striae distinctly impressed, finely and densely punctate, intervals convex, coarsely and moderately densely punctate, on odd intervals with a few long erect setae, otherwise with minute setae; epipleural edge robust, ending at strongly curved external apical angle of elytra, epipleura densely setose, apical border membranous, with short microtrichomes.

Ventral surface. Dull, with large and dense punctures, sparsely and shortly setose, setae partly adpressed; metacoxa glabrous, with fine setae laterally, apical margin convex and external apical angle rounded; each abdominal sternite with a distinct transversal row of coarse punctures each bearing a short seta between fine and moderately dense punctuation. Mesosternum between mesocoxae nearly half as wide as mesofemur, with irregularly scattered, fine setae. Ratio of length of metepisternum/metacoxa: 1/1.6. Pygidium moderately convex, finely and densely punctate, without smooth midline, with short setae beside apical margin.

Legs. Slender; femora with two longitudinal rows of setae, finely and moderately densely punctate; metatibia ventrally dull, anterior margin sharply carinate, without a submarginal serrated line, posterior margin moderately convex, with a few strong setae medially, only weakly widened externally in apical half and not serrated ventrally in distal half, finely serrated dorsally, with dense, short setae. Metatibia slender and moderately long, widest at apex, ratio width/length: 1/3.1, dorsal margin sharply carinate, with two groups of spines, basal group shortly before middle, apical one at about three quarters of metatibial length, basally with a few single, fine spines; external face longitudinally convex, with coarse, sparse punctures, glabrous; ventral margin finely serrated, with four fine, equidistant spines; medial face impunctate, apex concavely truncate internally near tarsal articulation. Tarsomeres dorsally impunctate, with sparse, short setae ventrally; metatarsomeres glabrous dorsally, with a strongly serrated ridge ventrally, and with a fine longitudinal carina immediately beside it; first metatarsomere little longer than following two tarsomeres combined and distinctly longer than dorsal tibial spur. Protibia long, bidentate, protarsal claws symmetrical, basal tooth of inner protarsal claw bluntly truncate apically.

Aedeagus. Fig. 2A–D.

Female

Unknown.
Neoserica yanyuan sp. nov.

Fig. 2F–I

Diagnosis

*Neoserica yanyuan* sp. nov. is in external and genital shape very similar to *N. rubellula* Ahrens, Liu & Fabrizi, 2014. *Neoserica yanyuan* differs from *N. rubellula* by the shape of the ventral phallobasal process, which has a slightly more extended apical convexity and being more sharply pointed, as well as by the shape of both parameres: the right paramere has a shorter basal piece, with the lateral branch being longer and more curved; the left paramere is more strongly curved (lateral view).

Etymology
The new species is named (name: noun in apposition) after its type locality, Yanyuan, China.

Type material examined
Holotype

Description
Measurements. Length: 9.2 mm, length of elytra: 7.1 mm, width: 5.2 mm.

Habitus and coloration (Fig. 2I). Body oblong, reddish brown, ventral surface light reddish brown, antenna yellow, dorsal surface dull and glabrous.

Head. Labroclypeus subtrapezoidal, widest at base, lateral margins weakly convex and convergent to moderately rounded anterior angles, lateral border and ocular canthus producing a distinct, blunt angle, margins weakly reflexed, anterior margin moderately sinuate medially; surface convex and moderately shiny, coarsely and densely punctate, with a few long setae; frontoclypeal suture feebly incised and medially bluntly angled; smooth area in front of eye approximately 1.5 times as wide as long; ocular canthus moderately long and slender, very finely and sparsely punctate, terminal seta absent. Frons dull, with fine and sparse punctures, glabrous. Eyes large, ratio of diameter/interocular width: 0.8. Antenna with ten antennomeres; club with four antennomeres, nearly 1.3 times as long as remaining antennomeres combined. Mentum convexly elevated anteriorly.

Pronotum. Moderately wide, widest at base, lateral margins evenly curved and narrowed anteriorly, anterior angles well produced and sharp, posterior angles blunt; anterior margin convexly produced medially, broad marginal line widely missing; basal margin without marginal line; surface with moderately dense and fine punctures, with minute setae, otherwise glabrous; anterior and lateral borders sparsely setose; hypomeron distinctly carinate at base. Scutellum narrow and long, sharp at apex, punctures sparse on basal midline, with minute setae in punctures only.

Elytra. Oblong, widest in posterior third, striae finely impressed, finely and densely punctate, intervals weakly convex, finely and moderately densely punctate, on odd intervals with a few short adpressed setae, otherwise with minute setae; epipleural edge robust, ending at strongly curved external apical angle of elytra, epipleura densely setose, apical border membranous, with short microtrichomes.

Ventral surface. Dull, with large and dense punctures, sparsely and shortly setose, setae partly adpressed; metacoxa glabrous, with fine setae laterally, apical margin convex and external apical angle rounded; each abdominal sternite with a distinct transversal row of coarse punctures each bearing a short seta between fine and moderately dense punctation. Mesosternum between mesocoxae nearly half as wide as mesofemur, with irregularly scattered, fine setae. Ratio of length of metepisternum/metacoxa: 1/1.33. Pygidium moderately convex, finely and densely punctate, without smooth midline, with short and sparse setae on apical half.

Legs. Slender; femora with two longitudinal rows of setae, finely and moderately densely punctate; metafemur ventrally dull, anterior margin sharply carinate, without a submarginal serrated line, posterior margin moderately convex, with a few strong setae medially, only weakly widened externally in apical half and not serrated ventrally in distal half, finely serrated dorsally, with dense, short setae. Metatibia slender and long, widest at apex, ratio width/length: 1/4.1, dorsal margin sharply carinate, with two groups of spines, basal group shortly before middle, apical one at about four fifths of metatibial length,
between them with another or two robust spines, basally with a few single, fine spines; external face longitudinally convex, with coarse, sparse punctures, glabrous; ventral margin finely serrated, with four fine, equidistant spines; medial face impunctate, apex concavely truncate interiorly near tarsal articulation. Tarsomerses dorsally impunctate, with sparse, short setae ventrally; metatarsomerses glabrous dorsally, with a strongly serrated ridge ventrally, and with a fine longitudinal carina immediately beside it; first metatarsomere little longer than following two tarsomerses combined and distinctly longer than dorsal tibial spur. Protibia long, bidentate, protarsal claws symmetrical, basal tooth of inner protarsal claw bluntly truncate apically.

Aedeagus. Fig. 2F–H.

Female
Unknown.

Further records of species of the Neoserica vulpes group

Neoserica biuncinata Ahrens, Liu & Fabrizi, 2014

Additional material examined
CHINA • 1 ♂; “China, S. Sichuan, Kiangshan Mts., S. Xichang h=3000m, 1.vii.2002 leg. S. Murzin, I. Shokhin”; CP.

Neoserica nykli Ahrens, Liu & Fabrizi, 2014

Additional material examined
CHINA • 1 ♂; “China, Yunnan 1993 50 km N Lijiang, 24.-29.6. Yulongshan Nat. Res. Leg. E. Jendek & O. Sausa”; CP.

Updated key to species of Neoserica vulpes group (males)

1. Phallobase with a ventral process .......................................................................................................................... 4
   – Phallobase without a ventral process, but with a lateral one ........................................................................... 2

2. Right paramere large and spherical, longitudinal extension half of phallobasal length .................................
   ..................................................................................................................................................N. baishuiensis Ahrens, Liu & Fabrizi, 2014
   – Right paramere small, spherical, longitudinal extension one third of phallobasal length ..................... 3

   – Lateral process convexly rounded at apex (dorsal view) ...........................................................................N. leiboensis Ahrens, Liu & Fabrizi, 2014

4. Phallobase with a dorsal process ......................................................................................................................... 5
   – Phallobase without a dorsal process ............................................................................................................. 6

   – Ventral phallobasal process much wider. Dorsal phallobasal lobe not widened at apex. Both parameres more robust ...........................................................................................................................................N. daxue sp. nov.

6. Ventral process of phallobase at apex widened, with sharp hooks or bent processes .................................. 7
   – Ventral process of phallobase at apex convexly rounded or pointed ............................................................ 18
   - Ventral process of phallobase at apex with sharp hooks or bent processes ............................... 8

8. Right paramere deeply bifurcate. Hooks small .............................................................................. 9
   - Right paramere simple, not bifurcate. Hooks large ..................................................................... 11

9. Ventral process in cross section circular ......................................................................................... 10
   - Ventral process dorsoventrally flattened ..................................................................................... \textit{N. parausta} Ahrens, Liu & Fabrizi, 2014

10. Ventral phallobasal process with less extended apical convexity and more less pointed. Right
    paramere with longer basal piece, its lateral branch is short and straight; left paramere straight
    (lateral view) ......................................................................................................................... \textit{N. rubellula} Ahrens, Liu & Fabrizi, 2014
   - Ventral phallobasal process with a slightly more extended apical convexity and more sharply pointed.
     Right paramere with shorter basal piece, its lateral branch is longer and more curved; left paramere
     strongly curved (lateral view) .................................................................................................. \textit{N. yanyuan} sp. nov.

11. Left paramere at apex strongly curved ventrally ............................................................................. 12
   - Left paramere at apex straight .................................................................................................... \textit{N. biuncinata} Ahrens, Liu & Fabrizi, 2014

12. Eyes smaller, ratio diameter/interocular with: 0.58. Ventral process of phallobase exceeding
    parameres .......................................................................................................................................... \textit{N. usta} Ahrens, Liu & Fabrizi, 2014
   - Eyes moderate to large, ratio diameter/interocular with > 0.7 .......................................................... 13

13. Ventral process of phallobase exceeding parameres ................................................................. 14
   - Ventral process of phallobase ending distally at same point as parameres ................................. 15

14. Ventral phallobasal process straight (lateral view), its ventral distal tooth well pronounced. Parameres
    shorter and less strongly curved ........................................................................................................ \textit{N. nykli} Ahrens, Liu & Fabrizi, 2014
   - Ventral phallobasal process well curved and its ventral distal tooth little pronounced. Parameres
     longer and more strongly curved .................................................................................................... \textit{N. mianningana} sp. nov.

15. Ventral process of phallobase basally very enlarged and strongly dorsoventrally produced on right
    side, its width at base subequal to half of phallobase length ................................................................. 16
   - Ventral process of phallobase basally only weakly enlarged and not dorsoventrally produced on right
     side, its width at base subequal to less than third of phallobase length ................................................. 17

16. Left paramere one third as wide as long .............................. \textit{N. sichuanica} Ahrens, Liu & Fabrizi, 2014
   - Left paramere half as wide as long ............................................................................................ \textit{N. dundai} Ahrens, Liu & Fabrizi, 2014

17. Ventral process of phallobase at middle strongly bent dorsally ....................................................... \textit{N. pseudovulpes} Ahrens, Liu & Fabrizi, 2014
   - Ventral process of phallobase nearly straight or only weakly bent at middle dorsally ................. \textit{N. ganhaiziana} Ahrens, Liu & Fabrizi, 2014

18. Ventral process of phallobase bent or strongly curved .................................................................... 19
   - Ventral process of phallobase straight ........................................................................................... 24

19. Left paramere bifurcate, divided in two long lobes ......................................................................... 20
   - Left paramere simple, not divided in two long lobes .................................................................... 21
20. Ventral lobe of left paramere distinctly wider than dorsal one (lateral view) .................................................. N. ningyuanensis Ahrens, Liu & Fabrizi, 2014
   Ventral lobe of left paramere as wide as dorsal one (lateral view) .................................................. N. heishuiana Ahrens, Liu & Fabrizi, 2014

21. Ventral process of phallobase sharply pointed at apex, curved slightly to the right N. kunmingensis Ahrens, Liu & Fabrizi, 2014
   Ventral process of phallobase convex at apex, curved slightly to the left ........................................ 22

22. Curvation of ventral process moderate, not exceeding width of process at middle N. kereni Ahrens, Liu & Fabrizi, 2014
   Curvation of ventral process strong, exceeding width of process at middle .................................. 23

   Distal portion of ventral phallobasal process short and little hooked (dorsal view) .......................... N. myanmarensis sp. nov.

24. Ventral process of phallobase in basal cross section circular .......................................................... 25
   Ventral process of phallobase in basal cross section flattened ............................................................ N. laocaiana Ahrens, Liu & Fabrizi, 2014

   Ventral process of phallobase not distinctly widened towards apex ............................................. 26

26. Right paramere spherical, at apex with a single process ................................................................. 27
   Right paramere spherical, but at apex with two separate processes ............................................. 28

27. Left paramere wider (dorsal view), strongly blown up and spherical (lateral view); ventral process of phallobase distinctly widened apically N. vulpes (Arrow, 1946)
   Left paramere narrower (dorsal view), less blown up and less spherical (lateral view); ventral process of phallobase not widened apically N. yangjiapingensis Ahrens, Liu & Fabrizi, 2014

   Left paramere at apex distinctly less than one third of total width of paramere. Parameres subsphaerical in lateral view .............................................................. N. shinkaisiensis Ahrens, Liu & Fabrizi, 2014

29. Parameres narrow, strongly bent to the left side (dorsal view) N. alaoshanensis sp. nov.
   Parameres wider, nearly straight (dorsal view) N. shinkaisiensis Ahrens, Liu & Fabrizi, 2014

**Discussion**

This is the third contribution on the knowledge of the species of the Neoserica vulpes group, and it shows that the extensive and comprehensive revisionary works done so far are still far from being conclusive, which makes updates with descriptions of individual species technically and scientifically necessary. We expect further new discoveries with more rigorous light trapping programs all over Asia, although that is technically not always easy for logistical reasons. This study once more reveals a large amount of endemism in Asian Sericini and demonstrates that night active chafers are still rather poorly represented in material from occasional, non-targeted field surveys.
Acknowledgements

I am grateful to Petr Pacholátko (Brno) for the loan of his interesting specimens and to Michal Langer and Christoph Reuter (Hamburg) for the donation of their specimens. Furthermore, I thank Max Barclay and the anonymous referees for the helpful comments on the manuscript.

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Manuscript received: 22 October 2022
Manuscript accepted: 15 March 2023
Published on: 11 August 2023
Topic editor: Tony Robillard
Section editor: Max Barclay
Desk editor: Pepe Fernández

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