

Contribution to the knowledge of Chinese Phasmatodea VII: A new genus for two new species of Medaurini from China (Phasmatidae: Clitumninae)

George Ho Wai-Chun

P. O. Box No. 73749, Kowloon Central Post Office, Hong Kong.

Email: georgehwc@hotmail.com

ABSTRACT

A new genus for two new species, *Neospiniphasma similis* **gen. nov. & sp. nov.** and *N. triangulatum* **sp. nov.**, from Yunnan, China, are described. A key to the genera of Chinese Medaurini and a key to the species of *Neospiniphasma* **gen. nov.** are provided.

Key words: Stick insects, new genus, new species, Yunnan, China

中國螞蟥目之新知VII:中國莫螞蟥族一新屬二新種(螞蟥科:短角枝螞蟥亞科)

何維俊

香港九龍中央郵政信箱73749號

摘要:本文記述中國莫螞蟥族一新屬及二新種:擬新刺螞蟥 *Neospiniphasma similis* **gen. nov. & sp. nov.**及三角新刺螞蟥 *N. triangulatum* **sp. nov.**; 並編制了該族分屬檢索表及該新屬分種檢索表。

關鍵字: 竹節蟲, 新屬, 新種, 雲南, 中國

INTRODUCTION

The stick insect tribe Medaurini Hennemann & Conle, 2008 includes eight genera, 62 species and two subspecies and is restricted to continental Southeast Asian (Otte and Brock, 2005; Chen and He, 2008; Hennemann and Conle, 2008; Hennemann et al., 2008a, 2008b; Ho, 2017, 2020a, 2020b; Brock et al., 2021). In China, six genera, 44 species and two subspecies are known (Ho, 2017, 2020a, 2020c; Brock et al., 2021). Ho (2017) provided the first taxonomic study for the Chinese taxa, with the descriptions of two new genera, 14 new species and two new subspecies.

In this paper, a new genus, *Neospiniphasma* **gen. nov.**, is described from the Medaurini of China. *Neospiniphasma* **gen. nov.** includes two new species. They are namely *N. similis* **sp. nov.** and *N. triangulatum* **sp. nov.**. This new genus is closely related to *Cnipsomorpha* Hennemann, Conle, Zhang & Liu, 2008, but can be separated by the posteriorly expanded mesonotum in the female, and the strongly elongate and straight anal abdominal semi-tergites in the male.

MATERIALS & METHODS

The terminology of armature used in this paper is largely based on Rehn and Rehn (1939). Ootaxonomic descriptions refer to Clark (1976a, 1976b, 1979,

1988, 1998), Clark-Sellick (1997) and Zompro (2004). Measurements of specimens are given in millimetre (mm). Illustrations (Figs. 1-7, 12-18) are based on the type material that was pinned and dried and deposited in the Hong Kong Entomological Society, Hong Kong collection (HKES).

RESULTS

Phasmatidae Gray, 1835

Clitumninae Brunner, 1893

Medaurini Hennemann & Conle, 2008

Type-genus: *Medaura* Stål, 1875: 69, designated by Hennemann and Conle, 2008: 72.

Distribution: China, Bangladesh, Cambodia, India, Laos, Myanmar, Thailand and Vietnam.

Notes: Currently seven genera, *Cnipsomorpha* Hennemann, Conle, Zhang & Liu, 2008, *Interphasma* Chen & He, 2008, *Medauroidea* Zompro, 2000, *Medauromorpha* Bresseel & Constant, 2017, *Neosinophasma* Ho, 2017, *Neospiniphasma* **gen. nov.** and *Parapachymorpha* Brunner, 1893, are recognised in China. A key to the genera of Chinese Medaurini is provided.

Key to the genera of Medaurini from China:

1. Second to seventh abdominal tergites with triangularly expanded posterolateral angles in both sexes. **2**
 - Second to seventh abdominal tergites lacking expanded posterolateral angles in both sexes or fourth and fifth abdominal tergites rarely with expanded posterolateral angles in female. **3**
2. Both robust and thick-built in both sexes. *Cnipsomorpha*
 - Both slender and elongate in both sexes. *Neospiniphasma* **gen. nov.**
3. Legs unarmed in both sexes. *Interphasma*
 - Legs armed with lamellae, spines or serrations in both sexes. **4**
4. Small size, body length shorter than 50 mm. *Neosinophasma*
 - Medium to large size, body length longer than 50 mm. **5**

5. Thorax and/or abdomen usually armed with spines or horns in both sexes; if unarmed, anal abdominal segment with rounded posterior margin in female.
Parapachymorpha
- Thorax and abdomen lacking noticeable armature, smooth or only granulated in both sexes, anal abdominal segment with emarginated posterior margin in female. **6**
6. Anal abdominal segment with deep V-shaped emargination on posterior margin in female, anal abdominal segment longer than ninth abdominal tergum in male. *Medauroidea*
- Anal abdominal segment with a small emargination on posterior margin in female, anal abdominal segment roughly as long as ninth abdominal tergum in male. *Medauroomorpha*

***Neospiniphasma* gen. nov.**

Type-species: *Neospiniphasma triangulatum* sp. nov., by present designation.

Differentiation: *Neospiniphasma* gen. nov. is closely related to *Cnipsomorpha* Hennemann, Conle, Zhang & Liu, 2008, but can be separated by the slender and elongate body, the less spinose thorax and abdomen, the strong triangularly expanded posterolateral angles on the second to eighth abdominal tergites and the well-developed serrations on the legs in the both sexes, the posteriorly expanded mesonotum in the female, and the strongly elongate and straight anal abdominal semi-tergites in the male.

Description: Small size. Body spinose, slender and long. Apterous. Head oval, with paired supra-antennal and supra-orbital armature. Occiput convex, with two pairs of occipital spines. Antennae short, distinctly segmented. Thorax spinose and slender. Mesonotum moderately expanded posteriorly. Abdomen cylindrical, with distinct triangularly expanded posterolateral angles from second to ninth tergites in female, male with distinct spinose posterolateral angles from second to eighth tergites. Female with distinct praeopercular organ on posteromedian area of seventh sternum, hump-like or dorsoventrally flattened. Anal segment with emarginations on posterior margin in female, dilated into two moderately straight semi-tergites in male. Cerci short and flattened in both sexes. Legs slender and long, femora and tibiae distinctly armed with serrations.

Distribution: China (Yunnan).

Notes: This new genus contains two species, including *N. similis* sp. nov. and *N. triangulatum* sp. nov.. A key to the species is given.

Etymology: The specific epithet of this new genus is derived from the words 'Neo' (= new), 'spini' (= spinose) and 'phasma' (= stick and leaf insects).

Key to the species of *Neospiniphasma* gen. nov.:

Male:

1. Posteromedian area of seventh abdominal sternum with a dorsoventrally flattened praeopercular organ. *N. similis* sp. nov.
- Posteromedian area of seventh abdominal sternum with a hump-like praeopercular organ. *N. triangulatum* sp. nov.

Female:

1. Poculum with tubercle-like median elevation, anterodorsal carina of tibiae with indistinct and minute serrations. *N. similis* sp. nov.
- Poculum with crest-like median elevation, anterodorsal carina of tibiae with distinct and well-developed serrations. *N. triangulatum* sp. nov.

***Neospiniphasma similis* sp. nov. (Figs. 1-11)**

Types: Holotype, ♀, 1500m, Jinping, Honghe, Yunnan, China, 28 August 2019, George Ho Wai-Chun (HKES); Paratypes, 1♀, 1♂, 5 eggs (naturally laid by paratype ♀), same data as holotype ♀ (HKES).

Differentiation: *Neospiniphasma similis* sp. nov. is similar to *N. triangulatum* sp. nov., but can be separated by the presence of a pair of posterior spines on the median abdominal segment and the dorsoventrally flattened praeopercular organ on the posteromedian area of seventh abdominal sternum in the female and the presence of minute serrations on the anterodorsal carina of tibiae in the male.

Description of female (Figs. 1-3, 8, 10): Small size. Body slender and elongate, distinctly larger and more robust than male. General colouration of body and legs green, with brownish markings.

Head: Oval, longer than wide, gently tapering posteriorly behind compound eyes. Vertex convex, with a pair of supra-antennal spines. Occiput distinctly convex, with paired supra-orbital spines; also with two pairs of medial spines along median longitudinal furrow, anterior pair as large as posterior pair, also as large as supra-orbital spines. Compound eyes small and rounded, its length about four to five times that of genae. Antennae with 13 segments, almost reaching middle point of profemora; scapus flattened, longer than third segment; and pedicellus shorter than third segment.

Thorax: Sparsely covered with very few small granules. Pronotum trapezoidal, gently expanded posteriorly, anterior margin gently incurved, posterior margin truncate, transverse and longitudinal sulci crossing at centre of segment; with paired posterior medial spines, lateral margins with a short spine pre-medially. Mesonotum moderately expanded posteriorly, about three times length of pronotum; with paired anterior medial, pre-median medial, post-median medial and

posterior medial spines; also with paired pre-median and median spines; lateral margins with a few spines. Metanotum longer than wide, about six times length of median segment; with paired anterior medial, median medial and post-median medial spines, also with paired pre-median spines, lateral margins with a few short spines. Mesopleurae and metapleurae with a short supra-coxal spine.

Abdomen: Cylindrical and tapering posteriorly, longer than combined length of head and thorax. Median segment narrow, wider than long, with paired anterior medial, median medial and posterior spines. Second to ninth tergites with distinct triangularly expanded posterolateral angles, also with paired anterior medial spines. Second to seventh tergites with paired median medial, posterior medial and posterior spines. Seventh sternum with a distinct dorsoventrally flattened praeopercular organ on posteromedian area, posterior margin distinctly emarginated. Eighth tergum longer than ninth tergum, with a pair of posterior medial spines. Ninth tergum with a bi-spinose crest posteromedially. Anal segment as long as ninth tergum, posterior margin with a small U-shaped emargination, posterolateral angles obtuse, median longitudinal carina gently elevated. Operculum scoop-shaped, posterior apex pointed and reaching posterior margin of anal segment. Cerci long, flattened, apices pointed and surpassing posterior apices of anal segment.

Legs: Slender. Femora thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae with three to six serrations. Profemora weakly curved basally. Tibiae longer than corresponding femora, anterodorsal and anteroventral carinae with four to seven serrations, posterodorsal and posteroventral carinae with indistinct and minute serrations.

Description of male (Figs. 4-5, 9, 11): Body slender and slim, distinctly smaller and slenderer than female. General colouration of body and legs brownish green.

Head: Oval, with very few small granules. Vertex weakly convex, with a pair of supra-antennal spines. Occiput moderately convex, median longitudinal furrow indistinct; with paired supra-orbital spines and two pairs of occipital medial spines along median longitudinal furrow, anterior pair larger than posterior pair, also larger than supra-orbital spines. Compound eyes small and rounded, its length about four-times that of genae. Antennae with 18 segments, apices reaching middle area of profemora; scapus flattened, almost as long as third segment, longer than pedicellus.

Thorax: Covered with very few small granules. Pronotum nearly trapezoidal, gently expanded posteriorly, anterior margin almost truncate, posterior margin rounded, with a pair of posterior medial spines, transverse and longitudinal sulci crossing at middle point, lateral margins with a short spine medially. Mesonotum moderately expanded posteriorly, with paired medial

spines along median longitudinal line pre-medially, post-medially and posteriorly. Metanotum longer than wide, with paired posterior medial spines and pre-median spines. Mesopleurae and metapleurae with a small supra-coxal spine.

Abdomen: Slender and cylindrical. Median segment narrow, wider than long, with a pair of post-median medial spines. Second to eighth tergites with triangularly expanded posterolateral angles, apex ending with a spine. Second to fifth tergites with a pair of posterior medial spines. Sixth tergum with paired posterior medial tubercles. Ninth tergum shorter than eighth tergum. Anal segment longer than ninth tergum, dilated into two distinct semi-tergites; semi-tergites elongate, lateral margins straight, inner margins moderately incurved, apices pointed with minute dentations. Poculum cup-shaped, with tubercle-like median elevation, posterior margin rounded and reaching anterior area of anal segment. Cerci flattened, weakly incurved, apices rounded and not exceeding posterior apices of anal segment.

Legs: Slender and long. Sparsely covered with short bristles. Femora thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae with two to five serrations. Profemora weakly curved basally. Anterodorsal carina of tibiae with three to four indistinct and minute serrations, anterodorsal, anteroventral and posteroventral carinae unarmed, medioventral carina weakly raised basally.

Measurements: See Table 1.

Description of egg (Figs. 6-7): Capsule brown, oval, posterior pole notched in lateral view, surface reticulate-foveate; depressions dark brown, more or less rounded or oblong, with dense and small granulations. Micropylar plate brown, oval, gently tapering anteriorly and posteriorly. Micropylar cup placed at posterior margin of micropylar plate. Median line short, placed behind micropylar cup, about one-fifth length of micropylar plate. Operculum centrally depressed.

Measurements: Length, 1.0 mm; width, 0.7 mm; height, 0.8 mm.

Distribution: China (Yunnan).

Etymology: The specific epithet of this new species is derived from the similar morphology with the taxa of *Neospiniphasma triangulatum* sp. nov. in the genus.

***Neospiniphasma triangulatum* sp. nov.** (Figs. 12-22)

Types: Holotype, ♀, 2000m, Jinping, Honghe, Yunnan, China, 26 August 2019, George Ho Wai-Chun (HKES); Paratypes, 2♀ (1 nymph), 7♂, 1 egg (naturally laid by paratype ♀), same data as holotype ♀ (HKES).

Differentiation: *Neospiniphasma triangulatum* sp. nov. is closely related to *N. similis* sp. nov., but can

be separated by the absence of paired posterior spines on the median abdominal segment and the hump-like praeopercular organ on the posteromedian area of seventh abdominal sternum in the female and the distinct and well-developed serrations on the anterodorsal carina of the tibiae in the male.

Description of female (Figs. 12-14, 19, 21): Small size. Body elongate, distinctly larger and more robust than male. General colouration of body and legs green, with brownish markings.

Head: Covered with very few small granules. Oval, longer than wide, gently tapering posteriorly behind compound eyes. Vertex convex, with a pair of supra-antennal spines or tubercles. Occiput distinctly convex, with paired supra-orbital spines; also with two pairs of medial spines along median longitudinal furrow, anterior pair as large as posterior pair, larger than supra-orbital spines. Compound eyes small and rounded, its length about four times that of genae. Antennae with 14 segments, reaching middle point of profemora; scapus flattened, as long as combined length of pedicellus and third segment; and pedicellus shorter than third segment.

Thorax: Sparsely covered with very few small granules. Pronotum trapezoidal, gently expanded posteriorly, anterior margin gently incurved, posterior margin rounded, transverse and longitudinal sulci crossing at centre of segment; with paired posterior medial spines, lateral margins with a short spine pre-medially. Mesonotum moderately expanded posteriorly, about three to three-and-one-half times length of pronotum; with paired anterior medial, pre-median medial, post-median medial and posterior medial spines; also with paired pre-median and median spines, lateral margins with a few short spines. Metanotum longer than wide, about five-and-one-half to six times length of median segment; with paired anterior medial, median medial and post-median medial spines, also with paired pre-median spines, lateral margins with a few short spines. Mesopleurae and metapleurae with a short supra-coxal spine.

Abdomen: Cylindrical and tapering posteriorly, longer than combined length of head and thorax. Median segment narrow, wider than long, with one to two paired medial spines. Second to ninth tergites with distinct triangularly expanded posterolateral angles, with paired anterior medial spines. Second to seventh tergites with paired posterior medial and posterior spines. Seventh tergum with a hump-like praeopercular organ on posteromedian area. Ninth tergum shorter than eighth tergum, with a pair of large tooth-like crests on posteromedian area. Anal segment as long as ninth tergum, mediolongitudinal carina elevated, elevated with paired small pre-median and posterior lamellae, posterior margin with a U-shaped emargination, posterolateral angles rounded. Operculum scoop-shaped, posterior apex pointed and reaching posterior area of anal segment. Cerci long, flattened, apices

pointed and surpassing posterior apices of anal segment.

Legs: Slender. Femora thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae with four to six serrations. Profemora weakly curved basally. Tibiae longer than corresponding femora, anterodorsal and anteroventral carinae with two to four serrations, posterodorsal carina with six to nine serrations, posteroventral carina lacking noticeable armature.

Description of male (Fig. 15-16, 20, 22): Body slender and slim, distinctly smaller and slenderer than female. General colouration of body and legs brownish green.

Head: Oval. Vertex weakly convex, with a pair of supra-antennal spines. Occiput moderately convex, median longitudinal furrow indistinct; with paired supra-orbital spines and two pairs of occipital medial spines along median longitudinal furrow, anterior pair larger than posterior pair, also larger than supra-orbital spines. Compound eyes small and rounded, its length about four-times that of genae. Antennae with 18 segments, apices reaching middle area of profemora; scapus flattened, almost as long as third segment, longer than pedicellus.

Thorax: Covered with very few granules. Pronotum nearly trapezoidal, gently expanded posteriorly, anterior margin weakly incurved, posterior margin rounded, with a pair of posterior medial spines, transverse and longitudinal sulci crossing at middle area, lateral margins with a short spine pre-medially. Mesonotum moderately expanded posteriorly, with paired medial spines along median longitudinal line pre-medially, medially and posteriorly. Metanotum longer than wide, with paired post-median medial and pre-median spines. Mesopleurae and metapleurae with a small supra-coxal spine.

Abdomen: Slender and cylindrical. Median segment narrow, wider than long, with a pair of median medial spines. Second to eighth tergites with triangularly expanded posterolateral angles, apex ending with a spine. Second to fifth tergites with a pair of posterior medial spines. Ninth tergum shorter than eighth tergum. Anal segment longer than ninth tergum, dilated into two distinct semi-tergites; semi-tergites elongate and tapering posteriorly, lateral margins straight, inner margins medially incurved weakly, apices pointed with minute dentations. Poculum cup-shaped, with distinct crest-like median elevation, posterior margin rounded and reaching anterior area of anal segment. Cerci short, flattened, apices incurved, pointed and not exceeding posterior apices of anal segment.

Legs: Slender and long. Sparsely covered with short bristles. Femora thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae with three to five serrations. Profemora weakly curved basally. Anterodorsal carina

of tibiae with three to four serrations, posterodorsal, anteroventral and posteroventral carinae unarmed, medioventral carina weakly raised basally.

Measurements: See Table 2.

Description of egg (Figs. 17-18): Capsule brown, oval, posterior pole rounded, surface reticulate-foveate; depressions indistinct, brown or dark brown, more or less rounded, with dense and small granulations. Micropylar plate brown, nearly rounded. Micropylar cup placed at posterior margin of micropylar plate. Median line short, placed behind micropylar cup, about one-fourth length of micropylar plate. Operculum centrally depressed with a closed-stalked capitulum.

Measurements: Length, 2.0 mm; width, 1.4 mm; height, 1.6 mm.

Distribution: China (Yunnan).

Etymology: The specific epithet of this new species is derived from the distinct triangularly expanded posterolateral angles on the abdominal tergites in the both sexes.

CONCLUSION

A total of seven genera, 46 species and two subspecies are currently recognised in the Medaurini of China. The discovery of *Neospiniphasma similis* **gen. nov. & sp. nov.** and *N. triangulatum* **sp. nov.** from Yunnan, China, further reflects the high species diversity of the tribe in China. Yunnan, located at southwestern China, is obviously the main distributional area of the tribe in China, as well as the distributional centre of the tribe in the continental Southeast Asian.

ACKNOWLEDGMENTS

I wish to deeply thank Dr Edward Baker (Natural History Museum, London, U.K.) for editing and providing valuable comments to improve the manuscript.

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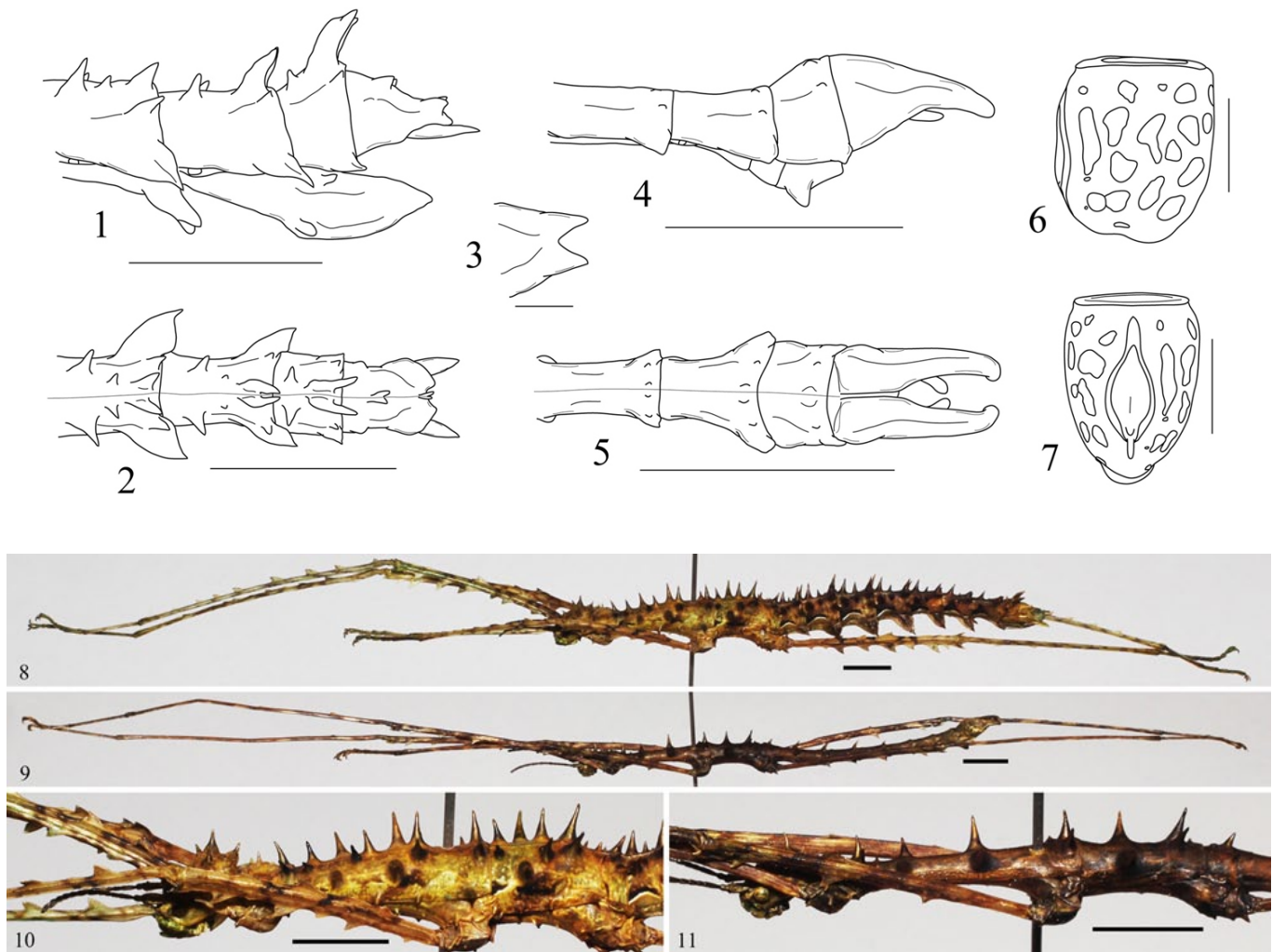
TABLES & FIGURES

	Holotype Female	Paratype Female	Paratype Male
Body	49.0	50.0	45.0
Head	5.0	5.0	3.0
Antennae	6.0	6.5	7.0
Pronotum	3.0	3.0	2.0
Mesonotum	9.5	9.5	9.0
Metanotum	6.0	6.0	5.5
Median segment	1.0	1.0	1.0
Profemora	20.0	20.0	22.0
Mesofemora	13.0	13.0	14.0
Metafemora	17.0	17.0	17.0
Protibiae	25.0	25.0	28.0
Mesotibiae	15.0	15.0	17.0
Metatibiae	21.0	20.0	23.0

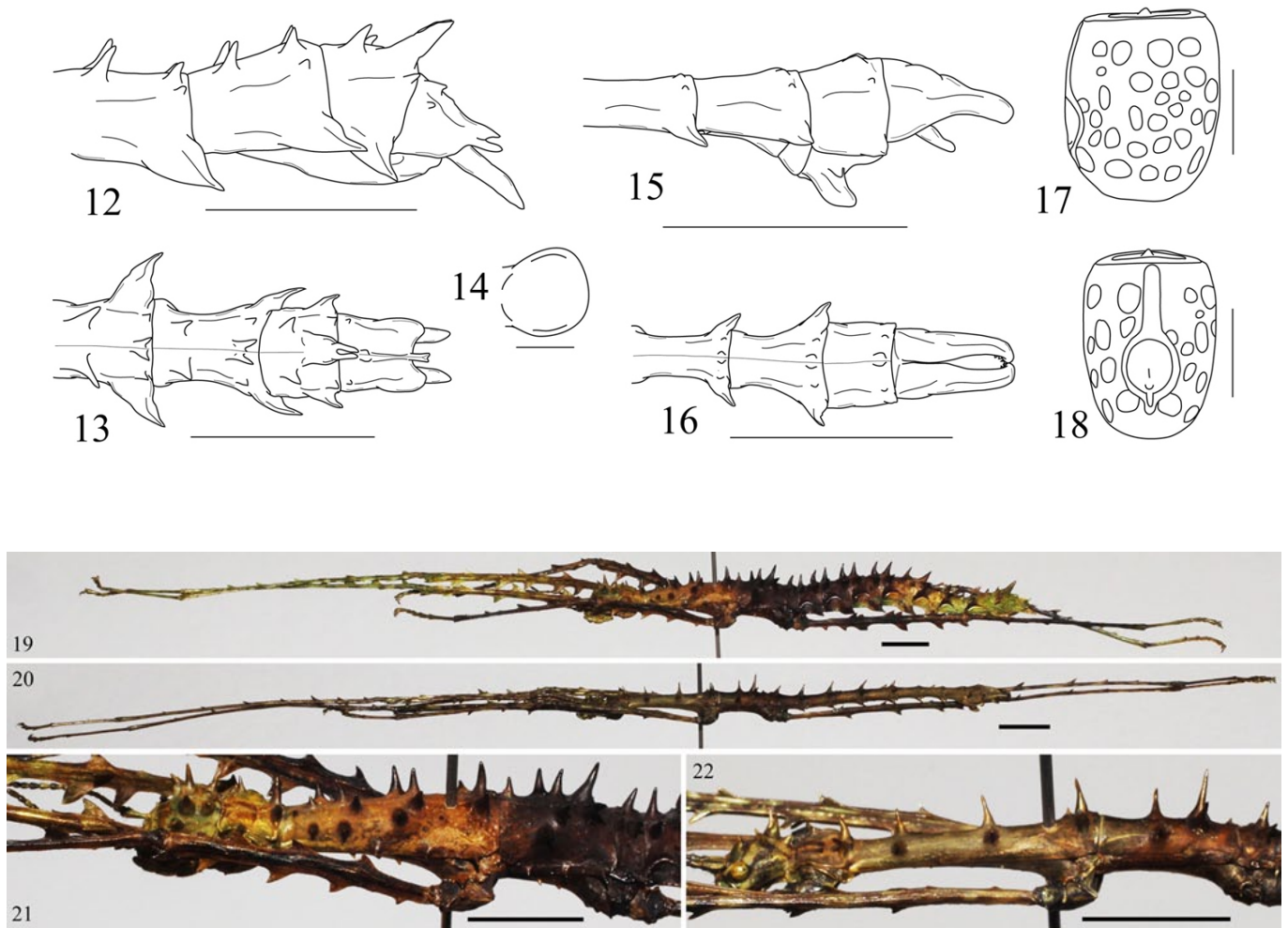
Table 1. Measurements of *Neospiniphasma similis* gen. nov. & sp. nov.

	Holotype Female	Paratype Female	Paratype Males
Body	49.0	49.5	42.0–47.0
Head	4.5	4.5	3.0
Antennae	7.0	6.0	8.0–10.0
Pronotum	3.0	3.0	2.0–2.5
Mesonotum	10.0	9.5	8.5–1.0
Metanotum	6.0	5.5	5.0–5.5
Median segment	1.0	1.0	1.0–1.5
Profemora	20.0	21.0	21.0–23.5
Mesofemora	13.0	13.0	13.5–15.0
Metafemora	17.0	17.0	17.0–20.0
Protibiae	25.0	26.0	26.0–28.0
Mesotibiae	15.0	16.0	15.5–17.0
Metatibiae	21.0	21.0	22.0–24.0

Table 2. Measurements of *Neospiniphasma triangulatum* gen. nov. & sp. nov.



Figures 1-11. *Neospiniphasma similis* gen. nov. & sp. nov. 1. Female, end of abdomen, lateral view. 2. Female, end of abdomen, dorsal view. 3. Female, praeopercular organ, ventral view. 4. Male, end of abdomen, lateral view. 5. Male, end of abdomen, dorsal view. 6. Egg, lateral view. 7. Egg, dorsal view. 8. Female, habitus. 9. Male, habitus. 10. Female, head and thorax, dorsolateral view. 11. Male, head and thorax, dorsolateral view. [Scale bars: end of abdomen, head, thorax and habitus = 5 mm; praeopercular organ and egg = 1 mm; drawings and photos by author]



Figures 12-22. *Neospiniphasma triangulatum* gen. nov. & sp. nov. 12. Female, end of abdomen, lateral view. 13. Female, end of abdomen, dorsal view. 14. Female, praeopercular organ, ventral view. 15. Male, end of abdomen, lateral view. 16. Male, end of abdomen, dorsal view. 17. Egg, lateral view. 18. Egg, dorsal view. 19. Female, habitus. 20. Male, habitus. 21. Female, head and thorax, dorsolateral view. 22. Male, head and thorax, dorsolateral view. [Scale bars: end of abdomen, head, thorax and habitus = 5 mm; praeopercular organ and egg = 1 mm; drawings and photos by author]