

Two new *Nemacerota* HAMPSON, [1893] (Lepidoptera, Thyatiridae) taxa from China

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Abstract

A new species, *Nemacerota speideli speideli* sp. n., and subspecies, *Nemacerota speideli severa* ssp. n., are described from China's Sichuan Province.

Keywords: *Nemacerota*, taxonomy, China, Sichuan.

Zusammenfassung

Eine neue Art, *Nemacerota speideli speideli* sp. n., und Unterart, *Nemacerota speideli severa* ssp. n., werden aus der chinesischen Provinz Sichuan beschrieben.

Introduction

The genus *Nemacerota* is a taxonomically problematic genus which now includes 16 species and 1 subspecies with the recently described *Nemacerota sejilaa* PAN, RONKAY, RONKAY, HAN 2014 and two new taxa described here. Only two other papers on this genus (ZHUANG & WANG, 2013 and PAN et al. 2014) have been published after the latest *Nemacerota* checklist was prepared by LASZLO, RONKAY, RONKAY & WITT in 2001 as part of an Eurasian Thyatiridae revision. *N. speideli speideli* sp. n. and *N. speideli severa* ssp. n. belong to the unconfirmed *Nemacerota tancrei* (Graeser, 1888) (Fig. 4) species group which includes *N. mandibulata* LASZLO et al, 2007, *N. taurina* LASZLO et al, 2007, *N. griseobasalis* (SICK, 1941) and *N. bacsovi* LASZLO et al, 2007. The genus *Nemacerota* is restricted to higher Asian mountain habitats ranging from Pakistan along the main Himalayan chain and the eastern corner of the Tibetan plateau to central China, the Russian Far East, Korea and Japan. Because species of this genus fly late in the season in high mountain forested areas they are less familiar to researchers but the discovery of two new taxa by Alessandro Floriani in China's Sichuan Province was still unexpected.

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Materials and methods

All moths studied were collected in ultraviolet light-traps. The genitalia of both sexes were examined using standard methods with abdomens macerated in a heated 10% aqueous alkali solution for 10 minutes before genitalia were dissected out with a micro-forceps. The separated aedeagus and complete female genitalia were stained with “Evans blue” dye (0.1% aqueous) for five minutes prior to being mounted in euparal and labeled. CorelDRAW 15 and Corel Photo-Paint 15 were used for image preparation and improvement. The DNA barcodes (658 base pairs of Cytochrome Oxidase Subunit I 5' region, COI-5P) were sequenced by Paul Hebert's lab at the University of Guelph.

Abbreviations for personal and institutional collections used herein include: AFM = Alessandro Floriani (Milan, Italy); MWM = Museum Witt (Munich, Germany); NRCV = Nature Research Centre (Vilnius, Lithuania).

Descriptions of new taxa

Nemacerota speideli speideli SALDAITIS, IVINSKIS & BORTH sp. n. (Figs 5, 6, 10, 11, 13)

Material. Holotype: male (Fig. 5), China, N. Sichuan, near Barkam, Zhe Gu Shan pass, H-3300 m, 21. IX. 2011, N31°55.625", E102°39.290", Floriani leg., slide No. BJ2063m (coll. MWM). Paratypes: 4 males with the same locality as the holotype, 1 female (Fig. 6), China, W. Sichuan, S. from Kangding, near Menghugang, H-2800 m, 15. X. 2009, Floriani leg., slide Nos BJ2062m, BJ2058f (colls AFM, NRCV).

Diagnosis. *N. speideli speideli* sp. n. (Figs 5, 6) is closely related to its sister species *N. mandibulata* (Figs 1, 2) and *N. taurina* (Fig. 5) from China, Shaanxi Province, however it differs in wing pattern, genitalia and DNA. Externally it can be separated from *N. mandibulata* and *N. taurina* by its larger size and darker markings. The new species also differs from *N. mandibulata* externally by the more conspicuously dentate border of its forewing's white median band which is densely suffused by dark brown scales, by black scales evident in the costal region of the hindwings and by contrasting coloration which from the base to median line is white with a yellow sheen and from the median line outward to the termen is grey black. *N. speideli speideli* sp. n. male genitalia (Figs 10, 11) differs from *N. mandibulata* (Fig. 9) by its distinctively widening uncus, foot-formed socii, small sacculus lobe and by aedeagus carinal hook curving nearly 90°. Female genitalia (Fig. 13) differ from *N. mandibulata* (LASZLO et al, 2001, pg. 412, Fig. 88b) by narrow papillae anales and apophyses anteriores and posteriors nearly equal in length. *N. taurina* male genitalia (ZHUANG & WANG, 2013, pg. 176, Fig. 3) differs from the new species as it is without the widening uncus and aedeagus with curved carinal hook, but with pointed socii, quadrangular tegument, narrow and apically rounded vinculum, elongated valve and a small sacculus lobe. *N. taurina* female genitalia (ZHUANG & WANG, 2013, pg. 176, Fig. 4) differ from *N. speideli speideli* sp. n. by broad papillae anales, wider ostium bursae and a larger sclerotized antrum.

Description. The wingspan and forewing length of the holotype are 39 mm and 19 mm, respectively, and of the paratypes are 38-40 mm and 18-20 mm (n- 5), respectively. Head relatively small; sides of palpi covered with long black hairs; antennae bipectinate; patagium whitish yellow; tegulae white bordered by black hair scales; thorax black mixed with white scales/hairs. Forewing wide; apex pointed with costal and outer margin evenly arcuate; basal area pale whitish mottled with black scales; subbasal line weakly expressed; antemedian band black, internal edge deep curved, outer edge with one right angle; median area broad dirty silvery white flecked with brown scales, in costal part with black stroke; reniform macula evenly distinct; postmedian area non uniform brownish black with black costal macula; postmedian line also black wavy at center with two distinct bulges; subterminal line silvery white, poorly visible. Hindwings from base to median line white with yellow shine; median line grey black, indistinct; postmedian area grey.

Female similar to male; antennae filiform; forewing pattern with much contrast; subbasal fascia well developed; median area silvery white with infrequent brown scales.

Male genitalia (Figs 10, 11). Uncus long, intensely broadened in middle; socii robust, foot shaped – broad at base, with straight angulum to outer side, apically rounded; tegumen elongate; fultura superior narrow; fultura inferior consisting of big plate concavated from lateral sides; vinculum wide, shove shaped, apically rounded; valve broad and short with strongly sclerotized and slightly concavate dorsal margin, apically broadening, rounded; sacculus strongly sclerotized including lobe; aedeagus straight, with thorn like carinal part, curved to nearly 90° angle; vesica simple, very broad at base with elongated subbasal diverticulum.

Female genitalia (Fig. 13). Papillae anales long, narrow, well sclerotised and covered with occasional sturdy short and long hairs; apophysis posterioris and apophysis anterioris strongly sclerotized, about equal length; ostium bursae wide; antrum broad; ductus bursae medium length; corpus bursae elongated, without signum.

Bionomics and distribution. The new species is only known from two localities of China's Sichuan Province. Six specimens were collected in September to October at altitudes ranging from 2800 to 3300 m; both males and females were attracted to light during cold rainy nights and appear to have a local distribution near Barkam and Kangding (Fig. 16) where they were discovered in two nearby valleys. The new taxa were collected in mountain virgin mixed forests dominated by various broad-leaved trees, rhododendron and bamboo. There they are sympatric with other autumn moths such as *Altipolia plantei* HACKER & PEKS, 1993, *Catocala armandi* POUJADE, 1888, *Charierges brunneomedia* DRAUDT, 1950, *C. nigralba* DRAUDT, 1950 and many other *Noctuidae*.

Etymology. The new species is named after our good friend, prominent entomologist Wolfgang Speidel.

***Nemacerota speideli severa* SALDAITIS, IVINSKIS & BORTH ssp. n.** (Figs 7, 8, 12, 14)

Material. Holotype: male (Fig. 7), China, W. Sichuan, near Xinbuqiao, Zhe Gu Shan pass, H-3611 m, 08. X. 2011, N30°04.256", E101°25.156", Floriani leg., slide No. BJ2087m, (coll.

MWM). Paratypes: 2 females (Fig. 8) with the same locality as the holotype, slide No. BJ2058f (colls AFM, NRCV).

Diagnosis. *Nemacerota speideli severa* ssp. n. externally and by genital structure differs somewhat from the nominative subspecies but molecular analysis is currently not definitive. *N. speideli severa* ssp. n. (Figs 7, 8) differs from the nominative subspecies by the forewing's dorsal silvery white basal area and ventral apical white patch. Male genitalia (Fig.12) differ by only a slightly widening uncus, gradually narrowing socii to tip, uniform width valva, triangulum sacculus lobe, very wide vinculum and carinal aedeagus hook curving to only a 45° angle.

Description. The wingspan and forewing length of the holotype are 40 mm and 20 mm, respectively, and of the paratypes are 40-41 mm and 20 mm (n= 2), respectively. Head relatively small, brown, mixed with white; palpi sides covered with long black hairs; antennae bipectinate; patagium brown bordered with long white scales; tegulae silvery white bordered by black and brown scales/hairs, thorax white mixed with black and brown scales/hairs; abdomen brownish yellow. Forewing wide; apex pointed; costal and outer margin evenly arcuate; pattern similar to nominative subspecies but lines and bands are more sharply expressed with black lines bordered by narrow white lines; basal area silvery white; subbasal line faintly diminishing to black dot; antemedian band black, internal edge deep curved, outer edge with one right angle; median area broad, dirty silvery white mixed with brown scales, in costal part with black stroke; reniform maculas evenly distinct; postmedian area shades of brownish black with black costal macula; postmedian line also black, wavy in center with two distinct protruding bulges; subterminal line pale white; underside apical patch white. Hindwings are the same as in the nominative subspecies.

Female similar to male; antennae filiform; forewing contrasted; subbasal fascia clearly distinguished, median area silvery white with occasional brown scales.

Male genitalia (Fig. 12). Uncus long, weakly broadened in middle; socii robust, broad at base, apically rounded; tegumen elongated; fultura superior narrow; fultura inferior like big triangulum plate; vinculum very wide, shovel shaped, apically rounded; Valve broad and short with strongly sclerotized and slightly concave dorsal margin, rounded; sacculus strongly sclerotized, with triangular sacculus lobe. Aedeagus ample, carinal hook curved at about 45°angle; vesica simple, very broad at base with elongated subbasal diverticulum.

Female genitalia (Fig. 14). Papillae anales long, conspicuously sclerotized, covered with infrequent prominent short and long hairs, apophysis posterioris and apophysis anterioris strongly sclerotized, about equal length; ostium bursae wide; antrum broad; ductus bursae medium length; corpus bursae elongated, without signum.

Bionomics and distribution. The new subspecies is known only from the Xinbuqiao area of Sichuan Province, China, on the east edge of the Tibetan plateau (Fig. 15). A single male and two females were attracted to light at 3600 m during a cold mid-October night when the temperature dropped to 5°C below zero. They were found in a shrubby swamp, along with a few other late autumn-winter Heterocera species, such as *Conistra pusilla* BENEDEK, BABICS & SALDAITIS, 2013 and *Rhodinia davidi* OBERTHÜR, 1886.

Etymology. In Latin *severa* means severe, hardened and refers to the stark climatic conditions encountered in the Tibetan plateau.

Molecular analysis. In addition to the morphological evidence, DNA barcoding corroborates the existence of a new species of *Nemacero*. Full length 658 base pair 'barcodes' of the Cytochrome Oxidase Subunit 5' Region (COI-5P) gene were prepared by the University of Guelph's barcode of Life Data Systems (BOLD) by methods described in Hebert et al. (2003). Molecular variation based on the Kimura two-parameter distance model for COI DNA barcodes between a single paratype specimen of *N. mandibulata* and three specimens of *N. speideli speideli* sp. n. are 3.64% while divergence rates between *N. mandibulata* and *N. speideli severa* ssp. n. are at least 3.81%, The variance between the three *N. speideli speideli* sp. n. and three *N. speideli severa* ssp. n. is at least 1.24%.

COI-5P nucleotide sequences follow:

Nemacero *speideli speideli* sp. n. HT – Sample ID 20042-210911-CH

AACATTATACTTTATCTTTGGAATTTGAGCTGGAATAGTGGAACCTCTTTAAGTTTATT
AATTCGTGCTGAATTAGGTAACCCAGGCTCACTAATTGGAGATGATCAAATTTATAATAC
TATTGTTACAGCTCATGCTTTTCATTATAAATTTTTTTTATAGTTATACCTATTATAATTGG
AGGATTTGAAAATTGATTAATTCCTTTAATATTAGGAGCCCCCGATATAGCTTTCCCTCG
TATAAATAATATAAGATTTTGAATGTTACCCCTCATTAAACATTATTAATTTCAAGAAG
AATTGTAGAAAATGGAGCAGGAAGTGGGTAACAGTTTACCCTCCTTTATCATCTAATAT
TGCTCATGGAGGAAGTTCAGTAGATTTAGCTATTTTTTCTCTTCATTTAGCTGGAATTTTC
TTCTATTTTAGGGGCAATTAATTTTATCACAACACTATTATTAATATACGTTTAAATAATAT
GTCATTTGATCAAATACCTTTATTTGTTTGAGCCGTAGGTATTACAGCTTTTCTATTACT
TCTATCTTTACCTGTATTAGCTGGTGCTATTACAATACTTTTAAACAGATCGAAATTTAAA
TACATCATTTTTTGATCCTGCTGGAGGAGGAGATCCAATTCATATCAACATTTATTT

Nemacero *speideli severa* ssp. n. HT - Sample ID 20045-081012-CH

AACATTATACTTTATCTTTGGAATTTGAGCTGGGATAGTGGAACCTCTTTAAGTTTATT
AATTCGTGCTGAATTAGGTAACCCAGGCTCACTAATTGGAGATGATCAAATTTATAATAC
TATTGTTACAGCTCATGCTTTTCATTATAAATTTTTTTTATAGTTATACCTATTATAATTGG
AGGATTTGAAAATTGACTAATTCCTTTAATATTAGGAGCCCCCGATATAGCTTTCCCTCG
TATAAATAATATAAGATTTTGAATGTTACCCCTCATTAAACATTATTAATTTCAAGAAG
AATTGTAGAAAATGGAGCAGGAAGTGGATGAACAGTTTACCCTCCTTTATCGTCTAATAT
TGCTCACGGAGGAAGTTCAGTAGATTTAGCTATTTTTTCTCTTCATTTAGCTGGAATTTTC
TTCTATTTTAGGAGCAATTAATTTTATCACAACACTATTATTAATATACGTTTAAATAATAT
GTCATTTGATCAAATACCTTTATTTGTTGGGCTGTAGGTATTACAGCTTTTCTATTACT
TCTATCTTTACCTGTATTAGCTGGTGCTATTACAATACTTTTAAACAGATCGAAATTTAAA
TACATCATTTTTTGATCCTGCTGGAGGAGGAGATCCAATTCATATCAACATTTATTT

Nemacero *mandibulata* PT-Sample ID 20058-151004-CH

AACATTATACTTTATCTTTGGAATTTGAGCTGGAATAGTGGAACCTCTTTAAGTTTATT
AATTCGTGCTGAATTAGGTAACCCAGGCTCATTAAATTGGAGACGATCAAATTTATAATAC

TATTGTTACAGCCCATGCTTTCATTATAATTTTTTTTATAGTTATACCTATTATAATTGG
AGGATTTGGAAATTGACTAGTTCCTTTAATATTAGGAGCCCCTGATATAGCTTTCCTCG
TATAAATAACATAAGATTTTGAATGTTACCTCCCTCATTAACATTATTAATTTCAAGAAG
AATCGTAGAAAATGGAGCAGGAAGTGGATGAACAGTTTACCCCCCTCTATCATCTAATAT
TGCTCATGGGGGAAGTTCGGTAGATTTAGCTATTTTTTCCCTTCATTTAGCCGGAATTC
TTCTATTTTAGGAGCAATTAATTTTATCACAACTATTATTAATATACGTTTAAATAACAT
ATCATTGATCAAATACCTTTATTTGTTGAGCTGTAGGTATTACAGCCTTCTTTTACT
TTTATCTTTACCTGTATTAGCTGGTGCTATTACAATACTTTTAAACAGATCGAAATTTAAA
TACATCATTTTTTGATCCTGCTGGAGGAGGAGATCCAATTTTATATCAACATTTATTT

Acknowledgements

The authors are grateful to Mrs Irene Floriani (Milan, Italy) and Mr Alessandro Floriani (Milan, Italy) for their enthusiasm and patience during the China trips and Mr Tomas Zubacikas (Vilnius, Lithuania) for his photographic assistance. A special thanks is extended to Dr Thomas Witt (Munich, Germany) and Dr Wolfgang Speidel (Munich, Germany) for their valuable support and text corrections.

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Legends of figures

Figures 1–8. *Nemacerota* ssp. adults. 1. *N. mandibulata*, male, paratype, China, Shaanxi (coll. MWM); 2. *N. mandibulata*, male, paratype, China, Shaanxi (coll. MWM); 3. *N. taurina*, male, paratype, China, Shaanxi (coll. MWM); 4. *N. tancrei*, male, Russia, Primorje (coll. NRCV); 5. *N. speideli speideli* sp. n., male, holotype, China, Sichuan (coll. MWM); 6. *N. speideli speideli* sp. n., female, paratype, China, Sichuan (coll. AFM); 7. *D. speideli severa* ssp. n., male, holotype, China, Sichuan (coll. MWM); 8. *D. speideli severa* ssp. n., female, paratype, China, Sichuan (coll. NRCV).



1.

PARATYPE
Nemacerota maackii
Lund, Ronke, Bouda
4 Nov. 2007

CHINA / SHANXI
Tangshan
17°45'N, 114°55'E
1000m, 10.10.2009
leg. A. Florant



2.

B32002

CHINA / SHANXI
Tangshan
17°45'N, 114°55'E
1000m, 10.10.2009
leg. A. Florant

PARATYPE
Nemacerota maackii
Lund, Ronke, Bouda
4 Nov. 2007



3.

Hungarian Natural History
Museum Budapest
Cell. Lepidoptera
Museum Budapest

PARATYPE
Nemacerota taurina
Lund, Ronke, Bouda
4 Nov. 2007

SI-MNH 702
LG 1720 M
CHINA, Shensi, Tansing Mts.
South Tansing, Hanchuan,
1000m, 10°45'N, 117°37'E,
13.06. - 13.08.1999
leg. Axel Florenzer

taurina László,
A., R., 1934.



4.

Russia, Primorje,
Xaosu Ping
Zanadvorovka
02.10.2010

*Nemacerota
taurina*
GRAESER
1888



5.

B32063

China, W. Sichuan,
near Hailuoguo
Zhe Guo Shan pass,
18.3.2010, 21.09.2011,
N 31°55'40",
E 102°39'20",
A. Florant leg.



6.

China, W. Sichuan
S. from Kangding
near Niuguogang
15.10.2009, 16.28.09m.

Nemacerota
sp.9

B32058



7.

B32087

China, W. Sichuan,
near Niuguogang
18.3611 m
08.10.2012
N 30°04'25",
E 101°53'50",
A. Florant leg.

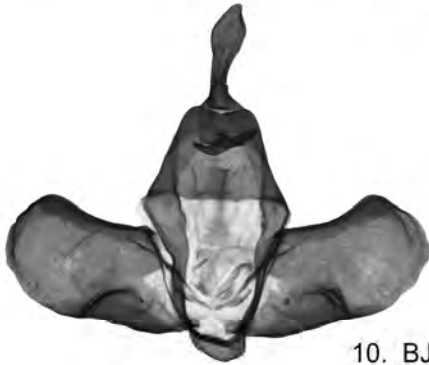


8.

China, W. Sichuan,
near Niuguogang
18.3611 m
08.10.2012
N 30°04'25",
E 101°53'50",
A. Florant leg.



9. BJ2002, PT.



10. BJ2063, HT.



11. BJ2062, PT.



Figures 9–11. *Nemacerota* ssp. male genitalia. 9. *N. mandibulata*, paratype, prep. BJ2002; 10. *N. speideli speideli* sp. n., holotype, prep. BJ2063; 11. *N. speideli speideli* sp. n., paratype, prep. BJ2062.



12. BJ2087, HT.



13. BJ2058, PT.



14. BJ2088, PT.

Figures 12–14. *Nemacerota* ssp. male and female genitalia. 12. *N. speideli severa* ssp. n., male, holotype, prep. BJ2087; 13. *N. speideli speideli* sp. n., female, paratype, prep. BJ2058; 14. *N. speideli severa* ssp. n., female, paratype, prep. BJ2088.



Figures 15–16. Biotopes. 15. China, W. Sichuan, near Xinbuqiao, Zhe Gu Shan pass, type locality of *N. speideli severa* ssp. n. (photo by Alessandro Floriani); 16. China, W. Sichuan, S. from Kangding, near Menghugang, type locality of *N. speideli speideli* sp. n. (photo by Alessandro Floriani).

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Jahr/Year: 2014

Band/Volume: [S17](#)

Autor(en)/Author(s): Saldaitis Aidas, Ivinskis Povilas, Rimsaite Jolanta, Borth Robert

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