Far Eastern Entomologist

Number 521: 15-20 ISSN 1026-051X (print edition) ISSN 2713-2196 (online edition) April 2025

https://doi.org/10.25221/fee.521.2
https://elibrary.ru/zermit
https://zoobank.org/References/27D1EFE3-37B4-4FDC-B67F-A91A8E5D45AA

NEW RECORDS OF *THEREUONEMA TUBERCULATA* (WOOD, 1862) (CHILOPODA, SCUTIGEROMORPHA) FROM RUSSIA AND KAZAKHSTAN

P. S. Nefediev

1) *Altai State University, Barnaul, 656049, Russia. E-mail: p.nefediev@mail.ru*
2) *Tomsk State University, Tomsk, 634050, Russia.*

Summary. Distribution of the scutigeromorph centipede *Thereuonema tuberculata* (Wood, 1862) in Russia and Kazakhstan has been refined. This species is recorded for the first time from Kemerovskaya oblast, Altaiskii krai, Krasnodarskii krai and the Republic of Altai in Russia, as well as from Kazakhstan. Moreover, *Scutigera coleoptrata* (Linnaeus, 1758) is excluded from the fauna list of the Asian part of Russia.

Key words: scutigeromorph centipedes, Scutigeridae, Thereuoneminae, fauna, new records, *Scutigera coleoptrata*, Russia, Kazakhstan.

П. С. Нефедьев. Новые находки *Thereuonema tuberculata* (Wood, 1862) (Chilopoda, Scutigeromorpha) в России и Казахстане // Дальневосточный энтомолог. 2025. N 521. С. 15-20.

Резюме. Уточнено распространение многоножки-мухоловки *Thereuonema tuberculata* (Wood, 1862) в России и Казахстане. Этот вид впервые приводится из Кемеровской области, Алтайского и Краснодарского краев и Республики Алтай, а также для Казахстана. Вид *Scutigera coleoptrata* (Linnaeus, 1758) исключен из списка фауны азиатской части России.

INTRODUCTION

The scutigeromorph centipede fauna of Russia and Kazakhstan is very poor. In Russia, only two species of Scutigeromorpha have been known to occur, viz. *Scutigera coleoptrata* (Linnaeus, 1758) and *Thereuonema tuberculata* (Wood, 1862) (Farzalieva, 2009; Ruchin, 2014; Nefediev *et al*., 2016; Zuev, 2016; Zuev & Evsyukov, 2016; Dyachkov, 2020, 2022, 2023, 2024a; Farzalieva *et al*., 2023; Nefediev & Farzalieva, 2024). In Kazakhstan, only three or four scutigeromorph species have been reported so far, viz. *Allothereua kirgisorum* Lignau, 1929, *Thereuonema turkestana* Verhoeff, 1905, *S. coleoptrata*, and *Thereuonema* sp. (Dyachkov *et al*., 2016; Bragina *et al*., 2020; Dyachkov, 2024b); the penultimate species is missing in Dyachkov (2024b), while the latter one emerges in that publication. The present paper focuses on the reexamination of deposited material of *Scutigera coleoptrata* from southwestern Siberia (see Nefediev *et al*., 2016), coupled with new collections of Scutigeromorpha, and a clarification of the distribution of *T. tuberculata* in Russia and Kazakhstan.

Scanning electron microscopy (SEM) was performed at the Center for Collective Use of Microscopy and X-ray Spectroscopy (Institute for Water and Environmental Problems, Siberian Branch, Russian Academy of Sciences, Barnaul, Russia = IWEP), using a Hitachi S-3400N scanning electron microscope. Mounts for SEM were made through air-drying, mounting on stubs, and coating with gold and platinum. SEM material was removed from stubs and returned to alcohol after examination. Digital image stacking and final figure plates were processed and assembled with Adobe Photoshop CS6. The distribution maps were produced using QGIS 3.38.1 'Grenoble'.

The material treated herein has been deposited in the collection of the Altai State University, Barnaul, Russia (ASU). Literature references to the species concern Russia and Kazakhstan. The terminology follows that of Würmli (1975, 2004), Edgecombe (2011), Minelli & Koch (2011), and Giribet & Edgecombe (2013). Abbreviations used to denote morphological structures are explained directly in the text and in the figure captions.

NEW RECORDS

Order Scutigeromorpha Pocock, 1895

Family Scutigeridae Leach, 1814

Subfamily Thereuoneminae Verhoeff, 1925

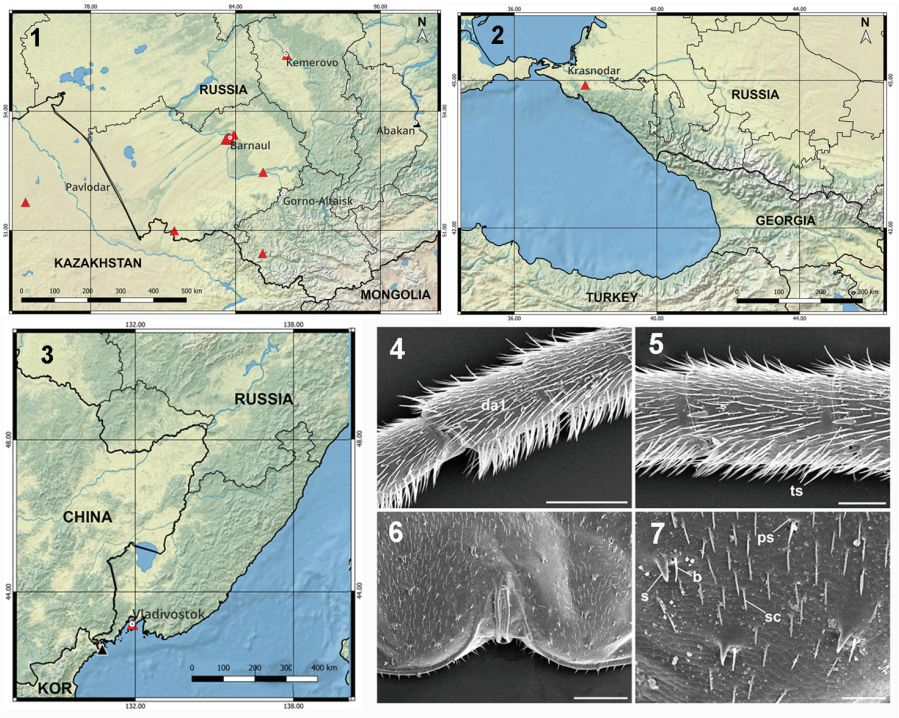
Genus *Thereuonema* Verhoeff, 1904

***Thereuonema tuberculata* (Wood, 1862)**
Figs 1–7

MATERIAL RE-EXAMINED (specimens previously identified as *Scutigera coleoptrata* by Nefediev *et al*., 2016). **Russia** (southwestern Siberia): **Kemerovskaya oblast**: Kemerovo, inside apartment, September 2000, 1 subad. ♂ (ASU.NPS.C-021), leg. D.A. Efimov; **Altaiskii krai**: Barnaul, "Edelveis" Park, 53.368810°N, 83.691650°E, h=225 m, summer 2013, 1 ♀, 1 juv. (ASU.NPS.C-022); Barnaul, Vlasikha, under bricks, summer 2013; Barnaul, inside house, summer 2013, 2 ♂ (ASU.NPS.C-023); Barnaul, inside apartment, summer 2013, 4 ♂, 2 ♀, 1 juv. (ASU.NPS.C-024); Barnaul, JSC "Dekorativnye kultury", seedling hothouse No. 10, 53.328869°N, 83.713061°E, h=180 m, 26.XII 2014, 1 subad. ♂ (ASU.NPS.C-025), leg. V.M. Mamina; Barnaul, M.A. Lisavenko Research Institute for Horticulture of Siberia, heated hothouse, 53.291707°N, 83.765627°E, h=210 m, 16.VI 2015, 3 juv. (ASU.NPS.C-026), leg. P.S. Nefediev; Barnaul, Altai State University, basement, 53.347410°N, 83.775620°E, March–April 2016, 1 subad. ♂ (ASU.NPS.C-027), leg. D.A. Durnikin; Barnaul, inside house, 24.IV 2016, 1 ♂, 1 subad. ♂ (ASU.NPS.C-028), leg. L.S. Snigiriova; **Republic of Altai**: Ust-Koksinskii District, Amur, 50.398955°N, 85.120657°E, h=1065 m, old sawmill, 22.VII 2014, 1 ♀ (ASU.NPS.C-029), leg. A.A. Streltsova.

NEW MATERIAL EXAMINED. **Russia**: **Altaiskii krai**: Barnaul, garages near Thermal Power Plant 3, 53.331982°N, 83.615154°E, h=220 m, 12.VII 2004, 1 ♂ (ASU.NPS.C-010); Biysk, Sibenergosnab LLC, cucumber hothouse, 52.490442°N, 85.139664°E, sawdust, 16.III 2010, 1 juv. (ASU.NPS.C-011), all leg. P.S. Nefediev; environs of Barnaul, Barnaulka River valley, 14–20.VI 2016, 1 ♀ (ASU.NPS.C-012), leg. E.V. Guskova; Barnaul, Gogol Street, Plaza Shopping Centre, Germes LLC, in office, 53.330171°N, 83.781933°E, 16.VI 2016, 1♂ (ASU.NPS.C-013), leg. Yu.S. Nefedieva; Loktevskii District, Gornyak, 3.VII 2016, 1 ♀ (ASU.NPS.C-014); Novoaltaisk, 20.VII 2016, 1 juv. (ASU.NPS.C-015), all leg. T. Stepanova, E. Chekmeniova; Barnaul, Nikitina Street, Tigirek State Nature Reserve, basement,

date unknown, 53.331347°N, 83.779219°E, 1 ♀ (ASU.NPS.C-016), collector unknown; **Primorskii krai**: Vladivostok, abandoned underground special facility of Local Air Defense No. 1, 43.116206°N, 131.889511°E, 10.II 2021, 1 ♂ (ASU.NPS.C-017), leg. Sh.R. Abdullin; **Krasnodarskii krai**: Krymskii District, Krymsk, right bank of Adagum River, environs of N.I. Vavilov Krymsk Experimental Breeding Station, 44.907889°N, 37.990444°E, h=30 m, 9.VIII 2020, 2 ♂ (ASU.NPS.C-020), leg. I.V. Enushchenko. **Kazakhstan**: Pavlodar oblast: Ekibastuz, private house, 1–2.V 2016, 2 ♂ (ASU.NPS.C-018); same locality, 30.VIII 2016, 1 ♀ (ASU.NPS.C-019), all leg. I.S. Koroliova.



Figs. 1–7. *Thereuonema tuberculata*. 1–3 – distribution (previously known localities marked by black, new record marked by red): 1 – in Siberia, Russia and Kazakhstan; 2 – in European Russia; 3 – in the Russian Far East; 4–7 – male (ASU.NPS.C-010): 4 – distal end of tarsus 1, caudolateral view; 5 – middle annuli of tarsus 1, caudolateral view; 6 – caudal part of tergal plate 6, dorsal view; 7 – detail from tergite 6, dorsal view. Abbreviations: **b** – bristle; **da1** – distal annulus of tarsus 1; **ps** – bristle with paired spines; **s** – spine; **sc** – spiculum; **ts** – small tarsal spines. Scale bars: 4–5 – 200 µm; 6 – 500 µm; 7 – 100 µm.

DISTRIBUTION. Being originally described as *Cermatia tuberculata* from Hong Kong, China (Wood, 1862), this species is mainly widespread in East Asia, namely China including Taiwan, South Korea including Jeju Island, and Japan (Würmli, 1975; Stoev & Geoffroy, 2004). *Thereuonema tuberculata* is also known to be introduced to the United Kingdom (Barber, 2011), and the United States of America (Ohio and Nebraska) (Reeves, 2017; Reeves & Miller, 2022). In Russia, this species has recently been recorded from the Primorskii krai,

Russian Far East (Dyachkov, 2022, 2023, 2024a) (Fig. 3) and from the Republic of Khakassia, central Siberia (Nefediev & Farzalieva, 2024) (Fig. 1).

REMARKS. A restudy of specimens from the Altaiskii krai, Kemerovskaya oblast and the Republic of Altai, previously identified as *Scutigera coleoptrata* by Nefediev *et al*. (2016), shows that all of them actually belong to *T. tuberculata* (Fig. 1). In that way, *T. tuberculata* is formally newly recorded from these three regions, as well as from the Krasnodarskii krai; and the latter record is new to Europe as a whole (Fig. 2). Meanwhile, *Scutigera coleoptrata* must be deleted from the Scutigeromorpha species list of Asian Russia. The above record of *T. tuberculata* from Kazakhstan is new to the fauna on this country (Fig. 1), replacing both *S. coleoptrata* and *Thereuonema* sp. (see Dyachkov, 2020, 2024b).

The main diagnostic characters of *T. tuberculata* (basically according to Würmli, 1975, 2004) are as follows: pigmentation blue-green, head more heavily pigmented; absence of a pair of spine bristles at the distal end of all tarsi 1 (**da1**) (only a single or a pair of small spines (**ts**) presence caudolaterally at the middle and proximal annuli of tarsi 1); spiculae (**sc**) on the tergal plates parallel-sided; 50–80 bristles (**b**) associated with a spine (**s**) on tergite 6; some single bristles with paired spines (**ps**) at base (Figs 4–7). Nevertheless, some adult specimens from both the Krasnodarskii and Altaiskii krais, as well as from the Republic of Altai are characterized with 30–35 bristles associated with a spine on the sixth tergal plate. Obviously, the number of bristles associated with a spine on tergite 6 may vary from 30 to 80 (*vs* 50–80 ones in Würmli, 1975, 2004).

CONCLUSION

At present, the scutigeromorph centipede fauna of Russia encompasses only two species from two subfamilies: Scutigerinae *Scutigera coleoptrata* (Linnaeus, 1758) and Thereuoneminae *Thereuonema tuberculata* (Wood, 1862). The first species inhabits the European part of Russia only, while the second one is recorded now from the whole country ranging from southern Russia in the west, through southwestern and central Siberia, to the Russian Far East in the east. The genus *Thereuonema* Verhoeff, 1904 and the species *T. tuberculata* are recorded from Europe, Krasnodarskii krai and Altaiskii krai, Kemerovskaya oblast, and the Republic of Altai for the first time.

The scutigeromorphs of Kazakhstan include three reliable species from the subfamily Thereuoneminae, i.e. *Allothereua kirgisorum* Lignau, 1929, *Thereuonema turkestana* Verhoeff, 1905 and *T. tuberculata*. The latter species is newly reported from the northern part of Kazakhstan, directly adjacent to the Altaiskii krai of Russia, where this species occurs.

All studied specimens of *T. tuberculata* are confined to synanthropic and anthropogenic habitats, making this species essentially introduced to both Russia and Kazakhstan.

The studied material of *T. tuberculata* show the variability in the number of bristles associated with a spine on tergite 6 with a lower threshold of 30 spines (*vs* 50 in Würmli, 1975, 2004). At the same time, Yang *et al*. (2022) hypothesized the presence of a couple of cryptic and potential cryptic species within *T. tuberculata* from China. Carrying out a molecular study of the *T. tuberculata* populations from Russia in the future will be able to shed light on the variability of morphological characters of the species.

Specimens of *T. tuberculata* can easily be differentiated from *S. coleoptrata* by the following characters: the absence of a pair of spine bristles at the distal annulus of all tarsi 1 in *T. tuberculata* (present in *S. coleoptrata*), and the presence of spiculae on the tergal plates in *T. tuberculata* (absent in *S. coleoptrata*).

ACKNOWLEDGEMENTS

I am very grateful to Sh.R. Abdullin (Vladivostok, Russia), I.V. Enushchenko (Irkutsk, Russia), I.S. Koroliova (Ekibastuz, Kazakhstan), E.V. Guskova, and D.V. Kuzmenkin (both Barnaul, Russia) who entrusted me the material for the present study. I am most thankful to A.T. Zinoviev, N.S. Malygina and A.V. Dyachenko (all IWEP) who kindly provided the facilities for taking SEM micrographs on a reimbursable basis. I am indebted to D.A. Hennen (Richmond, Virginia, USA) who kindly reviewed and improved the manuscript.

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