

Roberto BATTISTON* - Andrea MAURICI** - Paolo FONTANA***

New data on the distribution and ecology of the earwigs (Insecta, Dermaptera) of Kyrgyzstan

Abstract: An update on the dermapterofauna of Kyrgyzstan is presented. The distribution and ecology of *Oreasiobia fedtschenkoi* have been revised and the presence of *Anechura bipunctata* and *Labidura riparia* is reported for the first time in this country. The habitat, ecology and conservation of these species are discussed in the context of the Kyrgyz area and an identification key for the earwigs of Kyrgyzstan is included.

Riassunto: Nuovi dati sulla distribuzione ed ecologia delle Forficule (Insecta, Dermaptera) del Kyrgyzstan.

Viene presentato un aggiornamento sulla dermatterofauna del Kirghizistan. La distribuzione e l'ecologia di *Oreasiobia fedtschenkoi* sono state riviste e la presenza di *Anechura bipunctata* e *Labidura riparia* vengono segnalate per la prima volta in questo Paese. L'habitat, l'ecologia e la conservazione di queste specie sono discussi nel contesto dell'area del Kirghizistan e viene inclusa una chiave di identificazione per i dermatteri del Kirghizistan.

Key words: Dermaptera, taxonomy, ecology, distribution, conservation.

INTRODUCTION

Kyrgyzstan is a complex and diverse Country in its natural ecosystems, within the Central-Asian area, but still poorly known in its fauna and flora. About 94% of this Country is covered by mountains over 1000 m, and 40% of these peaks are 3000 m above sea level, with many glaciers, covering about 4% of the territory. Kyrgyzstan is however very rich in term of environments, ranging from semi-arid barelands to steppe foothills, mountain forests, sub-alpine and alpine meadows.

In this landscape earwigs are a neglected group of insects among the Kyrgyzstan fauna. At present only one species, *Oreasiobia fedtschenkoi* (de Saussure, 1874), is reported to be present in this country, though other species are reported for “Central Asia” or “Turkestan”, a neighboring country with documented earwig diversity (Steinmann, 1989; Haas, 2019). Semenov-Tjan-Shanskij (1935) is the first to report the presence of earwigs in this area (*O. fedtschenkoi* cited for the “kirghis steppe”). Mistshenko (1937) presented the collecting records of

O. fedtschenkoi in Kyrgyzstan in the Osh region and in the valley of the river Gultsha (Alai range). One further record is from the valley of the river Kyzylsuu attributed at the time to the Kashgaria region, now inside the borders of Kyrgyzstan. Later, Sakai (1973) cites this species for Afghanistan, Dzungaria, Kyrgyzstan and Turkestan. *Oreasiobia fedtschenkoi* has subsequently been reported from the Alai valley and the Issik-Kul basin, as the only earwig species of this country in the modern catalogs and atlases of the fauna of Kyrgyzstan (Chelpakova *et al.*, 2011; Lazkov *et al.*, 2016). This information is supported by the main world catalogs of Dermaptera (Steinmann, 1989; Haas, 2019). It must be noted that a second species, *Forficula tomis* (Kolenati, 1846) has been historically reported for Northern Kyrgyzstan, in Tokmok and supposed to be present in the Tien-Shan mountains (Bey-Bienko, 1936) and it is generally reported for Transcaucasia in Steinmann (1989). This specie is however not reported in more recent reports and its presence in Kyrgyzstan at present time should be confirmed.

*Roberto Battiston, Museo di Archeologia e Scienze Naturali G. Zannato, piazza Marconi 17, 36075 Montecchio, Italy; World Biodiversity Association, Italy. E-mail: roberto.battiston@comune.montecchio-maggiore.vi.it

**Andrea Maurici, Dipartimento di Biologia e Biotecnologie “Charles Darwin” (Zoologia), Sapienza Università di Roma, Viale dell'Università 32, 00185 Roma, Italy; World Biodiversity Association, Italy.

***Paolo Fontana, Fondazione Edmund Mach, Via della Val, 2 - Loc. Costa di Casalino - 38057 Pergine Valsugana (TN), Italy; World Biodiversity Association, Italy.

To date, there are no published specific investigations on this group of insects in Kyrgyzstan.

In the last two years two scientific expeditions: OS-Tianshanica-2018 and 2019, organized by the World Biodiversity Association and composed by different specialists and students, collected and produced new earwig material and information that increase our knowledge base and understanding of these insects.

This contribution is dedicated to Augusto Vigna Taglianti, extraordinary entomologist who extensively studied and improved the knowledge on Dermaptera, especially on high altitude populations, even in the most remote localities.

MATERIALS AND METHODS

During two scientific expedition in Kyrgyzstan (OS-Tianshanica 2018 and 2019) a total of fifteen earwig specimens were collected from different Kyrgyzstan localities, later mounted and examined following Fontana *et al.* (2002) and preserved in the entomological collections of the Museo di Archeologia e Scienze Naturali 'G. Zannato' (MCZ). The expeditions were conducted by car and horseback between the end of April and the beginning of May of both 2018 and 2019. Twenty collecting sites, representing differing environments and altitudes, were utilized to collect three species and update their distribution and male genital anatomy.

RESULTS

Labidura riparia (Pallas, 1773)

Forficula riparia Pallas, 1773

Forficula dentata Fabricius, 1775

Forficula pallipes Fabricius, 1775

Forficula maxima Villiers, 1780

Forficula bilineata Herbst, 1786

Forficula gigantea Fabricius, 1787

Forficula bidens Olivier, 1791

Forficula crenata Olivier, 1791

Forficula erythrocephala Fabricius, 1793

Forficula flavipes Fabricius, 1793

Forficula gigantea Fabricius, 1793

Forficula rufescens Palisot, 1805

Psalis morbida Audinet-Serville, 1831

Forficesila affinis Guérin-Méneville, 1836

Forficesila gigantea Burmeister, 1838

Forficesila suturalis Burmeister, 1838

Forficula bivittata Klug, 1838

Forficesila icterica Audinet-Serville, 1839

Forficesila terminalis Audinet-Serville, 1839

Forficula marginella Costa, 1839

Forficesila riparia Fischer, 1846

Forficula bicolor Motschulsky, 1846

Forficula fischeri Motschulsky, 1846

Forficula amurensis Motschulsky, 1858

Labidura bengalensis Dohrn, 1863

Labidura servillei Dohrn, 1863

Labidura auditor Scudder, 1878

Labidura clarki Kirby, 1891

Labidura granulosa Kirby, 1891

Labidura pluvialis Kirby, 1891

Labidura distincta Rodzianko, 1897

Labidura erythrocephala Bormans, 1900

Apterygida huseine Rehn, 1901

Labidura truncata Kirby, 1903

Labidura dubronyi Borg, 1904

Labidura karschi Borg, 1904

Tomopygia sinensis Burr, 1904

Labidura mongolica Rehn, 1905

Labidura confusa Capra, 1929

TYPE LOCALITY: Irtysh river.

DISTRIBUTION. Cosmopolitan. In Kyrgyzstan this species can be found on the shores of the lake Orto Tokoy in the Kochkor district.

SPECIMENS EXAMINED: Orto Tokoy (42°17'44" N, 75°56'36" E) 1729 m, 23.IV.2019, leg. OS-Tianshanica Team, Coll. MCZ, 3 males, 3 females. Several other specimens were observed in the area, with a high density and gregarious attitude, both as nesting couples or as single individuals, all adults (Figs. 1 and 2).

TAXONOMICAL AND ECOLOGICAL NOTES. This species was found in large numbers only on the shores of the Orto Tokoy, an artificial reservoir on the Chu River in an almost complete bare land (Fig. 3). Adult couples were found actively guarding their nests, often gregarious with other couples or singles. The gregariousness of this species is known to be low in laboratory conditions, if compared to other Dermaptera (Sauphanor & Sureau, 1993; Shepard *et al.*, 1973), and even lower during the adult and reproductive stage (Gomez & Kolliker, 2013) and it is practically unknown in nature. This species has been here observed to aggregate in high numbers

especially under abandoned tires (about 20 individuals were observed under the same tire; Fig. 1), a rather common waste along the roadside verges of Kyrgyzstan. The rubber of the tires may provide some thermal insulation to the extreme climate of this Country and promote aggregation, which may be lower in more temperate areas. Some groups of individuals have been however observed to occasionally aggregate also under wood and beach debris in other warmer regions (e.g. Southern Sicily, B. Massa pers. comm.) and this behavior may be more common than expected. This species has indeed a global distribution but is locally uncommon with fragmented populations.

Anechura bipunctata (Fabricius, 1781)

Forficula bipunctata Fabricius, 1781

Chelidura anthracina (Kolenati, 1846)

Anechura asiatica Semenov, 1903

Forficula biguttata (Fabricius, 1793)

Forficula fabricii (Fieber, 1853)

Anechura orientalis Krauss, 1900

TYPE LOCALITY: Italy

DISTRIBUTION. Central and East Europe; West and Central Asia. In Kyrgyzstan this species can be found in At-Bašy valley

SPECIMENS EXAMINED: At-Bašy valley (41°12'13"N; 75°45'28"E) 2018 m a.s.l., 28.IV.2019, leg. OS-Tianshanica Team, Coll. MCZ, 2 females, 2 juveniles (Fig. 4).

TAXONOMICAL AND ECOLOGICAL NOTES. This species was found in a single valley with a semi-desert environment (Figs. 3-8) and appears to prefer a warmer environment than other species in the Country. It must be noted that all the specimens collected have a black head and this character is usually referred to *Anechura asiatica* Semenov, 1903 (now in synonymy with *bipunctata*), in contrary to true *A. bipunctata* usually reported with a reddish head. While we respected here the synonymy, further investigations on these populations need to be done to confirm this taxonomy.

Oreasiobia fedtschenkoi (de Saussure, 1874)

Forficula fedtschenkoi de Saussure, 1874

Anechura fedtschenkoi Bormans & Krauss, 1900



Fig. 1. Male and female of *Labidura riparia* guarding their nest in early spring (left) and a single male resting under an abandoned tire in Orto Tokoy (right). Photo R. Battiston.

TYPE LOCALITY: Turkestan

DISTRIBUTION. Central Asia. In Kyrgyzstan this species is present in the Issyk-Kul area, the Alai Valley, in the Smaller Naryn River Valley, and near Kol Ukok lake. SPECIMENS EXAMINED: Kol Ukok lake (42°05'58.0"N 75°53'43.3"E) 3038 m, leg. R. Battiston, Coll. MCZ, 1 male; Smaller Naryn River (41°37'13"N, 76°26'35"E) 2429 m, 24.IV.2019, leg. OS-Tianshanica Team, Coll. MCZ, 2 males 2 females (Figs. 4 and 5).

TAXONOMICAL AND ECOLOGICAL NOTES. Adults of *Oreasiobia fedtschenkoi*, were found during the first OS-Tianshanica expedition in April, near Kol Ukok lake at 3,038 m above sea level in a typical high mountain environment (Fig. 3), with snow still present on the surrounding peaks. Other specimens were located in the Smaller Naryn valley along a riverbank in a snow-covered forest (Fig. 3). We presume this species has a large distribution in Kyrgyzstan. From a morphological point of view, it is interesting

to note that the peculiar shape in the apex of the central parameral plate of *Oreasiobia fedtschenkoi*, depicted



Fig. 2. Male terminalia of *Labidura riparia* from Orto Tokoy: genitalia (left) and supra genital plate (right). Scale bars: 1 mm.

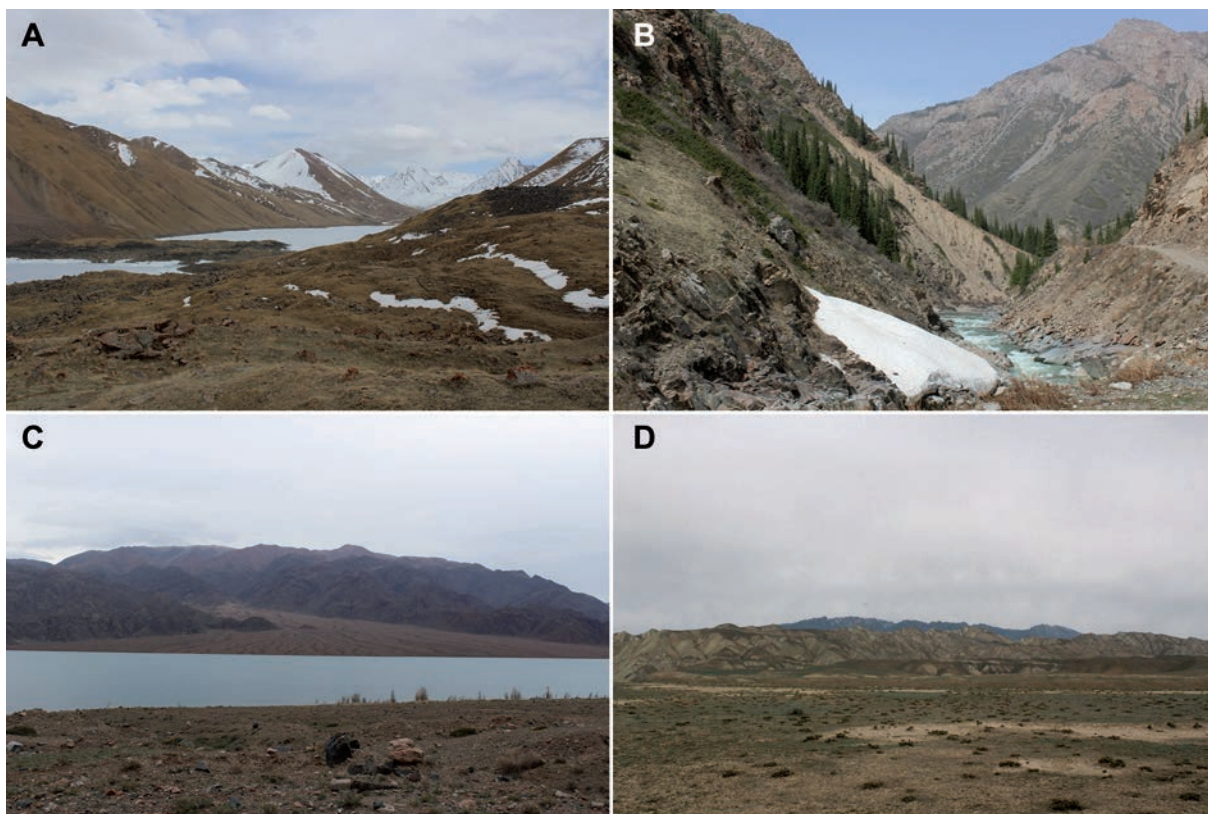


Fig. 3. Habitat of *Oreasiobia fedtschenkoi* (A - Kol Ukok: high mountain, B - Naryn: riverbank), *Labidura riparia* (C - Orto Tokoy: reservoir shores) and *Anechura bipunctata* (D - At-Başı: semi-desert, bare-land). Photo R. Battiston.

by Steinmann (1989) is variable and can be both triangular or square (Fig. 6). At present, the genus *Oreasiobia* is composed by 6 different species (Hopkins *et al.*, 2021) and this variability should be considered in future taxonomical revisions and updates.

KEY TO THE DERMAPTERA OF KYRGYZSTAN

- 1 Antennae with more than 20 segments
.....*Labidura riparia*
- Antennae with less than 16 segments.....2
- 2 Presence of a white spot on each tegmina and each wing*Anechura bipunctata*
- Presence of a white spot only on each tegmina, wings not or barely visible when folded3



Fig. 4. Female of *Anechura bipunctata* over dry soil in the bare-land of the At-Bašy valley. Photo A. Maurici.

- 3 Proximal-inner side of the male cerci curved and smooth*Oreasiobia fedtschenkoi*
- Proximal-inner side of the male cerci straight and crenulated.....*Forficula tomis*

DISCUSSION

With an extreme continental climate and discontinuous presence of water, this Country is challenging for many species of insects. Despite the historical lack of knowledge, earwigs seem to survive well in this country with a number of species much greater than what previously reported but probably still reduced if compared to other warmer regions. As earwigs in Kyrgyzstan appear resistant to environmental extremes, their distribution may be wider than previously thought (Fig. 7) and historical records need to



Fig. 5. Male of *Oreasiobia fedtschenkoi* wandering over humid soil in the river banks of the Smaller Naryn River. Photo R. Battiston.

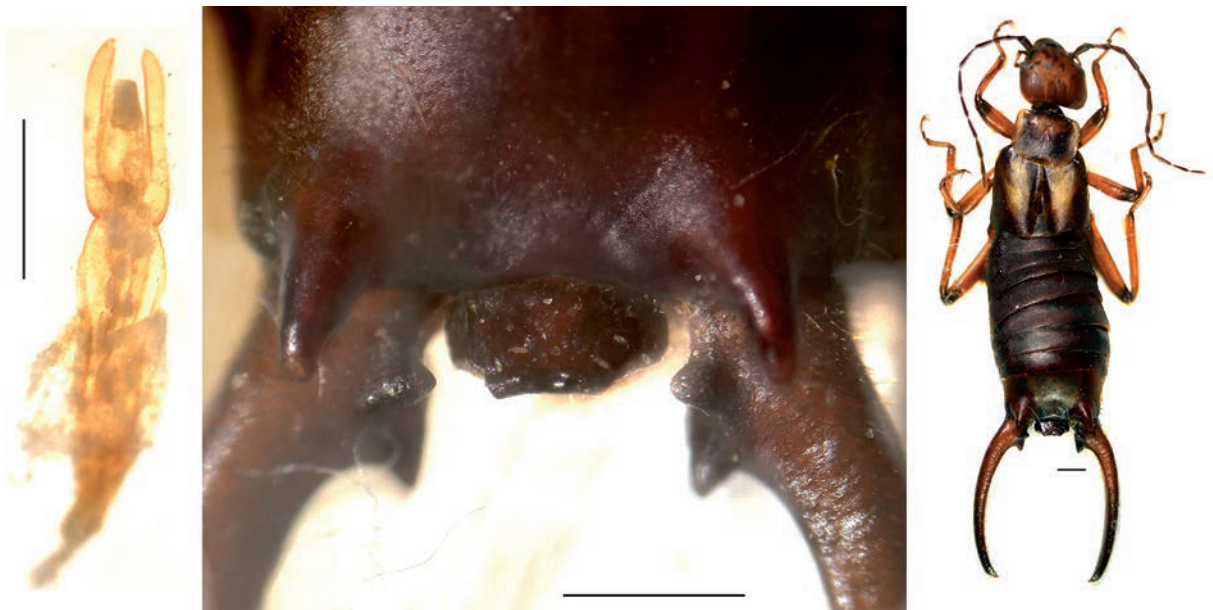


Fig. 6. Male terminalia of *Oreasiobia fedtschenkoi* from Naryn: genitalia (left), supra genital plate (center) and adult male habitus (right). Scale bars: 1 mm.



Fig. 7. Variability in the apex of the male genitalia of *Oreasiobia fedtschenkoi* in two Smaller Naryn River specimens from the same population (left and center), compared to Steinman, 1989 on the right. Scale bar: 1 mm.

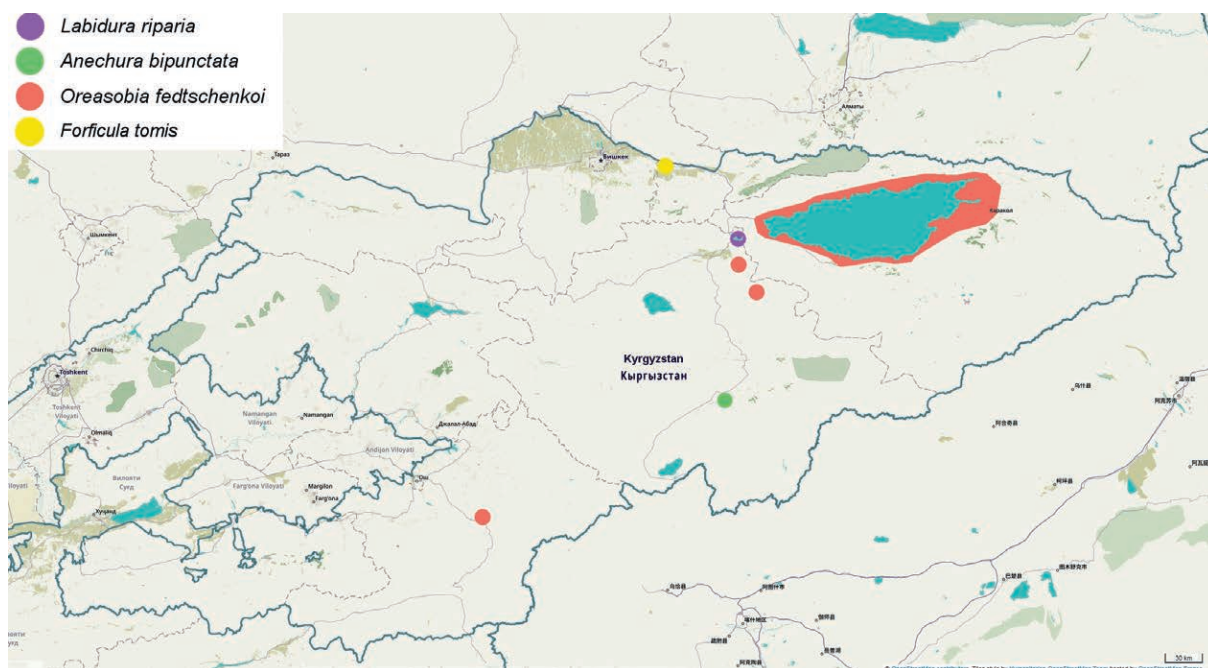


Fig. 8. Updated distribution of the earwig species in Kyrgyzstan with historical and new records. Base-map from the Humanitarian OpenStreetMap Team.

be confirmed, especially for *F. tomis* never encountered during these recent expeditions, but previously reported as abundant and wide spread (Bey-Bienko, 1936). Moreover, the apparent absence of *F. auricularia* Linnaeus, 1758 from Kyrgyzstan, a cosmopolit and adaptable species, usually common and already reported for Central Asia, need to be investigated. Further investigations are encouraged to better define the taxonomy, ecology and conservation of the dermapterofauna of Kyrgyzstan.

ACKNOWLEDGMENTS

This research is a result of the OS Tianshanica expeditions organized with the support of the World

Biodiversity Association. We would like to thank all its staff and in particular the leaders and members of the expedition: Rachele Amerini, Flavia Cerasti, Jennifer Pradelli, Luigi Quesada, Alberto Risato, Margherita Ruggeri, Angelo Todescan, Anna Todescan, Fosca Zannone, for their active help in the field surveys and collecting. We thank Tilek Zhetigenov and Baias Bakytbekov for their professional and kind logistical support in Kyrgyzstan, Evgeny Shcherbakov for his help with the Russian language and Gregory Lewbart for his linguistic revision, comments and advice on this manuscript. We are also grateful to Bruno Massa and Petr Kočárek for their valuable comments and contributions to this study.

REFERENCES

- BEY-BIENKO G. J., 1936 - Faune de l'URSS 5: Insectes Dermaptères. Publishing house of the USSR Academy of Sciences, Moscow-Leningrad, 137-139. (in Russian)
- CHELPAKOVA J.M., DAVLETBAKOV A.T., KUSTAREV L.A., 2011 - Fauna of Kyrgyzstan. Al Salam, 264 pp. (in Russian)
- FONTANA P., BUZZETTI F.M., COGO A., ODÈ B., 2002 - Cavallette, grilli, mantidi e insetti affini del Veneto. Guide Natura/1, Museo Naturalistico Archeologico di Vicenza, Vicenza, 324 pp.
- GOMEZ Y., KOLLIKER M., 2013 - Maternal care, mother-offspring aggregation and age-dependent coadaptation in the European earwig. *Journal of Evolutionary Biology*, 26: 1903-1911
- HAAS F., 2019 - Earwig Research Centre. Available online: <http://www.earwigs-online.de/> (accessed on 19 November 2020).
- HOPKINS H., MAEHR M.D., HAAS F., DEEM L.S., Dermaptera Species File. Version 5.0/5.0. [28/01/2021]. Available from: <http://Dermaptera.SpeciesFile.org>
- LAZKOV G.A., DAVLETBAKOV A.T., MILKO D.A., GANYBAEVA M.R., 2016 - Atlas of flora and fauna of the specially protected natural territories of the Central Tien Shan (Republic of Kyrgyzstan). Bishkek, 320 pp. (in Russian)
- MISTSHENKO L., 1937 - VII. A contribution to the fauna of Dermaptera, Mantodea, and Orthoptera in South Kirghizstan (U.S.S.R.) and Kashgaria (China). *Annals and Magazine of Natural History, Series 10*, 20(115): 87-94.
- STEINMANN H., 1989 - World catalogue of Dermaptera. Kluwer Academic Publishers, Dordrecht and Boston, 933 pp.
- SAKAI S., 1973 - Dermapterorum Catalogus Praeliminaris. Tokyo, 174 pp.
- SEMOV-TJAN-SHANSKIJ A. P., 1935 - Aperçu général de la faune Dermaptera de l'URSS. *Bulletin de l'Académie des Sciences de l'URSS. Classe des sciences mathématiques et naturalistiques*, (5): 825-830.
- SHEPARD M., WADDILL V., KLOFT W., 1973 - Biology of the Predaceous Earwig *Labidura riparia* (Dermaptera: Labiduridae). *Annals of the Entomological Society of America*, 66(4): 837-841.
- RADL R. C., LINSSENMAIR K. E., 2010 - Maternal Behaviour and Nest Recognition in the Subsocial Earwig *Labidura riparia* Pallas (Dermaptera: Labiduridae). *Ethology*, 89(4): 287-296.