



Myrmecophilidae (Orthoptera) – a new family for Siberian Fauna

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Abstract

For the first time, we report for the Siberian fauna the species *ant-loving cricket Myrmecophilus acervorum* (Panzer, 1799) (Orthoptera: Myrmecophilidae), found in the anthills of *Lasius* sp. (Hymenoptera: Formicidae), that is the most north-eastern locality of this rare species finding. We suggest an alien nature of *M. acervorum* distribution in Siberia.

Key words: ant-loving cricket, Altai Territory, *Lasius*, *Myrmecophilus acervorum*, myrmecophily.

Introduction

The ant-loving cricket *Myrmecophilus acervorum* (Panzer, 1799) (Orthoptera: Myrmecophilidae) is an obligate inquiline in ant nests of a number of genera: *Myrmica* Latreille, 1804, *Formica* Linnaeus, 1758, *Lasius* Fabricius, 1804, *Camponotus* Mayr, 1861, *Tetramorium* Mayr, 1855, *Messor* Forel, 1890, *Pheidole* Westwood, 1839, *Crematogaster* Lund, 1831, *Tapinoma* Förster, 1850, and *Polyergus* Latreille, 1804 (Hymenoptera, Formicidae) (Taszakowski *et al.* 2013). *M. acervorum* shows a preference to *Lasius* species (Franc *et al.* 2015).

M. acervorum is distributed in Austria, Belarus, Bulgaria, Czech Republic, Denmark, France, Greece, Netherlands, Italy, Spain, Lithuania, Luxembourg, North Macedonia, Germany, Poland, Russia (Kalininograd Oblast, “Voronezh and Moscow provinces of the Russian Empire” and “the center, the south [of the European part of Russia] to the Crimea and Ciscaucasia”), Romania, Slovakia, Spain, Sweden, Denmark, Ukraine, and Hungary (Seidl 1836; Pungur 1900; Csiki 1905; Jacobson & Bianki 1905; Schimmer 1909; Zacher 1917; Stach 1926; Poláček 1942; Hölldobler 1947; Chopard 1959; Bei-Bienko 1964; Baccetti 1966; Junker 1997; Junker & Bellmann 1997; Bezděčka *et al.* 2000; Junker & Ratschker 2000; Fedor 2001; Llucià-Pomares 2002; Proess 2004; Kočárek *et al.* 2005; Zechner *et al.* 2005; Olmo-Vidal 2006; Zoltan 2006; Bönsel & Möller 2008; Defaut *et al.* 2009; Espadaler & Olmo-Vidal 2011; Markevičius 2015; Sardet *et al.* 2015; Stalling *et al.* 2015; Ostrovsky 2016; Bubenko 2017; Stalling *et al.* 2017; Hörren *et al.* 2019; Kleukers *et al.* 2020; Iorgu *et al.* 2021), Croatia ? (Skejo *et al.* 2018).

In the recent years, *M. acervorum* has been reported from Transcaucasia (Armenia and Georgia) (Stalling 2013; Stalling & Seropian 2022), and in South-East Kazakhstan (the environs of Almaty)

(Temreshev & Kolov 2013; Childebaev et al. 2014) and Uzbekistan (Tashkent botanical garden) (Lebedeva 2017).

According to the IUCN Red List Category nomenclature, the species occupies the status LC (A least-concern species is a species that has been categorized by the International Union for Conservation of Nature (IUCN) as evaluated as not being a focus of species conservation because the specific species is still plentiful in the wild) (Hochkirch et al. 2016).

Material and methods

The material is kept in a 70% ethanol solution in the first author's collection. The adult specimens were photographed using an Olympus DP74 camera attached to an Olympus SZX16 stereo-microscope. The photos were enhanced and arranged to plates with Corel PHOTO-PAINT 2017 software. The map was made using open source software: (<https://www.simplemappr.net/>).

Results and Discussion

Myrmecophilus acervorum (Panzer, 1799)

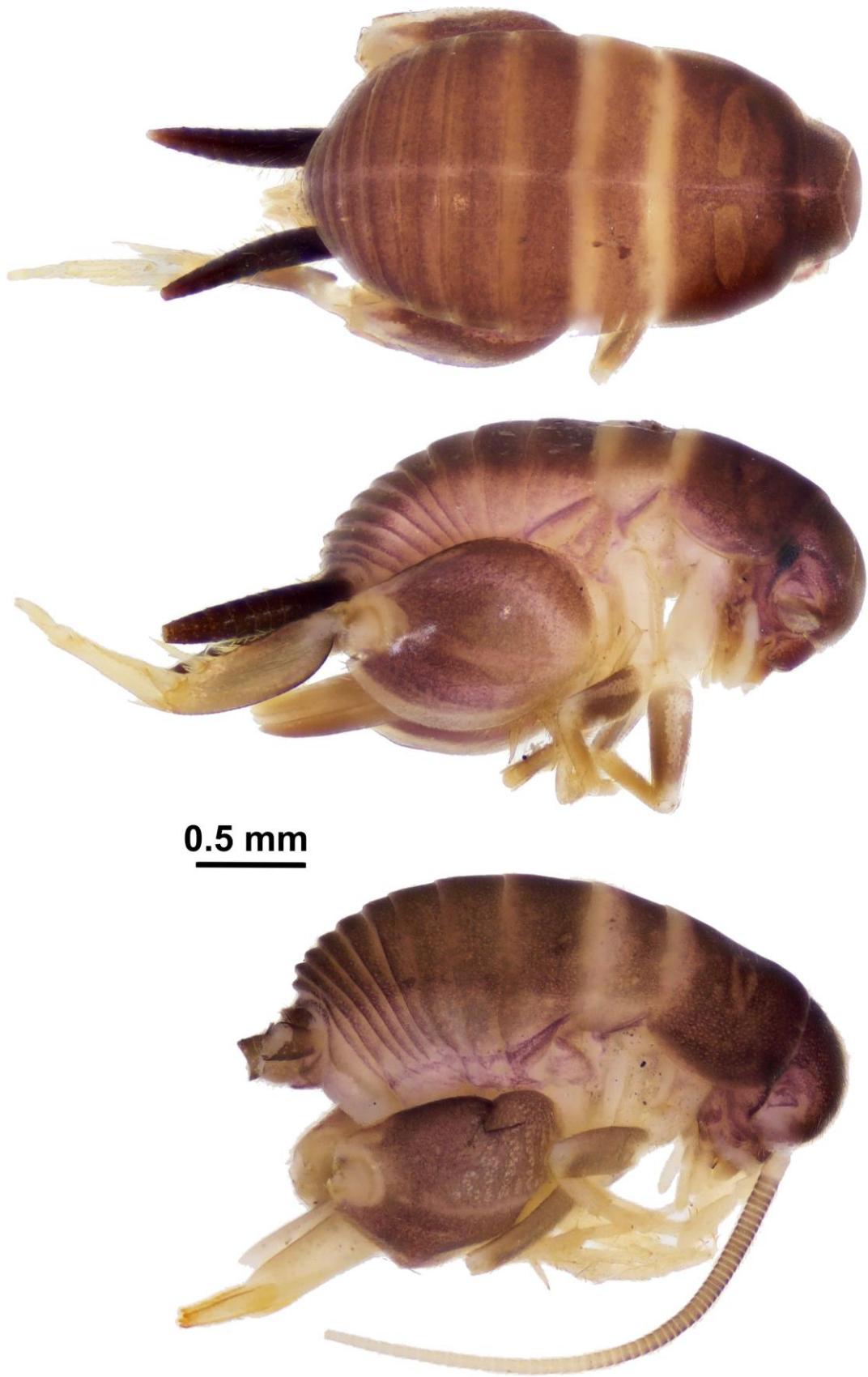
Figs 1–4

Material examined. 4 females, Russia, South-Western Siberia, Altai Krai, Barnaul (Oktyabrsky Sadovod), 53°15'07.0" N 83°44'22.5"E, in the *Lasius* sp. nest, 18–26 July 2022, leg. T. Zalutsky (private collection of T. Zalutsky, Barnaul).

The current finding is in the most north-eastern locality of the family Myrmecophilidae. The analysis of publications shows not only a significant expansion of the natural habitat of the species to the north (findings of the recent years in Sweden and Denmark) (Stalling et al. 2017), but also the appearance of very remote populations in Transcaucasia, Central Asia and south-western Siberia (Stalling 2013; Temreshev & Kolov 2013; Childebaev et al. 2014; Lebedeva 2017; Stalling & Seropian 2022). These trends are interpreted by the colleagues ambiguously. Stalling et al. (2017) associate the expansion of the European part of the range with the climate warming: “One reason might be an expansion because of global warming or other population effects, which is supported by the fact that there were also several newly found localities within the known distribution area in recent times (e.g. Bönsel & Möller 2008; Taszakowski et al. 2013), and there are several other orthopteran species expanding northwards because of global warming at the present time (e.g. Koćarek et al. 2008; Bakker et al. 2015). The finding locality in Copenhagen, Denmark, is located in the city centre and has a very warm local summer climate... The Swedish locality in eastern Småland is in an area known for high summer temperatures”. The colleagues confirm their conclusions by the examples of expansions of the northern borders of the habitats.

Childebaev et al. (2014) suggest an alien nature of the appearance of *M. acervorum* “Можно предположить, что *M. acervorum* является адвентивным видом для Казахстана. Возможность его самостоятельного расселения маловероятна. Он был найден нами только в г. Алматы и сопредельных территориях в тех местах, где произрастала сосна обыкновенная и другие интродуцированные породы деревьев. Там же встречались другие завозные виды насекомых — *Ips sexdentatus* (Boerner, 1776), *Ostoma ferrugineum* (Linnaeus, 1758) и *Uleiota planata* (Linnaeus, 1761) [Темрешев, Колов, 2013]. Возможно, что сверчок-муравьелюб был завезён с почвой или посадочным материалом. [We may suggest that *M. acervorum* is an adventive species for Kazakhstan. The possibility of his self-settlement is almost improbable. It was found only in the city of Almaty and adjacent territories, in those places where Scotch pine and other introduced tree species grew. Other imported species of insects were also found there: *Ips sexdentatus* (Boerner, 1776), *Ostoma ferrugineum* (Linnaeus, 1758) and *Uleiota planata* (Linnaeus, 1761) [Temreshev, Kolov, 2013]. Probably, the ant-loving cricket was brought with soil or planting stock]”.

Lebedeva (2017) does not discuss the deep separation of the Uzbek population from the main range and indicates the need to protect this species due to its locality and rarity.



Figures 1–3. *M. acervorum*, adult females: 1. Dorsal view; 2. Lateral view; 3. Lateral view.

Considering that all the findings of *M. acervorum* in Asia (Kazakhstan, Uzbekistan and south-western Siberia) were made in disturbed habitats (forest plantations, horticulture, botanical gardens), in our opinion, these populations are invasive.



Figure 4. Distributional map of the Asian portion of *M. acervorum* habitat

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References

- Baccetti, B. (1966) Notulae Orthopterologicae XXII. Il Genre *Myrmecophilus* (Berth.) in Italia. *Redia*, 50, 1–33.
- Bei-Bienko G.Ya. Family Myrmecophilidae - Ant-loving crickets. Order Orthoptera - Orthoptera. *Key to insects of the European part of the USSR. Volume I. Inferior, ancient-winged, with incomplete metamorphosis*. Moscow-Leningrad: Nauka, 1964, pp. 240–241. (in Russian)
- Bezděčka, P., Kočárek, P. & Šuhaj, J. (2000) Distribution of the Cricket *Myrmecophilus acervorum* (Orthoptera: Myrmecophilidae) in Moravia and Silesia with notes on the biology. *Klapalekiana*, 36, 7–17.
- Bönsel, A. & Möller, S. (2008) Die Ameisengrille *Myrmecophilus acervorum* (PANZER, 1799) in Mecklenburg-Vorpommern. *Articulata*, 23(1), 81–87.
- Bubenko, A.N. (2017) Otriad Orthoptera Olivier, 1789 – Prjamokrylye. In: Tsinkevich, V.A. (ed.), *Catalogue of Insects of the National Park „Belovezhskaya Pushcha”*, pp. 21–24. Belorusskii Dom Pechati, Minsk, 344 pp. (in Russian).

- Childebaev, M.K., Temreshev, I.I. & Kolov, S.V. (2014) *Myrmecophilus acervorum* Panzer, 1799 (*Orthoptera, Myrmecophilidae*) – first records ant-loving cricket for the fauna of Kazakhstan. Euroasian entomological journal, 13(3), 246 (in Russian)
- Chopard, L. (1951) Orthopteroïdes. *Faune de France*, 56, 196–197.
- Csiki, E. (1905) Adátok a hangyásztücsök (*Myrmecophila acervorum* Panz.) ismerethéz. *Allátani Közlemények*, 4(2), 97–100.
- Defaut, B., Sardet, E. & Braud, Y. (2009) Orthoptera (Ensifera et Caelifera). *Catalogue permanent de l'entomofaune française*, 7, 1–94.
- Espadaler, X. & Olmo-Vidal, J.M. (2011) The Myrmecophilic Cricket *Myrmecophilus* in Spain (Orthoptera, Myrmecophilidae). *Sociobiology*, 57 (2), 321–328.
- Fedor, P.J. (2001) The orthopteroid insect fauna in the surroundings of the Zemplinska Sirava reservoir (Eastern Slovakia) after forty years. *Acta Zoologica Universitatis Comenianae*, 44, 51–56.
- Franc, V., Majzlan, O., Krištín, A. & Wiezik, M. (2015) On the distribution and ecology of the ant cricket (*Myrmecophilus acervorum*) (Orthoptera: Myrmecophilidae) in Slovakia. Matthias Belivs University Proceedings (UMB Banská Bystrica), 5, Suppl. 2 (Proceedings of the conference «Roubalove dni I», Banská Bystrica, 27. 1. 2015), 40–50.
- Hochkirch, A., Nieto, A., García Criado, M., Cálix, M., Braud, Y., Buzzetti, F.M., Chobanov, D., Odé, B., Presa Asensio, J.J., Willemse, L., Zuna-Kratky, T., Barranco Vega, P., Bushell, M., Clemente, M.E., Correas, J.R., Dusoulier, F., Ferreira, S., Fontana, P., García, M.D., Heller, K-G., Iorgu, I.Ş., Ivković, S., Kati, V., Kleukers, R., Krištín, A., Lemonnier-Darcemont, M., Lemos, P., Massa, B., Monnerat, C., Papapavlou, K.P., Prunier, F., Pushkar, T., Roesti, C., Rutschmann, F., Şirin, D., Skejo, J., Szövényi, G., Tzirkalli, E., Vedenina, V., Barat Domenech, J., Barros, F., Cordero Tapia, P.J., Defaut, B., Fartmann, T., Gomboc, S., Gutiérrez-Rodríguez, J., Holuša, J., Illich, I., Karjalainen, S., Kočárek, P., Korsunovskaya, O., Liana, A., López, H., Morin, D., Olmo-Vidal, J.M., Puskás, G., Savitsky, V., Stalling, T. & Tumbrinck, J. (2016) *European Red List of Grasshoppers, Crickets and Bush-crickets*. Luxembourg: Publications Office of the European Union, 86 pp. DOI: 10.2779/60944
- Hölldobler, K. (1947) Studien über die Ameisengrille (*Myrmecophilus acervorum* Panzer) im mittleren Maingebiet. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 20 (7), 607–648.
- Hörren, T., Bodingbauer, S., Enß, J. & Rautenberg, T. (2019) Die Ameisengrille *Myrmecophilus acervorum* (Panzer, 1799) im Ballungsraum Ruhrgebiet und ihre aktuelle Verbreitung in Nordrhein-Westfalen (Orthoptera: Gryllotalpoidea: Myrmecophilidae). *Entomologischer Verein Krefeld. Series Naturalis*, 1, 1–8.
- Iorgu, I.S., Iorgu, E.I., Stalling, T., Puskás, G., Chodanov, D., Szövényi, G., Moscaliuc, L.A., Motoc, R., Tăuşan, I. & Fusu, F. (2021) Ant crickets and their secrets: *Myrmecophilus acervorum* is not always parthenogenetic (Insecta: Orthoptera: Myrmecophilidae). *Zoological Journal of the Linnean Society*, 20, 1–18.
- Jacobson, G.G. & Bianki, V.L. (1905) *Orthopteroid and Pseudoneuropteroid Insects of Russian Empire and adjacent countries*. SPb.: Izdatie A.F. Devriena, 529 p. (in Russian)
- Junker, E. (1997) Untersuchungen zur Lebensweise und Entwicklung von *Myrmecophilus acervorum* (Panzer, 1799) (Saltatoria: Myrmecophilidae). *Articulata*, 12 (2), 93–106.
- Junker, E. & Bellmann, H. (1997) Untersuchungen zur Ökologie und Ethologie von *Myrmecophilus acervorum* (Panzer, 1799). *Mitteilungen der Deutschen Gesellschaft für allgemeine und angewandte Entomologie*, 11, 447–452.
- Junker, E. & Ratschker, U. (2000) Zur Verbreitung der Ameisengrille *Myrmecophilus acervorum* (Panzer (1799)), in Sachsen (Insecta, Ensifera, Myrmecophilidae). *Faunistische Abhandlungen Staatliches Museum für Tierkunde Dresden*, 22 (2), 11–21.
- Kleukers, R., Felix, R. & Winkelhorst, W. (2020) Eerste vondst van de mierenkrekel *Myrmecophilus acervorum* in Nederland (Orthoptera). *Nederlandse Faunistische Mededelingen*, 55, 1–7.
- Kočárek, P., Holuša, J. & Vidlicka, L. (2005) *Blattaria, Mantodea, Orthoptera a Dermaptera České republiky*. Kabourek, Zlín, 348 pp.
- Lebedeva, N.I. (2017) First record of *Myrmecophilus* (*Myrmecophilus*) *acervorum* Panzer, 1799 (Orthoptera: Myrmecophilidae; Myrmecophilinae) from Uzbekistan. *Wschodnioeuropejskie Czasopismo Naukowe (East European Scientific Journal)*, 3(19), 4–8.
- Llucià-Pomares, D. (2002) Revisión de los ortópteros (Insecta: Orthoptera) de Cataluña (España). *Monografías de la Sociedad Entomológica Aragonesa*, 7, 1–226.

- Markevičius, G. (2015) Detection of a new Orthoptera species for Lithuania. *Insects.lt* [10.01.2023], – < <http://www.insects.lt/aptikta-nauja-lietuvių-tiesiasparniurusis/> >.
- Olmo-Vidal, J.M. (2006) *Atles dels ortòpters de Catalunya i llibre vermell*. Departament de Medi Ambient i Habitatge. Generalitat de Catalunya. Barcelona. 428 pp.
- Ostrovsky, A.M. (2016) Addition to the checklist of orthopterous (Insecta, Orthoptera) of south-east Belarus. In: Dudka, I.A., Didukh, Ya.P., Bisko, N.A., Sukhomlyn M.M., Fedotov, O.V., Dotsenko, O.I., Lialiuk, N.M., Oberemko, A.V., Ovchinnikova, Y.I., Prysedskyi Y.H., & Velyhodska, A.K. (eds). *Current problems of biology and ecology. Materials of International Scientific and Practical Conference, October, 3–7, 2016, Vinnytsia*, pp. 157–160. Ministry of Education and Science of Ukraine & Vasyl' Stus Donetsk National University, 520 pp. (In Ukrainian)
- Poláček, V. (1942) Příspěvek k rozšíření cvrčka *Myrmecophila acervorum* Panz. v Čechách. *Časopis Československé společnosti entomologické*, 39, 143–144.
- Proess, R. (2004) Verbreitungsatlas der Heuschrecken des Großherzogtums Luxemburg. *Ferrantia*, 39, 7–178.
- Pungur, J. (1900) Orthoptera, Insecta. *Fauna Regni Hungariae*, III. Arthropoda, Budapest, 46 pp.
- Sardet, E., Roesti, C. & Braud, Y. (2015) *Cahier d'identification des orthoptères de France, Belgique, Luxembourg et Suisse*. Edition Biotope, 304 pp.
- Schimmer, F. (1909) Beitrag zu einer Monographie der Gryllodeengattung *Myrmecophila* Latr. *Zeitschrift für wissenschaftliche Zoologie*, 93, 409–534.
- Seidl, W. (1836) Die Orthopteren Böhmens. *Weitwebers Bieträge zur Gesammten Natur und Heilwissensch*, 1(8), 205–223.
- Skejo, J., Rebrina, F., Szovényi, G., Puskás, G. & Tvrtković, N. (2018) The first annotated checklist of Croatian crickets and grasshoppers (Orthoptera: Ensifera, Caelifera). *Zootaxa*, 4533, 001–095.
- Stach, J. (1926) Mrowiszczak (*Myrmecophila acervorum* Panz.) z jaru Dniestrowego. *Polskie Pismo Entomologiczne*, 4, 244–249.
- Stalling, T. (2013) First record of the Ant – loving cricket (*Myrmecophilus acervorum* (Panzer, 1799)) from Armenia and comments on *Myrmecophilus hirticaudus* Fischer von Waldheim, 1846 (Orthoptera: Myrmecophilidae). *Biological Journal of Armenia*, 2 (65), 120–122.
- Stalling, T., Espadaler, X. & Ortiz de Zugasti Carrón, N. (2015) First record of the ant-loving cricket *Myrmecophilus fuscus* Stalling, 2013 (Orthoptera: Myrmecophilidae) in mainland Spain. *Sociobiology*, 62(4), 481–483.
- Stalling, T., Sjödahl, M. & Ulrik, P. (2017) Records of the ant cricket *Myrmecophilus acervorum* from the northern border of the distribution range (Orthoptera: Myrmecophilidae). *Entomologisk Tidskrift*, 138, 97–101.
- Stalling, T. & Seropian, A. (2022) The Common Ant Cricket *Myrmecophilus acervorum* (Panzer, [1799]), new to the fauna of Georgia, southern Caucasus ecoregion (Orthoptera: Myrmecophilidae), with additional data on *Myrmecophilus hirticaudus* Fischer von Waldheim, 1846. *Caucasiana*, 1, 21–23. DOI: 10.3897/caucasiana.1.e87210
- Tamutis V., Ferenca, R. & Martinaitis, K. (2017) *Myrmecophilus acervorum* (Panzer, 1799) (Orthoptera: Myrmecophilidae) - a new species for Lithuanian fauna. *Bulletin of the Lithuanian Entomological Society*, 1 (29), 8–10.
- Taszakowski, A., Kolak, G. & Imiela, A. (2013) New locality of *Myrmecophilus acervorum* (Panzer, 1799) in Poland. *Acta entomologica Silesiana*, 21, 5–8.
- Temreshev, I.I. & Kolov, C (sic!).V. (2013) Insects from windbreak sites in the State National Natural Park «Ile-Alatau», Almaty Oblast, Kazakhstan. *Euroasian entomological journal*, 12 (2), 125–131 (in Russian)
- Zacher, F. (1917) *Die Geredflügler Deutschlands und ihre Verbreitung. Systematisches und synonymisches Verzeichniss der im Gebiete des Deutschen Reiches bisher aufgefundenen Orthopteren-Arten (Dermaptera, Oothecaria, Saltatoria)*. Verlag von Gustav Fischer, Jena, 287 pp.
- Zechner, L., Koschuh, A., Berg, H-M., Paill, W. Reinbacher, H. & Zuna-Kratky, T. (2005) Checkliste der Heuschrecken der Steiermark mit Kommentaren zu Verbreitung und Habitatansprüchen (Insecta: Orthoptera). *Beiträge zur Entomofaunistik*, 6, 127–160.
- Zoltan, K. (2006) Adatok a Dunántúli-középhegység egyenesszárnyú (Orthoptera) faunájának ismeretéhez II. *Folia Historico Naturalia Musei Matrensis*, 30, 189–201.

Żurawlew, P., Rutkowski, T., Błędowski, J., Konwerski, S., Grobelny, S., Orzechowski, R., Ruta, R., Wagner, G.C., Pacuk, B., Staniec, B., Szpalek, A., Zagaja, M. & Czyżewski, S. (2022) Distribution of *Myrmecophilus acervorum* (Panzer, 1799) (Orthoptera: Myrmecophilidae) in Poland. *Fragmenta Faunistica*, 65 (1), 55–68. DOI: 10.3161/00159301FF2022.65.1.055